# CHAPTER 1

## PRINCIPLES OF

**FLIGHT**

* **Airplane**
* **Four forces of flight**
* **Aerodynamics of Maneuvering Flight**
* **Stability**

1. One of the main functions of flaps during the Answer **(B)** is correct.

approach and landing is to **DISCUSSION:** Extending the flaps increases

the wing camber, the wing area (some types), and

* 1. Decrease the angle of descent without the angle of attack of the wing. This allows the wing increasing the airspeed. to provide the same amount of lift at a slower airspeed.
  2. Provide the same amount of lift at a slower.
  3. Decrease lift, thus enabling a steeper-than- normal approach to be mad.

1. The angle of attack of a wing directly controls the: Answer **(C)** is correct.

**DISCUSSION:** The angle of attack of an airfoil directly

* 1. Angle of incidence of the wing. Controls the distribution of pressure below and
  2. Amount of airflow above and below the wing. Above it . when a wing is at low but positive angle of
  3. Distribution of pressure acting on the wing. attack, most of the lift is due to the wing’s negative pressure (upper surface) and downwash.

**NOTICE:** Negative Pressure is any pressure less than atmospheric, and positive pressure is pressure greater than atmospheric.

1. Frost covering the upper surface of an airplane Answer **(B)** is correct.

wing usually will cause **DISCUSSION:** Frost on the surface of a wing interferes with the smooth flow of air over the wing

* 1. The airplane to stall at an angle of attack surface; i.e., parasite drag is increased.

that is higher than normal. The air flowing over the wing is thus disrupted and

* 1. The airplane to stall at an angle of attack stalls at a lower angle of attack (a higher speed) that is lower than normal. when there is frost on the wing surface.
  2. Drag factors so large that sufficient speed cannot be obtained for take-off

1. By changing the angle of attack of a wing, the pilot Answer **(A)** is correct.

can control the airplane’s **DISCUSSION:** The pilot can control the airplane’s lift, Airspeed, and drag by changing the angle of attack

* 1. Lift, airspeed, and drag. of the wing. As the angle of attack is increased, the
  2. Lift, airspeed, and CG lift increases to the critical angle of attack, airspeed
  3. Lift and airspeed, but not drag. decrease and induced drag increases with the increase in lift.

1. The angle of attack at which a wing stalls remains Answer **(A)** is correct.

constant regardless of **DISCUSSION:** The angle of attack at which a wing stalls is constant regardless of weight, bank, pitch, etc.

* 1. Weight, dynamic pressure, bank angle, or pitch attitude.
  2. Dynamic pressure, but varies with weight, bank angle, and pitch attitude.
  3. Weight and pitch attitude, but varies with dynamic pressure and bank angle.

1. Stall speed is affected by Answer **(A)** is correct.

**DISCUSSION:** Stall speed may vary under different

* 1. Weight, load factor, and power. circumstances. Factors such as weight, load factor,
  2. Load factor, angle of attack, and power. power, centre of gravity, altitude, temperature, and
  3. Angle of attack, weight, and air density the presence of snow, ice, or frost on the wings will affect an aircraft’s stall speed.

1. An airplane will stall at the same Answer **(A)** is correct

**DISCUSSION:** An airplane will always stall at the

* 1. Angle of attack regardless of the attitude same angle of attack. The airplane’s attitude with with relation to the horizon. relation to the horizon has no significance to the
  2. Airspeed regardless of the attitude with stall. relation to the horizon.
  3. Angle of attack and attitude with relation to the horizon.

1. In a rapid recovery from a dive, the effects of Answer **(A)** is correct.

load factor would causes the stall speed to **DISCUSSION:** In a rapid recovery from a dive, the load factor would be increased because of the

* 1. Increase. rapid change in the angle of attack, since gravity
  2. Decrease. and centrifugal force would prevent the airplane
  3. Not vary. from immediately altering its flight path. Because

the relative wind is opposite the flight path, the critical angle of attack will be reached at a higher airspeed.

1. The stalling speed of an airplane is most affected Answer **(C)** is correct.

by **DISCUSSION:** Indicated stall speed is most affected

by the gross weight and how it is distributed within

* 1. Changes in air density the airplane.
  2. Variations in flight altitude.
  3. Variations in airplane loading.

1. Recovery from a stall in any airplane becomes Answer **(A)** is correct.

more difficult when its **DISCUSSION:** The recovery from a stall in any airplane becomes progressively more difficult as the airplane’s

* 1. Centre of gravity moves aft. centre of gravity moves aft. This difficulty is due to the
  2. Centre of gravity moves forward. decreasing stability in pitch, which results in the
  3. Elevator trim is adjusted nose down. decrease of elevator effectiveness in lowering the nose.

1. In small airplanes, normal recovery from spins Answer **(B)** is correct.

may become difficult if the **DISCUSSION:** Because rotation is around the CG in spin with a rearward CG, the control arm at the rudder is

* 1. CG is too far rearward, and rotation is around sufficiently. shortened that it may make spin recovery

the longitudinal axis. difficult, if not impossible. intuitively, if there is too much

* 1. CG is too far rearward, and rotation is around weight near the tail it is also hard to get the nose down the CG. to produce an angle of attack below the critical angle.
  2. Spin is entered before the stall is fully developed.

1. Which statement is true relative to changing Answer **(B)** is correct.

angle of attack ? **DISCUSSION:** As the angle of attack is increased, up to the critical angle of attack, the greater the amount of

* 1. A decrease in angle of attack will increase lift is developed and the greater the induced drag. pressure below the wing, and decrease drag.
  2. An increase in angle of attack will increase drag.
  3. An increase in angle of attack will decrease. pressure below the wing, and increase drag.

1. To generate the same amount of lift as altitude is Answer **(C)** is correct.

increased, an airplane must be flown at **DISCUSSION:** At an altitude of 18,000 ft, MSL, the air has one-half the density of air at sea level. thus, in

* 1. The same true airspeed regardless of angle of order to maintain the same amount of lift as altitude attack. increases, an airplane must be flown at a higher true
  2. A lower true airspeed and a greater angle of airspeed for any given angle of attack. attack.
  3. A higher true airspeed for any given angle of attack.

1. As the angle of bank is increased, the vertical Answer **(A)** is correct.

component of lift **DISCUSSION:** In level flight, all lift is vertical (upwards). as bank is increased, however, a portion of the airplane’s

* 1. Decreases and the horizontal component of lift lift is transferred from a vertical component to a increases. horizontal component. thus the vertical component
  2. Increases and the horizontal component of lift the vertical component of lift decreases and the decreases. horizontal component of lift increases as the angle
  3. Decreases and the horizontal component of lift of bank is increased. remains constant.

1. Which is true regarding the forces acting on Answer **(C)** is correct.

an aircraft in a steady-state descent? The sum **DISCUSSION:** In any steady-state flight, whether

of all level flight, climbs, or descents, the sum of all

* 1. Upward forces is less than the sum of all forward forces is equal to the sum of all downward forces. rearward forces, and the upward forces equal
  2. Rearward forces is greater than the sum of all the rearward downward forces. forward forces.
  3. Forward forces is equal to the sum of all rearward forces.

1. What changes in airplane longitudinal control Answer **(B)** is correct.

must be made to maintain altitude while the **DISCUSSION:** As airspeed decreases, the airfoils

airspeed is being decreased? generate less lift. Accordingly, to maintain altitude, the angle of attack must be adjusted to compensate

* 1. Increase the angle of attack to produce for the decrease in lift. more lift than drag.
  2. Increase the angle of attack to compensate for the decreasing lift.
  3. Decrease the angle of attack to compensate for the increasing drag.

1. Which is true regarding the force of lift in steady, Answer **(B)** is correct

un-accelerated flight ? **DISCUSSION:** Different angles of attack provide different lift, any given angle of attack has a corresponding airspeed

* 1. At lower airspeed the angle of attack must be to provide sufficient lift to maintain altitude. less to generate sufficient lift to maintain

altitude.

* 1. There is a corresponding indicated airspeed required for every angle of attack to generate sufficient lift to maintain altitude.
  2. An airfoil will always stall at the same indicated airspeed; therefore, an increase in weight will require an increase in speed to generate sufficient lift to maintain altitude.

1. In theory, if the airspeed of an airplane is Answer **(C)** is correct.

double while in level flight, parasite drag will **DISCUSSION:** Tests shows that lift and drag vary as the

become square of the velocity. The velocity of the air passing

over the wing in flight is determined by the

* 1. Twice as great. airspeed of the airplane. Thus, if an airplane
  2. Half as great doubles its airspeed, lift and drag will be four
  3. Four times great times greater.(assuming that the angle of attack remains the same).

1. As airspeed decreases in level flight below that Answer **(B)** is correct.

speed for maximum lift/drag ratio total drag of an **DISCUSSION:** Total drag is at a minimum for the

airplane maximum lift/drag (L/Dmax) ratio at one specific

angle of attack and lift coefficient. As airspeed

* 1. Decreases because of lower parasite drag. decreases, the induced drag will increase
  2. Increases because increased induced drag. because a greater angle of attack is required to
  3. Increases because of increased parasite drag. maintain level The amount of induced drag varies inversely as the square of the airspeed.

1. In theory, if the angle of attack and other factors Answer **(C)** is correct.

remain constant and the airspeed is doubled, the **DISCUSSION:** If the angle of attack and other remain

lift produced at the higher speed will be factors remain constant, lift is proportional to the square of the airplane’s velocity For example, an

* 1. The same as the lower speed. airplane travelling at 200 kt. . has four times the lift
  2. Two times greater than at the lower speed. as the same airplane travelling at 100 knots.
  3. Four times greater than at the lower speed.

1. An aircraft wing is designed to produce lift Answer **(C)** is correct.

resulting from a difference in the **DISCUSSION:** An airplane’s lift is produced by a pressure differential resulting from relatively

* 1. Negative air pressure below and a vacuum lower (i.e., less than atmospheric) pressure above above the wing’s surface the wing and higher the wing and higher(i.e., greater
  2. Vacuum below the wing’s surface an greater than atmospheric) pressure below the wing’s surface. air pressure above the wing’s surface.
  3. Higher air pressure below the wing’s surface and lower air pressure above the wing’s surface.

1. Lift on a wing is most properly define as the Answer **(A)** is correct

**DISCUSSION:** Lift opposes the downward force

* 1. Force acting perpendicular to the relative of weight, is produced by the dynamic effect

wind. of the air acting on the wing, and acts perpendicular

* 1. Differential pressure acting perpendicular to to the relative wind through the wing’s centre of lift. the chord of the wing.
  2. Reduce pressure resulting from a laminar flow over the upper chamber of an airfoil which acts perpendicular to the mean camber.

1. (Refer to Figure 1 ) At an airspeed represented Answer **(B)** is correct

by point B, in steady flight, the pilot can **DISCUSSION:** Point B (Figure 1) is the intersection

expect to obtain the airplane’s maximum of the parasite and induced drag curves, which

is the point where the total drag is at its minimum

* 1. Endurance. (also known as the point of maximum L/D ratio).
  2. Glide range. L/D max is the airspeed at which the pilot of either
  3. Coefficient of lift. at jet or a propeller-driven airplane can expect to obtain that airplane’s.

1. ( Refer to Figure 1) At the airspeed Answer **(A)** is correct

represented by point A, in steady flight, the **DISCUSSION:** Point A (Figure 1 ) is at the minimum

airplane will point on the total drag curve. By definition, this is

the point of maximum L/D ratio. Note that airspeed

* 1. Have its maximum L/D ratio. is on the horizontal axis and drag is on the vertical axis.
  2. Have its minimum L/D ratio.
  3. Be developing its maximum coefficient of lift.

1. On a wing, the force of lift acts perpendicular to Answer **(B)** is correct.

and the force of drag acts parallel to the **DISCUSSION:** Lift acts perpendicular to the relative wind, which is opposite the flight path. Drag acts parallel to the

* 1. Chord line. flight path.
  2. Flight path
  3. longitudinal axis

1. Which statement is true regarding the opposing Answer **(A)** is correct.

forces acting on an airplane in steady-state level **DISCUSSION:** In steady-state level flight, the sum of the

flight? opposing forces is equal to zero.

* 1. These forces are equal.
  2. Thrust is greater than drag and weight and lift are equal
  3. Thrust is greater than drag and lift is greater than weight.

1. An airplane leaving ground effect will Answer **(B)** is correct

**DISCUSSION:** An airplane leaving ground effect

* 1. Experience a reduction in ground friction and (a height greater than the wingspan) will: require a slight power reduction. 1. Require an increase in angle of attack to
  2. Experience an increase in induced drag and maintain the same lift coefficient,

require more thrust. 2. Experience an increase in induced drag

* 1. Require a lower angle of attack to maintain the and thrust required,

same lift coefficient. 3. Experience a decrease in stability and a nose-up change in moment, and

4. Produce a reduction in static source pressure and increase in indicated airspeed.

1. To produce the same lift while in ground effect Answer **(A)** is correct.

as when out of ground effect, the airplane **DISCUSSION:** In ground effect, induced drag

requires decreases due to a reduction in wingtip vortices

(caused by a reduction in the wing’s downwash),

1. A lower angle of attack. which alters the span wise lift distribution and reduces
2. The same angle of attack. the induced angle of attack .Thus, The wing will require
3. A greater angle of attack. a lower angle of attack in ground effect to produce the same lift as when out of ground effect.
4. If the same angle of attack is maintained in Answer **(A)** is correct.

ground effect as when out of ground effect, **DISCUSSION:** In ground effect induced drag

lift will decreases due to a reduction in wingtip vortices

(caused by a reduction in the wing's downwash),

1. Increase, and induced drag will decrease. which alters the span wise lift distribution and reduces
2. Decrease, and parasite drag will increase. the induced angle of attack. Thus, if an airplane is
3. Increase, and induced drag will increase. brought into ground effect with a constant angle of attack, an increase in lift will result.
4. Longitudinal stability involves the motion of the Answer **(B)** is correct.

airplane controlled by its **DISCUSSION:** Longitudinal stability is the quality which makes an airplane stable about its lateral (i.e., pitch)

* 1. Rudder. axis. This motion is controlled by the elevators
  2. Elevator.
  3. Ailerons.

1. If the airplane attitude remains in a new position Answer **(A)** is correct.

after the elevator control is pressed forward and **DISCUSSION:** When an airplane’s attitude is momentarily

released, the airplane display displaced and it remains at its new attitude, it is said to have neutral longitudinal static stability. Longitudinal

* 1. Neutral longitudinal static stability. stability is the quality which makes an airplane
  2. Positive longitudinal static stability. stable about its lateral axis (pitch)
  3. Neutral longitudinal dynamic stability.

1. If the airplane attitude initially tends to return to Answer **(B)** is correct

its original position after the elevator control is **DISCUSSION:** When an airplane’s elevator control is

pressed forward and released, the airplane pressed forward and released and its attitude initially

displays tend to return to its original position, the airplane

displays positive static stability.

1. Positive dynamic stability.
2. Positive static stability.
3. Neutral dynamic stability.
4. If an airplane is loaded to the rear of its CG Answer **(B)** is correct.

range, it will tend to be unstable about it. **DISCUSSION:** As the CG is move rearward, it may move behind the centre of lift, in which case the airplane is said to have negative stability about its lateral axis. Recall that

* 1. Vertical axis. the CG should be forward of the centre of lift and that
  2. Lateral axis. the tail surface is designed to have negative lift.
  3. Longitudinal axis.

1. If airspeed is increased during a level turn, what Answer **(C)** is correct.

action would be necessary to maintain altitude? **DISCUSSION:** To compensate for the added lift what

the angle of attack would result if the airspeed were increased during a turn ,the angle of attack must be decreased, or the angle

* 1. And angle of bank must be decreased. of bank increased, to maintain a constant altitude.
  2. Must be increased or angle of bank decreased.
  3. Must be decreased or angle of bank increased.

1. If a standard rate turn is maintained, how long Answer **(B)** is correct.

would it take to turn 360° **DISCUSSION:** A standard rate turn is one during which the heading changes at a rate of 3°/sec. Thus, a 360°

* 1. 1 minute. turn would take 2min. (360°÷ 3°/sec = 120 sec.,
  2. 2 minutes. or 2 min)
  3. 3 minutes.

1. While maintaining a constant angle of bank and Answer **(B)** is correct.

decreased load factor. **DISCUSSION:** When in a constant bank in a coordinated turn, and increase in airspeed will decrease the rate of

* 1. Loss of the vertical component of lift turn . Because the bank is held constant, there will be no
  2. Loss of horizontal component of lift and the change in load factor. increase in centrifugal force.
  3. Rudder deflection and slight opposite aileron throughout the turn.

1. Why is it necessary to increase back elevator Answer **(A)** is correct.

pressure to maintain altitude during a turn? **DISCUSSION:** As you enter a turn, lift is divided into

to compensate for the horizontal and vertical components. This division reduces the amount of lift which is opposing weight

1. Loss of the vertical component of lift. and thus the airplane loses altitude unless additional
2. Loss of the horizontal component of lift and lift is created. This is done by increasing back elevator the increase in centrifugal force. pressure increase the angle of attack until the vertical
3. Rudder deflection and slight opposite aileron component of lift is equal to the weight to maintain throughout the turn. maintain altitude without a change in thrust.
4. To maintain altitude during a turn, the angle of Answer **(B)** is correct.

attack must be increased to compensate for the **DISCUSSION:** As you enter a turn, lift is divide into

decrease in the horizontal and vertical components. This division reduces the amount of lift which is opposing weight

* 1. Forces opposing the resultant component of and thus the airplane loses altitude unless additional drag. lift is created. This is done by increasing back elevator
  2. Vertical component of lift. pressure increase the angle of attack until the vertical
  3. Horizontal component of lift. component of lift is equal to the weight to maintain maintain altitude without a change in thrust.

1. The ratio between the total air load imposed on Answer **(A)** is correct

the wing and the gross weight of an aircraft in **DISCUSSION:** A load factor is the ratio of the total air load

flight is known as acting on the airplane to the gross weight of the airplane. For example, if the air load imposed on the wing is twice

* 1. Load factor and directly affects stall speed. the actual weight of the airplane, the load factor is said
  2. Aspect load and directly affects stall speed. to be 2Gs and the stall speed increase.
  3. Load factor and has no relation with stall speed.

1. Load factor is the lift generated by the wings of Answer **(A)** is correct.

an aircraft at any given time **DISCUSSION:** Since the load factor is the ratio between the total air load imposed on the wing and the gross weigh

* 1. Divide by the total weight of the aircraft. of the airplane, the load factor is the lift generated by the
  2. Multiplied by the total weight of the aircraft. wings divided by the total weight of aircraft. For example
  3. Divide by basic empty weight of the aircraft , an airplane weighing 2,000 lb. of the wings. Thus, the load factor of 2.0 would require 4,000 lb. of lift by the wings. Thus ,the load factor of 2.0 is equal to the 4,000 lb. of wing lift divided by the gross weight of 2,000 lbs.

1. For a given angle of bank, in any airplane, the Answer **(A)** is correct.

load factor imposed in a coordinated constant **DISCUSSION:** In any airplane at any airspeed, if a constant

altitude turn altitude is maintained during the turn, the load factor for a given degree of bank is the same, which is the resultant

* 1. Is constant and the stall speed increases. of weight and centrifugal force. Because of the increased
  2. Varies with the rate of turn. load factor in a turn the stall speed is also increased in
  3. Is constant and the stall speed decreases. proportion the square root of the load factor.

1. Airplane wing loading during a level coordinated Answer **(B)** is correct.

turn in smooth air depends upon the **DISCUSSION:** The load factor for a given airplane during a level coordinated turn is determined solely by the angle

* 1. Rate of turn. of bank.
  2. Angle of bank.
  3. True airspeed.

1. (Refer to figure 3) If an aircraft with a gross Answer **(B)** is correct.

weight of 3,000 pounds was subjected to a 60° **DISCUSSION:** In a constant-altitude, 60°bank turn, the

constant-altitude bank, the total load would be wings are loaded at 2 Gs. Therefore, the total load of a 3,000-lb. airplane is 6,000 lb. (3,000 x 2).

1. 3,000 pounds.
2. 6,000 pounds.
3. 12,000 pounds.
4. (Refer to figure 3) If the airspeed is increased Answer **(C)** is correct.

From 90 knots to 135 knots during a level 60° **DISCUSSION:** Since the only determinant of load factor

banked turn, the load factor will in level, coordinated turns is the amount of bank a change in airspeed does not change the load factor.

1. Increase as well as the stall speed. When airspeed is increased, however, the rate of
2. Decrease and the stall speed will increase. turn decreases and the radius of turn increases.
3. Remain the same but the radius of turn will increase.
4. Baggage weighing 90 pounds is placed in a Answer **(B)** is correct.

normal category airplane’s baggage compartment **DISCUSSION:** Since 90 lb. is less than the amount of which is placard at 100 pounds. If this airplane placard weight (100 lb), there is no problem with the

is subjected to a positive load factor of 3.5 Gs, weight. The positive load factor of 3.5 Gs is within the

the total load of the baggage would be normal operational limit of 3.8 Gs of normal category airplanes. The placard weight does not have to be

1. 315 pounds and would be excessive. divided by the design load factor of the airplane. When
2. 315 pounds and would not be excessive. 100 lb. was set as baggage limit in this particular case,
3. 350 pounds and would not be excessive. the designers recognized subjected to 3.8 Gs, i.e., 380 pounds. . The baggage weight of90 lb. is multiplied by

3.5 Gs to get a load of 315 pounds.

1. Which factor below is the best indication of Answer **(B)** is correct.

positive or negative Gs in an aircraft? **DISCUSSION:** Positive or negative load factor is mostly easily observed by considering how heavy or light

* 1. Change in the amount of pressure by the pilot you feel in the seat. This effect is one of the primary needed on the controls. considerations in the design of the structure for all
  2. Change in how heavy or light you feel in your airplanes. seat.
  3. Change in control-surface effectiveness.

1. (Refer to Figure 2) The acute angle A is the Answer **(B)** is correct.

Angle of **DISCUSSION:** The angle of attack is the acute angle

between the relative wind and the chord line of the

* 1. Incidence. wing.
  2. Attack.
  3. Dihedral.

1. The term “angle of attack” is defined as the angle Answer **(A)** is correct.

**DISCUSSION:** The angle of attack is the acute angle

* 1. Between the wing chord line and the relative between the relative wind and the chord line of the wind. wing.
  2. Between the airplane’s climb angle and the horizon.
  3. Formed by the longitudinal axis of the airplane and the chord line of the wing.

1. The angle between the chord line of an airfoil Answer **(B)** is correct.

and the relative wind is known as the angle of **DISCUSSION:** The angle of attack is the acute angle between the chord line of the wing and direction of wind.

* 1. Lift. the relative
  2. Attack.
  3. Incidence.

1. Angle of attack is defined as the angle between Answer **(A)** is correct.

the chord line of an airfoil and the **DISCUSSION:** The angle of attack is the angle between the chord line of the airfoil and the direction of the

* 1. Direction of the relative wind. relative wind.
  2. Pitch angle of an airfoil.
  3. Rotor plane of rotation.

1. Which statement relates to Bernoulli’s principle? Answer **(C)** is correct.

**DISCUSSION:** Bernoulli’s principle states in part that

* 1. For every action there is an equal and opposite the pressure of a fluid (liquid or gas) decreases at reaction. points where the speed of the fluid increases.
  2. An additional upward force is generated as the lower surface of the wing deflects air downward.
  3. Air travelling faster over the curved upper surface

of an airfoil causes lower pressure on the top surface.

1. An airplane said to be inherently stable will Answer **(B)** is correct.

**DISCUSSION:** A stable airplane will tend to return

* 1. Be difficult to stall. to the original condition of flight if disturbed by a force
  2. Require less effort to control. such as turbulent air. This means that a stable airplane
  3. Not spin. is easy to fly.

1. What determines the longitudinal stability of an Answer **(A)** is correct.

airplane? **DISCUSSION:** The location of the centre of gravity

with respect to the centre of lift determines to a great

* 1. The location of the CG with respect to the extent the longitudinal stability of an airplane. Centre of

centre of lift. gravity aft of the centre of lift will result in an undesirable

* 1. The effectiveness of the horizontal stabilizer, pitch-up moment during flight. An airplane with centre of rudder and rudder trim tab. gravity forward of the centre of lift will pitch down when
  2. The relationship of thrust and lift to weight power is reduced. and drag.

1. Changes in the centre of pressure of a wing Answer **(C)** is correct.

affect the aircraft’s **DISCUSSION:** The centre of pressure of an asymmetrical airfoil moves forward as the angle of attack is increased

* 1. Lift/drag ratio. and backward as the angle of attack is decreased. The
  2. Lifting capacity backward and forward movement of the point at which
  3. Aerodynamic balance and controllability. lift acts, affects the aerodynamic balance and the controllability of the aircraft.

1. What causes an airplane (except a T-tail) to pitch Answer **(B)** is correct.

nose-down when power is reduced and controls are **DISCUSSION:** The location of the centre of gravity with not adjusted? respect to the centre of lift determines to a great extent

the longitudinal stability of an airplane. centre of gravity

1. The CG shift forward when thrust and drag are aft of the centre of lift will result in an undesirable pitch- reduced. up moment during flight. an airplane with the centre of
2. The downwash on the elevators from the propeller gravity forward of the centre of lift will pitch down when slipstream is reduced and elevator effectiveness is power is reduced. This will increase the airspeed and the reduced. downward force on the elevators will bring the nose up
3. When thrust is reduced to less than weight, lift is , providing positive stability. The farther forward also reduced and the wings can no longer support

the weight.

1. An airplane has been loaded in such a manner Answer **(B)** is correct.

that the CG is located aft of the aft CG limit. One **DISCUSSION:** Loading in a tail-heavy condition can undesirable flight characteristic a pilot might reduce the airplane’s ability to recover from stalls and

experience with this airplane would be. Spins .tail-heavy loading also produces very light stick forces, making it easy for the pilot to inadvertently

* 1. A longer take off run. Overstress the airplane.
  2. Difficulty in recovering from a stalled condition.
  3. Stalling at higher-than-normal airspeed.

1. Loading an airplane to the most aft CG will cause Answer **(A)** is correct.

the airplane to be **DISCUSSION:** Loading in a tail-heavy condition can reduce the airplane’s ability to recover from stalls

* 1. less stable at all speeds. and spins. tail-heavy loading also produces very light
  2. less stable at slow speeds, but more stable at stick forces at making it easy for the pilot to high speed. Inadvertently all speed ,overstress the airplane.
  3. less stable at high speeds, but more stable at low speeds.

1. (Refer to Figure 3) If an airplane weights 4,300 Answer **(C)** is correct.

pounds, what approximate weight would the **DISCUSSION:** Use the following steps : airplane structure be required to support during

a 60°banked turn while maintaining altitude ? 1. Enter the chart at a 60°angle of bank

and proceed upward to the curved reference line.

* 1. 2,300 Pounds. From the point of intersection ,move to the left side of
  2. 3,400 Pounds. the chart and read a load factor of 2 Gs
  3. 8,600 Pounds. 2. Multiply the aircraft weight by the load factor: 4,300 x 2 = 8,600 lbs

or, Working from the table :

4,300 x 2.0 ( load factor ) = 8,600 lb

1. (Refer to Figure 3) If an airplane weighs 3,300 Answer **(C)** is correct.

pounds, what approximate weight would the **DISCUSSION:** Use the following steps : plane structure be required to support during a

30◦ banked turn while maintaining altitude ? 1. Enter the chart at a 60°angle of bank and proceed upward to the curved reference line. From the point of intersection ,move to the left side of

* 1. 1,200 the chart and read a load factor of 1.2 Gs
  2. 3,100
  3. 3,960 2. Multiply the aircraft weight by the load factor:

3,300 x 1.2 = 3,960 lbs

or, Working from the table :

3,300 x 1.154 (load factor) = 3,808 lbs Answer C is the closest.

1. (Refer to Figure 3) If an airplane weighs 4,500 Answer **(B)** is correct.

pound’s what approximate weight would the **DISCUSSION:** Use the following steps : airplane structure required to support during

a 45°banked turn while maintaining altitude ? 1. Enter the chart at a 45°angle of

to the curved reference line. From bank and proceed upward. the point of intersection move to the left side of the

* 1. 4,500 pounds. 2. Multiply the aircraft weight by the load factor:
  2. 6,700 pounds. 4,500 x 1.5 = 6,700 lbs
  3. 7,200 pounds. or, Working from the table :

4,500 x 1.141 (load factor) = 6,750 lbs Answer B is closest.

1. The amount of excess load that can be imposed Answer **(B)** is correct.

on the wing of an airplane depends upon the **DISCUSSION:** At slow speeds, the maximum available lifting force of the wing is only slightly greater than

* 1. Position on the CG. the amount necessary to support the weight of the
  2. Speed of the airplane. airplane. However, at high speeds, the capacity of
  3. Abruptness at which the load is applied. the elevator controls, or a strong gust, may increase the load factor beyond safe limits.

1. Which basic flight manoeuvre increases the load Answer **(B)** is correct.

factor on an airplane as compared to straight-and- **DISCUSSION:** A change in speed during straight flight level flight? will not produce any appreciable change in load, but

when a change is made in the airplane’s flight path,

* 1. Climbs. an additional load is imposed upon the airplane
  2. Turns. structure. This is particularly true if a change in direction
  3. Stalls. is made at high speed with rapid, forceful control

movements.

1. What force makes an airplane turn? Answer **(A)** is correct.

**DISCUSSION:** As the airplane is banked, lift acts

* 1. The horizontal component of lift. horizontally as well as vertically and the airplane
  2. The vertical component of lift. is pulled . around the turn
  3. Centrifugal force.

1. During an approach to a stall, an increased load Answer **(A)** is correct.

factor will cause the airplane to **DISCUSSION:** Stall speed increases in proportion to the square root of the load factor. Thus, with a

* 1. Stall at a higher airspeed. load factor will stall at a speed which is of 4, an
  2. Have a tendency to spin. aircraft double the normal stall speed.
  3. Be more difficult to control.

1. As altitude increase the indicated airspeed at Answer **(C)** is correct.

which a given airplane stalls in a particular **DISCUSSION:** An increase in altitude has no effect on the

configuration will indicated airspeed at which an airplane stalls at altitudes normally used by general aviation aircraft. This means

* 1. Decrease as the true airspeed decreases. that the same indicated airspeed should be maintained
  2. Decrease as the true airspeed increases. during the landing approach regardless of the elevation
  3. Remain the same regardless of altitude. or the density altitude at the airport of landing.

1. In what flight condition must an aircraft be placed Answer **(C)** is correct.

in order to spin ? **DISCUSSION:** A spin results when a sufficient degree of rolling or yawing control input is imposed

* 1. Partially stalled with one wing low. on an airplane in the stalled condition. If the wing
  2. In a steep diving spiral. is not stalled, a spin cannot occur.
  3. Stalled.

1. During a spin to the left, which wing(s) is/are Answer **(A)** is correct.

stalled ? **DISCUSSION:** One wing is less stalled than the other,

but both wings are stalled in a spin.

* 1. Both wings are stalled.
  2. Neither wing is stalled.
  3. Only the left wing is stalled

1. The angle of attack at which an airplane wing Answer **(C)** is correct.

stalls will **DISCUSSION:** When the angle of attack is increased to between 18°and 20°(critical angle of attack) on most

* 1. Increase if the CG is move forward. airfoils , the airstream can no longer follow the upper
  2. Change with an increase in gross weight. curvature of the wings because of the excessive change
  3. Remain the same regardless of gross weight. in direction .the airplane will stall if the critical angle of attack is exceeded. the indicated airspeed at which

stall occurs stall angle of attack is the same.

1. One of the main functions of flaps during approach Answer **(C)** is correct.

and landing is to **DISCUSSION:** Flaps increase drag, allowing the pilot to make steeper approaches without increasing

* 1. Decrease the angle of descent without increasing airspeed. the airspeed.
  2. Permit a touchdown at a higher indicated airspeed.
  3. Increase the angle of descent without increasing the airspeed.

1. What is one purpose of wing flaps ? Answer **(A)** is correct.

**DISCUSSION:** Flaps increase drag, allowing the pilot to

* 1. To enable the pilot to make steeper approaches make steeper approaches without increasing airspeed. to a landing without increasing the airspeed.
  2. To relieve the pilot of maintaining continuous pressure on the controls.
  3. To decrease wing area to vary the lift.

1. What must a pilot be aware of as a result of Answer **(B)** is correct.

ground effect ? **DISCUSSION:** The reduction of the wing-tip vortices , due to ground effect, alters the span wise lift

* 1. Wingtip vortices increase creating wake distribution and reduces the include angle of attack, turbulence problems for arriving and departing and induced drag causing.

aircraft

* 1. Induced drag decreases; therefore, any excess speed at the point of flare many cause considerable floating.
  2. A full stall landing will require less up elevator deflection than would a full stall when done free of ground effect.

1. Ground effect is most likely to result in which Answer **(B)** is correct.

problem ? **DISCUSSION:** Due to the reduced drag in ground effect, the airplane may seem capable of take-off well below the

* 1. Setting to the surface abruptly during landing. recommended speed. It is important that no attempt be
  2. Becoming airborne before reaching recommended made to force the airplane to become airborne with a Take-off speed. deficiency of speed. The recommended take-off speed is
  3. Inability to get airborne even through airspeed is necessary to provide adequate initial climb performance. sufficient for normal take-off needs.

1. What is ground effect ? Answer **(A)** is correct.

**DISCUSSION:** Ground effect is the result of the

* 1. The result of the interference of the surface of the interference of the surface of the Earth with the airflow earth with airflow patterns about an airplane patterns about an airplane.
  2. The result of an alteration in airflow patterns in- creasing induced drag about the wings of an air- plane
  3. The result of the disruption of the airflow patterns about the wings of an airplane to the point where the wings will no longer support the airplane in flight.

1. Floating caused by the phenomenon of ground Answer **(A)** is correct.

effect will be most realized during an approach to **DISCUSSION:** When the wing is at a high equal to its span, land when at the reduction in induced drag is only 1.4%. however, when

the wing is at a high equal to one-fourth its span, the reduction

* 1. Less than the length of the wingspan above the in induced drag is 23.5% and when the wing is at a height equal surface to one-tenth its span, the reduction in induced drag is 47.6%
  2. Twice than length of the wingspan above the surface.
  3. A higher-than-normal angle of attack.

1. When landing behind a large aircraft, which Answer **(A)** is correct.

procedure should be followed for vortex **DISCUSSION:** When landing behind a large aircraft, stay

avoidance ? at or above the large aircraft’s final approach path. Note its touch down point and land beyond it.

* 1. Stay above its final approach flight path all the way to touch down.
  2. Stay below and to one side of its final approach Flight path.
  3. Stay well below its final approach flight path and land at least 2,000 feet behind.

1. How does the wake turbulence vortex circulate Answer **(C)** is correct.

around each wingtip. **DISCUSSION:** The vortex circulation is outward, upward

, and around the wing tips when viewed from either

* 1. Inward, upward, and around each tip. ahead or behind the aircraft.
  2. Inward, upward, and counter clockwise.
  3. Outward, upward, and around each tip.

1. When talking off or landing at an airport where Answer **(C)** is correct.

heavy aircraft are operation, one should be **DISCUSSION:** Flight tests have shown that the vortices particularly alert to the hazards of wingtip vortices from large aircraft sink at a rate of about 400 to 500 feet because this turbulence tends to per minute. they tend to level off at a distance about 900

feet below the path of the generating aircraft.

* 1. Rise from a crossing runway into the take-off or landing path.
  2. Rise into the traffic pattern area surrounding the airport.
  3. Sink into the flight path of aircraft operation below the aircraft generating the turbulence.

1. The greatest vortex strength occurs when the Answer **(C)** is correct.

generating aircraft is **DISCUSSION:** The strength of the vortex is governed by the weight, speed and shape of the wing of the

* 1. Light, dirty, and fast. generating aircraft .the greatest vortex strength occurs
  2. Heavy, dirty, and fast. when the generating aircraft is heavy clean and slow.
  3. Heavy, clean, and slow.

1. Wingtip vortices created by large aircraft Answer **(A)** is correct.

tend to **DISCUSSION:** Flight tests have shown that the vortices

from large aircraft sink at a rate of about 400 to 500 feet

* 1. Sink below the aircraft tend to per minute .they tend to level off at a distance about 900
  2. Rise into the traffic pattern. feet below the path of the generating aircraft.
  3. Rise into the take-off or landing path of a crossing runway.

1. The wind condition that requires maximum caution Answer **(B)** is correct.

when avoiding wake turbulence on landing is a **DISCUSSION:** A tailwind condition can move the vortices of a preceding aircraft forward into the touchdown zone.

* 1. Light ,quartering headwind. A light quartering tailwind requires maximum caution.
  2. Light, quartering tailwind pilots should be alert to large aircraft upwind from
  3. Strong headwind. their approach and take off flight paths.

1. When landing behind a large aircraft, the pilot Answer **(A)** is correct.

should avoid wake turbulence by staying **DISCUSSION:** when landing behind a large aircraft stay at or above the large aircraft’s final approach path.

* 1. Above the large aircraft’s final approach path and Note its touchdown point and land beyond it. landing beyond the large aircraft ; touchdown point.
  2. Below the large aircraft ; final approach path and landing before the large aircraft’s touchdown point.
  3. Above the large aircraft’s final approach path and landing before the large aircraft’s touchdown point.

1. When departing behind a heavy aircraft, the Answer **(B)** is correct.

pilot should avoid wake turbulence by **DISCUSSION:** When departing behind a large aircraft,

manoeuvring the aircraft. note the large aircraft ; rotation point, rotate prior to it, continue to climb above it and request permission to

* 1. Below and downwind from the heavy aircraft. deviate upwind of the large aircraft’s climb path until
  2. Above and upwind from the heavy aircraft. turning clear of the aircraft wake.
  3. Below and upwind from the heavy aircraft.

1. The four forces acting on an airplane in flight Answer **(A)** is correct.

are **DISCUSSION:** lift, weight, thrust, and drag, are the four

basic aerodynamic forces acting on an aircraft in flight.

* 1. Lift, weight, thrust, and drag.
  2. Lift, weight, gravity, and thrust.
  3. Lift, gravity, power, and friction

1. What is the relationship of lift, drag, thrust, and Answer **(A)** is correct

weight when the airplane is in straight-and-level- **DISCUSSION:** Lift and thrust are considered positive

flight? force, while weight and drag are considered negative

* 1. Lift equals weight and thrust equals drag. force and the sum of the opposing forces is zero that is,
  2. Lift, drag, and weight equal thrust. lift = weight and thrust = drag
  3. Lift and weight equal thrust and drag.

1. What is the purpose of the rudder on an airplane ? Answer **(A)** is correct.

**DISCUSSION:** The purpose of the rudder is to control

* 1. To control yaw. yaw.
  2. To control overbanking tendency.
  3. To control roll.

1. When are the four forces that act on an airplane Answer **(A)** is correct.

in equilibrium ? **DISCUSSION:** in un-accelerated (steady state) flight the opposing forces are in equilibrium.

* 1. During un-accelerated flight.
  2. When aircraft is accelerating.
  3. When the aircraft is at rest on the ground.

1. What the relationship of lift , drag ,thrust ,and Answer **(A)** is correct

weight when the airplane is in straight-and-level **DISCUSSION:** the four aerodynamic forces are lift , weight , flight? Thrust , and drag . They are in equilibrium during straight and

level , un-accelerated flight ; lift equals weight and thrust

* 1. Lift equals weight and thrust equals drag. equals drag .
  2. Lift Drag and weight equal thrust.
  3. Lift and weight equal thrust and drag.

1. How will frost on the wings of an airplane Answer **(A)** is correct

affect take off performance ? **DISCUSSION:** Frost forms on airplane surfaces when the surface is at or below the dew point of the surrounding air and

* 1. Frost will disrupt the smooth flow of air over it will disrupt the smooth flow of air over the wings , adversely the wings, adversely affecting its lifting affecting its lifting capability .

capability

* 1. Frost will change the camber of the wing, increasing its lifting capability.
  2. Frost will cause the airplane to become airborne with a higher angle of attack, decreasing the stall speed

1. In what flight condition is torque effect the Answer **(A)** is correct

greatest in a single-engine airplane ? **DISCUSSION:** Torque effect is greatest in a single engine airplane during a low airspeed , high power flight condition .

* 1. Low airspeed, high power, high angle of attack
  2. low airspeed , low power, low angle of attack.
  3. High airspeed, high power, high angle of attack.

1. The left turning tendency of an airplane caused by Answer **(B)** is correct

P-factor is the result of the **DISCUSSION:** P-factor results from the descending propeller Blade on the right producing more thrust than the ascending

* 1. Clockwise rotation of the engine and the blade on the left . P-factor causes an airplane to yaw to the left propeller turning the airplane counter clockwise. when it is at high angles of attack .
  2. Propeller blade descending on the right, producing more thrust than the ascending blade on the left,
  3. Gyroscopic forces applied to the rotating propeller blades acting 90°in advance of the point the force was applied.

1. When does P-factor cause the airplane to Answer **(B)** is correct

yaw to the left ? **DISCUSSION:** Asymmetrical thrust occurs when an airplane is flown at a high angle of attack . This causes un even angle

* 1. When at low angles of attack. of attack between the ascending and descending propeller
  2. When at high angles of attack. blades . P-factor causes an airplane to yaw to the left when
  3. When at high airspeeds. It is at high angles of attack .

1. What determines the longitudinal stability Answer **(A)** is correct

of an airplane ? **DISCUSSION:** The position of the centre of gravity in relation to the centre of lift is a critical factor in longitudinal stability .

* 1. The location of the CG with respect of the centre of lift .
  2. The effectiveness of the horizontal stabilizer, rudder, and rudder trim tab.
  3. The relationship of thrust and lift to weight and drag.

1. (Refer to figure 3) If an airplane weighs 1,600 Answer **(B)** is correct

pounds, what approximate weight would the **DISCUSSION:** With a 60° bank , two G's are required to airplane structure be required to support during maintain level flight . This means the airplane's wings must a 60° banked turn while maintaining altitude? Support twice the weight of the airplane and its contents ,

although the actual weight of the airplane does not increase .

* 1. 2,300 pounds.
  2. 3,200 pounds.
  3. 2,600 pounds

1. (Refer to figure 3) If an airplane weighs 3,300 Answer **(C)** is correct

pounds, what approximate weight would the **DISCUSSION:** 3300 × 1.2 = 3960 lbs

airplane structure be required to support 1. Enter the table at a given bank angle ( 30°)

during a 30° banked turn while maintaining 2. Proceed vertically up to the reference line

altitude? 3. Proceed horizontally to the load factor

4. airplane weights × load factor =the airplane wings support

* 1. 1,200 pounds. 5. 3,300 × 1.2 = 3,960 lbs
  2. 3,100 pounds.
  3. 3,960 pounds.

1. (Refer to figure 3) If an airplane weighs 4,500 Answer **(B)** is correct pounds, what approximate weight would the **DISCUSSION:**

airplane structure be required to support banked 1. Enter the table at a given bank angles ( 45°)

during a 45° turn while maintaining altitude? 2. Proceed vertically up to the reference line

3. proceed horizontally to the load factor

* 1. 4,500 pounds 4. 4,500 × 1.5 = 6750 lbs
  2. 6,750 pounds
  3. 7,200 pounds

1. The amount of excess load that can be imposed Answer **(B)** is correct

on the wing of an airplane depends upon the **DISCUSSION:** The higher the airspeed , the greater the amount of excess load that can be imposed before a stall occurs . the

* 1. Position of the CG. Amount of excess load that can be imposed on an airframe
  2. Speed of the Airplane. depends on the airplane's speed .
  3. Abruptness at which the load is applied.

1. Which basic flight manoeuvre increases the load Answer **(B)** is correct

factor on an airplane as compared to straight- **DISCUSSION:** The load factor imposed on an airplane will

and-level flight? Increase as the angle of bank is increased .

* 1. Climbs.
  2. Turns.
  3. Stalls.

1. One of the main functions if flaps during Answer **( C )** is correct

approach and landing is to **DISCUSSION:** Flaps allows you to steepen the angle of descent on an approach without increasing airspeed .

* 1. Decrease the angle of descent without increasing the airspeed.
  2. Permit a touchdown at a higher indicated airspeed.
  3. Increase the angle of descent without increasing the airspeed.

1. What is one purpose of wing flaps ? Answer **(A)** is correct

**DISCUSSION:** An approach with full flaps permits you to fly

* 1. To enable the pilot to make steeper approaches slowly and at a fairly steep descent angle without gaining to a landing without increasing the airspeed. airspeed .
  2. To relive the pilot of maintaining continuous pressure on the controls.
  3. To decrease wing area to vary the lift.

1. In what flight condition must an aircraft be Answer **(C)** is correct

placed in order to spin ? **DISCUSSION:** To enter a spin , an airplane must first be stalled . in a spin , both wings are in a stalled condition .

1. Partially stalled with one wing low
2. In a steep diving spiral.
3. Stalled.
4. During a spin to the left which wing(s) Answer **(A)** is correct

is/are stalled ? **DISCUSSION:** In a spin , both wings are in a stalled condition .

1. Both wings are stalled.
2. Neither wing is stalled.
3. Only the left wing is stalled.
4. The angle of attack at which an airplane Answer **(A)** is correct

wing stall will **DISCUSSION:** If you load your airplane so the CG is forward of the forward CG limit , it will be too nose heavy . Although

* 1. Increase if the CG is moved forward this tends to make the airplane seem stable , adverse side
  2. Change with an increase in gross weight effects include longer take off distance and higher stalling
  3. Remain the same regardless of gross weight. speeds.

1. What is ground effect ? Answer **(A)** is correct

**DISCUSSION:** During take offs or landing**s ,** when you are

* 1. The result of the interference if the surface of the flying very close to the ground , the earth's surface interferes Earth with the airflow patterns about an airplane with the airflow and actually alters the three-dimensional
  2. The result of an alteration in airflow patterns airflow pattern around the airplane . This causes a reduction

Increasing induced drag about the wing of an in wingtip vortices and a decrease in up wash and downwash. airplane .

* 1. The result of the disruption of the airflow patterns about the wings of an airplane to the point where

the wings will no longer support the airplane in flight.

1. Floating caused by the phenomenon of ground Answer **(A)** is correct

effect will be most realized during an approach to **DISCUSSION:** an airplane is usually in ground effect land when at when it is less than the height of the airplane's wing

span above the surface .

1. Less than the length of the wingspan above the surface
2. Twice the length of the wingspan above the surface
3. A higher-than-normal angle of attack.
4. What must a pilot be aware of as a result Answer **(B)** is correct

of ground effect ? **DISCUSSION:** In ground effect , induced drag decreases , and excess speed in the flare may cause floating .

1. Wingtip vortices increase creating wake turbulence problems for arriving and departing aircraft.
2. Induced drag decreases; therefore any excess speed at the point of flare may cause considerable floating.
3. A full stall landing will require less up elevator deflection than would a full stall when done free of ground effect.
4. When taxing with strong quartering tailwind which Answer **(C)** is correct

aileron positions should be side **DISCUSSION:** the most critical situation is when you are taxiing a tricycle-gear airplane with a high wing in a

* 1. Aileron down on the downwind side strong quartering tail wind . Aileron down on the side
  2. Ailerons neutral from which the wind is blowing .
  3. Aileron down on the side from which the wind is Blowing .

1. What force provides the forward motion necessary Answer **(C)** is correct

to move a glider through the air ? **DISCUSSION:** In a descent , a component of weight (gravity) acts forward along the flight path .

1. Lift.
2. Centripetal Force.
3. Gravity.
4. Wing tip vortices have the highest intensity during: Answer **(A)** is correct

**DISCUSSION:** The strength of the tip vortices is proportionate to

* 1. Take-off. the angle of attack. At take-off the speed is very low requiring a
  2. Cruise. high Angle of attack to obtain lift, an angle larger than in a turn
  3. High speed. within limitations.

1. At the tip of the wing in level flight, the air flows: Answer **(B)** is correct

**DISCUSSION:** Air has a neutral tendency to stream from higher to

* 1. From the upper surface to the lower surface. lower pressure. The wing in level flight will have a low pressure
  2. From the lower surface to the upper surface and then on the top surface and a higher pressure on the bottom surface. down at the trailing edge. Consequently, there will be a flow from the lower surface to the
  3. From the lower surface to the upper surface and then upper surface. The air streaming over the wing because of the diverges away from the fuselage. motion has to be added giving the flow a swirling moment that

causes a downwash behind the wing.

1. When are the wing tip vortices created? Answer **(B)** is correct.

**DISCUSSION:** the tip vortices are formed when the pressure

* 1. When the airplane starts. difference between upper and lower surface of the wing exists,
  2. When the wing produces lift. which is when lift is produced.
  3. Only in airplanes with a short wing span.

1. A high aspect ratio wing produces: Answer **(A)** is correct.

**DISCUSSION:** At a given angle of attack, a higher aspect ratio

* 1. A decrease in induced drag. produces less induced drag for the same amount of lift.
  2. Less sensitivity to gust effects.
  3. A decrease in stall speed.

1. The principal cause of hazardous conditions associated Answer **(B)** is correct.

with the wake turbulence of large airplanes is the: **DISCUSSIO:** the danger associated with wake turbulence

is from the tip vortices that extend up to 9 NM behind the

1. High speed at which large aircraft operate. airplane.
2. Vortices generated at the wing tips.
3. Propeller or jet wash.
4. Vortex wake behind large airplane: Answer **(C)** is correct.

**DISCUSSION:** Trailing vortices tend to drift slowly downward

* 1. Stays at ground level. and level off between 500 and 1,000 feet below the flight path
  2. Gradually descends to ground level. of the aircraft.
  3. Gradually descends to a lower level.

1. During the take-off made behind a departing large airplane, Answer **(C)** is correct.

The pilot can minimise the hazard of wake turbulence by: **DISCUSSION:** The wake turbulence starts when the aircraft

rotates, and the vortices tend to drift downwards. To avoid

1. Extend the take-off roll and not rotating until well beyond encountering a preceding airplane's wake turbulence, take-off the jet's rotation point. should be before the other aircraft's rotation point and climb
2. Maintaining extra speed on take-off and climb out. Above its flight path.
3. Being airborne prior to reaching the jet's rotation point and climbing above its flight path.
4. Induced drag is greatest: Answer **(A)** is correct.

**DISCUSSION:** Induced drag associated with the production of

* 1. At the wingtip. lift. It is directly related to angle of attack and increases as
  2. At the wings root. angle of attack increases. Normally, induced drag decreases as
  3. At high speeds. airspeed increases.

1. For an aircraft in level flight, induced drag: Answer **(A)** is correct.

**DISCUSSION:** At a given angle of attack, a higher aspect ratio

* 1. Would be less if the aspect ratio was increased. produces less drag for the same amount of lift.
  2. Would be greater if the aspect ratio was increased.
  3. Would be less if the weight was increased.

1. Induced drag of an aircraft would be increased with: Answer **(B)** is correct.

**DISCUSSION:** Increased weight means increased lift required.

* 1. Increased speed. maintaining speed the only way to increase lift is to increase the
  2. Increased weight. angle of attack to get a higher value of lift coefficient.
  3. Increased aspect ratio.

1. Induced drag is caused by: Answer **(C)** is correct.

**DISCUSSION:** in aerodynamics, lift-induced drag, induced drag

* 1. Increased pressure at the leading edge stagnation point. vortex drag, or sometimes drag due to lift, is a drag force that occurs
  2. Wing mounted fuel tanks. Whenever a moving object redirects the airflow coming at it.
  3. Wing tip vortices and downwash. This drag force occurs in airplanes due to wings. With other Parameter remaining the same, as the angle of attack increases, Induced drag increases.

1. With flaps deployed, at a constant IAS in straight and Answer **(C)** is correct.

level flight, the magnitude of tip vortices: **DISCUSSION:** deployment of flaps increases coefficient of lift.

. to maintain level flight the wing angle of attack has to be decreased.

1. Increases. lower angle of attack means weaker tip vortices.
2. Increases or decreases depending upon the initial angle of attack.
3. Decreases.
4. What phenomena causes induced drag? Answer **(A)** is correct.

**DISCUSSION:** when you are flying in ground effect, the effects

* 1. Wing tip vortices. of up-wash, downwash, and wing tip vortices decrease. This
  2. Wing tanks. results in a reduction of induced drag.
  3. The increased pressure at the leading edge.

1. Which location on the aeroplane has the largest effect on the Answer **(C)** is correct.

induced drag. **DISCUSSION:** the wing tip vortices form as higher pressure air below the wing spills in to the area of lower pressure above the

* 1. Wing root junction. wing causing the airflow behind the wing to be forced downwards
  2. Engine cowling. (downwash). The downwash causes the airflow direction at the
  3. Wing tip. centre of pressure to be deflected and thus tilting the total reaction And the horizontal component – in opposite direction to the

moment is induced drag.

1. The relationship between induced drag and the aspect ratio is: Answer **(A)** is correct.

**DISCUSSION:** a decrease in aspect ratio means a larger

* 1. A decrease in the aspect ratio increases the induced drag. total drag and induced drag.
  2. There is no relationship.
  3. Induced drag = 1,3 aspect ratio value.

1. Induced drag at constant IAS is affected by: Answer **(B)** is correct.

**DISCUSSION:** the airplane weight is equal to the lift, and at a

* 1. Engine thrust. certain speed this means flying the certain angle of attack. more
  2. Aeroplane weight. weight at the same speed requires a larger angle of attack, and a
  3. Aeroplane wing location. larger angle of attack gives more induced drag.

1. The angle between the aeroplane longitudinal axis Answer **(A)** is correct.

and the chord line is the: **DISCUSSION:** Once the design of the wing is determined, the wing must be mounted on the airplane. Usually it

* 1. Angle of incidence. is attached to the fuselage with the chord line inclined upward
  2. Glide path angle. at a slight angle, which is called the angle of incidence.
  3. Angle of attack.

1. The term angle of attack is defined as: Answer **(B)** is correct.

**DISCUSSION:** The angle formed by the wing chord line and

* 1. The angle that determines the magnitude of the force. relative wind is called the angle of attack.
  2. The angle between the wing chord line and the relative wind.
  3. The angle between the relative airflow and the horizontal axis.

1. The airfoil chord is: Answer **(A)** is correct.

**DISCUSSION:** The chord line is an imaginary straight line drawn

* 1. A straight line from the wing leading edge to the trailing edge. through an airfoil from the leading edge to the trailing edge.
  2. A line equidistant from the upper and lower wing surfaces.
  3. A line tangential to the wing surface at the point of maximum curvature.

1. The angle between the chord line of the wing and the longitudinal Answer **(C)** is correct.

Axis of the airplane is known as the angle of: **DISCUSSION:** angle of incidence is the angle between the chord line and a line parallel to the longitudinal axis of an airplane.

* 1. Attack. you cannot control this angle.
  2. Relative wind.
  3. Incidence.

1. The aspect ratio of the wing: Answer **(B)** is correct.

**DISCUSSION:** Aspect ratio is the span of the wing, wingtip to

* 1. Is the ratio between the wingspan and the root chord. wingtip, divided by its average chord.
  2. Is the ratio between the wingspan and the mean geometric chord.
  3. Is the ratio between the tip chord and the wingspan.

1. Drag is acting in the direction of ……….; lift is Answer **(B)** is correct.

perpendicular to the…….. **DISCUSSION:** Lift is always perpendicular to the direction of movement and drag is in the opposite direction to the movement.

* 1. Chord line. Relative wind/airflow is the direction of movement.
  2. Relative wind (airflow).
  3. Horizon.

1. Bernoulli's theorem states: Answer **(B)** is correct.

**DISCUSSION:** Bernoulli's principle explains how air pressure

* 1. Dynamic pressure increases and static pressure increases. deceases as velocity increases.
  2. Dynamic pressure increases and static pressure decreases.
  3. Dynamic pressure is maximum at stagnation point.

1. The angle between the airflow (relative wind) and the Answer **(C)** is correct.

The chord line of an aerofoil is: **DISCUSSION:** The angle formed by the wing chord line and relative wind is called the angle of attack.

1. Climb path angle.
2. Glide path angle.
3. Angle of attack.
4. Which of the following statements are correct? Answer **(A)** is correct.

**DISCUSSION:** Lift is always perpendicular to the direction of

* 1. Drag acts in the same direction as the relative airflow movement and drag is in the opposite direction to the movement. and lift perpendicular to it. relative wind/airflow is the direction of movement.
  2. Lift acts at right angles to the top surface of the wing and drag acts at right angles to lift.
  3. Drag acts parallel to the chord and opposite to the direction of motion of the aircraft and lift acts perpendicular to the chord.

1. Dihedral of the wing is: Answer **(C)** is correct.

**DISCUSSION:** Dihedral is the upward angle of the airplane's

* 1. The angle between the leading 0,25 chord line of the wing wings with respect to the horizontal (lateral axis). and the vertical axis.
  2. The angle between the leading edge of the wing and the lateral axis.
  3. The angle between the plane of the wing and the lateral axis.

1. Which one of the following statements about Bernoulli's Answer **(C)** is correct.

theorem is correct? **DISCUSSION:** As the velocity of a fluid (air) increases, its internal pressure decreases.

1. The dynamic pressure is maximum in the stagnation point.
2. The dynamic pressure decreases as static pressure decreases.
3. The dynamic pressure increases as static pressure.
4. A wing has a span of 50 feet and an area of 200 square Answer **(A)** is correct.

feet . Its mean chord would be: **DISCUSSION:** From the formula wing area = span × chord, the chord can be found as: chord = area ÷ span = 200 ÷ 50 = 4

1. 4 feet
2. 10 feet
3. 7,5 feet.
4. Aspect ratio is: Answer **(C)** is correct.

**DISCUSSION:** aspect ratio is the span of the wing,

* 1. The ratio of the mean chord to the maximum wing thickness wingtip to wingtip ,divided by its average chord.
  2. The ratio of the wingspan to the square of the mean chord.
  3. The ratio of the wing span to the mean chord.

1. A wing has a span of 64 m and an area of 525 square metres. Answer **(C)** is correct.

The means chord is: **DISCISSION:** wing area is span multiplied by chord or S = b × c, Where “S’ is wing area, “b” the span, and “c” the mean chord. to

* 1. 7,8 m find the mean chord rewrite the equation to : c = S ÷ b, and in this
  2. 0,12m case: c = 525 ÷ 64 = 8,2
  3. 8,2 m.

1. A wing would be said to be swept back if: Answer **(C)** is correct.

**DISCUSSION:** The sweep angle is usually measured as

* 1. The wing tips were lower than the wing roots. the angle between the line of 25% chord and a perpendicular
  2. The tip chord was less than the root chord. to the root chord.
  3. The quarter chord line was inclined backward from the lateral axis.

1. A wing has a span of 30 m and an area 300 square metres. Answer **(A)** is correct.

The aspect ratio is: **DISCUSSION:** The aspect ratio of a wing is defined as

the ratio between wingspan and the average chord. the average

1. 3:1 chord is the same as the mean geometric chord. informally,
2. 10:1 a high aspect ratio indicates long, narrow wings, whereas a
3. 30:1 low aspect ratio indicates short, stubby wings.

Aspect ratio = (wingspan)² ÷ wing area or

aspect ratio = wing span ÷ mean chord. in this case we get AR = (30m)² ÷300m² = 900 ÷ 300 =3;1.

1. A wing has a mean chord of 6 metres and a span of 30 metres. Answer **(A)** is correct.

The aspect ratio is: **DISCUSSION:** The aspect ratio of a wing is defined as the ratio between wingspan and the average chord. The average chord is the

* 1. 5 to 1 same as the mean geometric chord. informally, a high aspect ratio
  2. 30 to 1 indicates long, narrow wing, whereas a low aspect ratio indicates
  3. 180 to 1 short, stubby wings.

AR = 30 m ÷ 6 m = 5:1.

1. A swept wing: Answer **(C)** is correct.

**DISCUSSION:** The sweptback and delta wings used on higher

* 1. Produces more lift at a given angle of attack than an performance aircraft are efficient at high speeds, so produces less equivalent straight wing. lift at a given angle of attack than an equivalent straight
  2. Reaches the critical angle of attack before an equivalent straight wing.
  3. Produces less lift at a given angle of attack than an equivalent straight.

1. Which of the following is the correct definition of Answer **(C)** is correct.

aspect ratio? **DISCUSSION:** aspect ratio is defined as the ratio between

span and average chord.

1. Span divided by tip chord.
2. Chord divided by span.
3. Span divided by mean chord.
4. The force, which acts at right angles to the relative airflow, is: Answer **(C)** is correct.

**DISCUSSION:** Of the offered choices the lift force is the only

* 1. Thrust one acting perpendicular to the relative airflow
  2. Total reaction.
  3. Lift.

1. Angle of attack of an aerofoil is: Answer **(B)** is correct

**DISCUSSION:** The angle formed by the wing chord line

* 1. The angle between the camber line and the relative airflow. and relative wind is called the angle of attack.
  2. The angle between the chord line and the relative airflow.
  3. The angle between the incidence line and the relative airflow.

1. Which ratio is defined as the ‘’aspect ratio” of a wing? Answer **(B)** is correct.

**DISCUSSION:** Aspect ratio is the relationship between

* 1. Ratio between wing span and gross wing area. the length and width of a wing
  2. Ratio between span and mean chord.
  3. Ratio between the span and the square of the gross wing area.

1. The characteristics of a “high aspect ratio” wing area: Answer **(A)** is correct.

**DISCUSSION:** In general, the higher the aspect ratio,

* 1. Short chord, long span. the higher the lifting efficiency of the wing. For example ,
  2. Long span, long chord. short chord and long span.
  3. Long chord, short span.

1. Bernoulli's theorem states that in a perfect and constant Answer **(A)** is correct.

airstream: **DISCUSSION:** Bernoulli's theorem states that, the sum of static and dynamic pressure is constant.

1. The sum of static and dynamic pressure is constant.
2. The dynamic pressure is equal to the static pressure.
3. The dynamic pressure is always greater than the static pressure.
4. Of the total lift produced by the wing: Answer **(C)** is correct.

**DISCUSSION:** The pressure distribution around a wing

* 1. The lower surface produces the greater proportion. profile is shown on the illustration. It is quite obvious that
  2. The upper and lower surfaces always give equal proportions the low pressure on the upper side is contributing more to of the lift. the lift than the high pressure below the wing.
  3. The upper surface produces the greater proportion at at all speeds.

1. Downwsh is: Answer **(C)** is correct.

**DISCUSSION:** As air flows towards an aerofoil producing lift it

* 1. The decreases in the angle of incidence from root to tip will be turned towards the lower pressure at the upper surface of the wing. (up-wash). After passing over the aerofoil the airflow returns to
  2. The higher speed airspeed behind the propeller. Its original position and state (down wash).
  3. The downward deflection of the airflow behind the wing.

1. As the air flows over the upper surface of a wing: Answer **(B)** is correct.

**DISCUSSION:** Because of the curvature of the wing the

* 1. Its speed increases and total pressure decreases. air on the top has to travel a longer distance. the speed
  2. Its speed increases and static pressure decreases. must therefore increase. According to Bernoulli’s equation,
  3. Its speed decreases and static pressure decreases. higher velocity means lower static pressure.

1. The angle of attack of a wing controls the: Answer **(C)** is correct.

**DISCUSSION:** The angle of attack determines the pressure

* 1. Amount of airflow. pressure distribution of positive and negative pressure acting
  2. Point at which the centre of gravity is located. on the wing.
  3. Distribution of positive and negative pressure acting on the wing.

1. At zero angle of attack in flight, a symmetrical wing section Answer **(C)** is correct.

will produce: **DISCUSSION:** A symmetrical aerofoil at α = 0° has a symmetrical pressure distribution which means no lift is

* 1. Some lift and drag. produced. However, there will still be a certain amount
  2. Zero lift with some induced and profile drag. of parasite drag (friction and form drag).
  3. Zero lift with some drag.

1. Which of the following statements about the lift to drag ratio Answer **(A)** is correct.

in straight and level flight is correct? **DISCUSSION:** When considering that in straight and level flight they must be equal to the weight and thus

* 1. At the highest value of the lift/drag ratio the total drag is lowest. constant, the highest value of L/D must be when
  2. The highest value of the lift/drag ratio is reached when the lift the total drag is at its minimum. is zero.
  3. The lift/drag ratio always increases as the lift decreases.

1. If the weight of an aircraft is increased, the maximum lift/drag Answer **(C)** is correct.

ratio will: **DISCUSSION:** The lift/drag ratio, two quantities

only depending on profile and aspect ratio. Consequently,

1. Decrease. the maximum value is independent of weight.
2. Increase.
3. Not be affected.
4. Lift of a wing is increased by: Answer **(B)** is correct.

**DISCUSSION:** In the lift equation, the density varies with

* 1. An increase in the temperature of the atmosphere. temperature, pressure and humidity. Higher temperature or higher
  2. An increase in the pressure of the atmosphere. humidity means decreased density and hence decrease in the lift
  3. An increase in the humidity of the atmosphere. when the other factors are unchanged. A higher pressure

means an increased density and increase lift.

1. The effect of increasing aspect ratio is to: Answer **(A)** is correct.

**DISCUSSION:** when the aspect ratio increasing, that causes

* 1. Increase the maximum lift/drag ratio. increase the maximum lift/drag ratio.
  2. Decrease the maximum lift/drag ratio.
  3. Not affect the maximum lift/drag ratio.

1. If the weight of the aircraft is increased, the maximum Answer **(C)** is correct.

lift/drag ratio will: **DISCUSSION:** However, to fly the maximum L/D means flying with a specific angle of attack, so a higher weight require a higher

* 1. Decrease. weight requires a higher speed to maintain the lift. The drag
  2. Increase. therefore also increases, but the L/D remains the same.
  3. Remain the same but occur at a higher speed.

1. Maximum glide distance of an aircraft is obtained when: Answer **(B)** is correct.

**DISCUSSION:** Maximum gliding distance is obtained when

* 1. Induced drag is equals the coefficient of lift. is L/D maximum, or where the total drag is minimum. This is
  2. Induced drag and parasite drag are equal. when induced and parasite drag are equal.
  3. Parasite drag is the least.

1. The effects of increased pressure would be: Answer **(A)** is correct.

**DISCUSSION:** Since the density of air is proportional with

* 1. Increased lift and drag. the static pressure an increase in pressure will increase
  2. Decreased lift and drag. the density; so increase lift and drag.
  3. Have no effect on lift and drag.

1. Coefficient of lift varies with: Answer **(C)** is correct.

**DISCUSSION:** Lift coefficient varies with angle of attack.

1. Pressure.
2. Density.
3. Angle of attack.
4. If indicated airspeed and angle of attack are kept constant Answer **(C)** is correct.

and density decreases, the lift: **DIASCUSSION:** From the lift equation it is evident, that if the IAS is is kept constant, the dynamic pressure is also constant. A

* 1. Increases. decrease in density at constant IAS means a higher TAS, but
  2. Decreases. the dynamic pressure remains the same. The lift coefficient
  3. Remain constant. depends on angle of attack, and the remains constant with unchanged angle of attack. in total , all factors in the formula (lift equation) are not changed and the lift remains constant.

1. A high aspect ratio wing: Answer **(B)** is correct.

**DISCUSSION:** The tip vortices of a high aspect ratio wing affect

* 1. Increase induced drag. a smaller proportion of the span so the overall change in downwash
  2. Decrease induced drag. will be less, giving a smaller rearward tilt to the lift force. induce
  3. Is structurally stiffer than a low aspect ratio. drag therefore decreases as aspect ratio increases.

1. As fuel is consumed during a level flight cruise at high level: Answer **(D)** is correct.

**DISCUSSION:** The fuel consumed will decrease the total weight

* 1. The angle of attack must be increased. of the aircraft. To maintain level flight the angle of attack can
  2. The stalling speed will increase. therefore be decreased which in turn decreases the induced drag.
  3. The centre of pressure will move forward.
  4. The angle of attack must be decreased.

1. Induced drag is created by the: Answer **(C)** is correct.

**DISCUSSION:** Induce drag is associated with the

* 1. Separation of the boundary layer over the wing. production of lift. It is directly related to angle of attack and
  2. Interference of the air stream between wing and fuselage. increases as angle of attack increases. such as, spanwise
  3. Span-wise flow pattern resulting in the tip vortices. flow pattern resulting in the tip vortices (induced drag).

1. At a constant IAS, induced drag is affected by: Answer **(A)** is correct.

**DISCUSSION:** Induced drag depends on the angle of attack, and

* 1. Aircraft weight. with a constant IAS in level flight the angle of attack is constant.
  2. Changes in thrust. however, if the weight changes the lift must be change
  3. Winglets. correspondingly by adjusting the angle of attack.

1. Which of the following is the cause of wing tip vortices? Answer **(B)** is correct.

**DISCUSSION:** On the upper side of the wing there is a lower

* 1. Air spilling from the top surface to the bottom surface at the static pressure the ambient pressure causing the airflow to move wing tip. toward the wing roots whilst the higher pressure underside gives
  2. Air spilling from the bottom surface to the top surface at the a movement towards the tip. At the wing tip the higher pressure wing tip. under the wing has a possibility of moves towards the lower
  3. Air spilling from the bottom surface to the top surface at the pressure on top, but adding the aircraft velocity results left wing tip and from the top. Surface to the bottom surface in a swirling motion creating the tip vortex.

at the right wing tip.

1. High aspect ratio: Answer **(B)** is correct.

**DISCUSSION:** An increase in aspect ratio means a smaller

* 1. Reduces parasite drag. total drag, because less induced drag exist.
  2. Reduces induced drag.
  3. Increases stalling speed.

1. Induced drag may be reduced by: Answer **(B)** is correct.

**DISCUSSION:** Increased aspect ratio thus means

* 1. An increase in the taper ratio of the wing. decreased induced drag.
  2. An increase in aspect ratio.
  3. A decrease of the aspect ratio.

1. The induced drag: Answer **(B)** is correct.

**DISCUSSION:** increased aspect ratio thus means

* 1. Increases as the lift coefficient increase. decreased induced drag.
  2. Increases as the aspect ratio increases.
  3. Has no relation to the lift coefficient.

1. A wing is said to be tapered if: Answer **(B)** is correct.

**DISCUSSION:** Taper ratio is defined as the root chord

* 1. It is inclined upwards from root to tip. divided by the tip chord. consequently, a tapered wing
  2. The chord at the wing tip is less than the chord at the root. will have a smaller chord at the tip than at the root.
  3. The incidence at the tip is less than at the root.

**INTENTIONALLY LEFT**

**BALNK**

# CHAPTER 2

## THE FLIGHT ENVIRONMENT

* **Safety of Flight**
* **Airports**
* **Airspace**
* **Radio Communications**
* **Radar and ATC Services**
  + 1. How can you determine If another aircraft is on a collision Answer **(C)** is correct.

course with your aircraft ? **DISCUSSIN:** Any aircraft that appears to have no relative motion and stays in one scan quadrant is likely to be on a

* + - 1. The other aircraft will always appear to get larger and collision course. closer at a rapid rate.
      2. The nose of each aircraft is pointed at the same point in space.
      3. There will be no apparent relative motion between your aircraft and the other aircraft.
    1. What preparation should a pilot make to adapt the eyes Answer **(C)** is correct.

for night flying ? **DISCUSSION:** Exposure to total darkness for at least 30 minutes is required for complete dark adaptation. Any degree of

* + - 1. Wear sunglasses after sunset until ready for flight. dark adaptation is lost within a few seconds of viewing a
      2. Avoid red lights at least 30 minutes before the flight. bright light. Red lights do not affect night vision.
      3. Avoid bright white lights at least 30 minutes before the flight.
    1. Except in Alaska, during what time period should lighted Answer **(C)** is correct.

position lights be displayed on an aircraft ? **DISCUSSION:** an aircraft must display lighted position lights from sunset to sunrise

1. End of evening civil twilight to the beginning of morning civil twilight.
2. 1 hour after sunset to 1 hour before sunrise.
3. Sunset to sunrise.
   * 1. During a night flight, you observe a steady red light and Answer **(A)** is correct.

a flashing red light ahead and at the same altitude. What is the **DISCUSSION:** Airplanes have a red light on the left wing tip, a general direction of movement of the other aircraft ? green light on the right wing tip and a white light on the tail.

The flashing and red light is the rotating beacon which can

1. The other aircraft is crossing to the left. be seen from all directions around the aircraft. If the only
2. The other aircraft is crossing to the right. steady light seen is red, then airplane is crossing from right to
3. The other aircraft is approaching head-on. the observing pilot.
   * 1. During a night flight, you observe a steady white light Answer **(A)** is correct.

and a flashing red light ahead and at the same altitude. **DISCUSSION:** Airplanes have a red light on the left wing tip, what is the general direction of movement of the other a green light on the right wing tip and a white light on the tail. aircraft ? The flashing and red light is the rotating beacon which can

be seen from all directions around the aircraft. when the

1. The other aircraft is flying away from you. only steady light seen is white, then the airplane is head
2. The other aircraft is crossing to the left. away from the observing pilot.
3. The other aircraft is crossing to the right.
   * 1. During a night flight, you observe steady red and green Answer **(C)** is correct.

lights ahead and at the same altitude. What is the general **DISCUSSION:** When both a red and green light of another of direction of movement of the other aircraft ? airplane are observed, the airplane would be flying in general

direction toward you. Airplanes have a red light on the left

1. The other aircraft is crossing to the left. wing tip, a green light on the right wing tip and a white light
2. The other aircraft is flying away from you. the tail.
3. The other aircraft is approaching head-on.
   * 1. The best method to use when looking for other traffic at Answer **(A)** is correct.

night is to **DISCUSSION:** During daylight, an object can be seen best by looking directly at it, but at night, a scanning procedure to

* + - 1. Look to the side of the object and scan slowly. permit “off-center” viewing of the object is more affective.
      2. Scan the visual field very rapidly. In addition, the pilot should consciously practice moving the
      3. Look to the side of the object and scan rapidly. eyes more slowly than in daylight to optimize night vision.

Off-center viewing must be utilized during night flying because of the distribution of rods and cones in the eye.

* + 1. The most effective method of scanning for other air- Answer **(C)** is correct.

craft for collision avoidance during nighttime hours is to use **DISCUSSION:** During daylight, an object can be seen best by

looking directly at it, but at night, a scanning procedure to

1. Regularly spaced concentration on the 3-, 9- and 12-o permit “off-center” viewing of the object is more effective. clock position In addition, the pilot should consciously practice moving the
2. A series of short, regularly spaced eye movements to search eye more slowly than in daylight to optimize night vision. each 30-degree sector Off-center viewing must be utilized during night flying because
3. Peripheral vision by scanning small sectors and utilizing of the distribution of rods and cones in the eye. off center viewing.
   * 1. What affect does haze have on the ability to see traffic of terrain Answer **(C)** is correct.

features during flight ? **DISCUSSION:** Atmospheric haze can create the illusion of being at a greater distance from objects on the ground and

* + - 1. Haze causes the eyes to focus at infinity. in the air.
      2. The eyes tend to overwork in haze and do not detect relative movement easily.
      3. All traffic or terrain features appear to be farther away than their actual distance.
    1. The most effective method of scanning for other aircraft for collision Answer **(B)** is correct.

avoidance during daylight hours is to use. **DISCUSSION:** Effective scanning is accomplished with a series of short, regularly spaced eye movements that bring successive

* + - 1. Regularly spaced concentration on the 3-, 9-, and 12-o’clock areas of the sky into the central visual field. Each movement positions. should not exceed 10°, and each area should be observed for
      2. A series of short, regularly spaced eye movements to search each at least one second to enable detection. 10-degree sector off center viewing.
      3. Peripheral vision by scanning small sectors and utilizing off center viewing.
    1. Which technique should a pilot use to scan for traffic to the right Answer **(A)** is correct.

and left during straight-and-level flight ? **DISCUSSION:** Effective scanning is accomplished with a series of short, regularly spaced eye movements that bring successive

* + - 1. Systematically focus on different segments of the sky for short areas of the sky into the central visual field. Each movement intervals. areas of the sky into the central visual field. Each movement
      2. Concentrate on relative movement detected in the peripheral at least one second to enable detection. vision area.
      3. Continuous sweeping of the windshield from right to left.
    1. Most midair collision accidents occur during Answer **(B)** is correct.

**DISCUSSION:** The ICAO near Mid-Air Collision Report indicates

* + - 1. Hazy days. that 81% of the incidents occurred in clear skies and unrestricted
      2. Clear days. visibility conditions.
      3. Cloudy nights.
    1. Prior to starting each maneuver, pilots should Answer **(B)** is correct.

**DISCUSSION:** Scanning the sky for other aircraft is a key factor

* + - 1. Check altitude, airspeed, and heading indications. in collision avoidance.
      2. Visually scan the entire area for collision avoidance.
      3. Announce their intentions on the nearest CTAF.
    1. What is the most effective way to use the eyes during Answer **(B)** is correct.

night flight ? **DISCUSSION:** During daylight an object can be seen best by looking directly at it, but at night a scanning procedure to

* + - 1. Look only at far away, dim lights permit “off-center” viewing of the object is more effective.
      2. Scan slowly to permit off center viewing. In addition, the pilot should consciously practice moving the
      3. Concentrate directly on each object for a few seconds. eyes more slowly than in daylight to optimize night vision.

off-center viewing must be utilized during night flying because of the distribution of rods and cones in the eye.

* + 1. When taxing with strong quartering tailwinds, which aileron Answer **(C)** is correct.

positions should be used ? **DISCUSSION:** Taxiing with a quartering tailwind provides the most hazardous conditions. In this case, the elevator should be

* + - 1. Aileron down on the downwind side. in the down position and the aileron on the upwind side should
      2. Ailerons neutral. also be in the down position to keep the wing from lifting.
      3. Aileron down on the side from which the wind is blowing.
    1. Which aileron positions should a pilot generally use when Answer **(A)** is correct.

taxing in strong quartering headwinds ? **DISCUSSION:** When taxiing a nose wheel aircraft in the presence of the moderate to strong winds, extra caution

* + - 1. Aileron up on the side from which the wind is blowing. should taken. For a quartering headwind, the elevator should
      2. Aileron down on the side from which the wind is blowing. be held in the neutral position, and the aileron on the upwind
      3. Ailerons neutral. side should be in the up position.
    1. When approaching to land on a runway served by a visual Answer **(B)** is correct.

approach slope indicator (VASI), the pilot shall **DISCUSSION:** An airplane approaching to land on a runway served by a visual approach indicator, shall maintain an altitude

* + - 1. Maintain an altitude that captures the glide slope at least 2 at or above the glide slope until a lower altitude is necessary miles downwind from the runway threshold. for a safe landing.
      2. Maintain an altitude at or above the glide slope.
      3. Remain on the glide slope and land between the tow-light bar.
    1. A slightly high glide slope indication from a precision approach Answer **(B)** is correct.

path indicator is **DISCUSSION:** The precision approach path indicator (PAPI) uses light units similar to the VASI but are installed in a single

* + - 1. Four white lights. row of either two or four light units. Four white lights means
      2. Three white lights and one red lights. you are above the glide slope, three white lights and one red
      3. Two white lights and two red lights. light means you are slightly high, two red and two white lights means you are on the glide slope, three reds and one white light means you are slightly low and four red lights means

you are below the glide slope .

* + 1. A below glide slope indication from a tri-color VASI is a Answer **(A)** is correct.

**DISCUSSION:** A tri-color VASI normally is a single light unit

* + - 1. Red light signal. projecting a three-color visual approach path. Below the glide
      2. Rink light signal. path is red, on the glide path is green, and above the glide path
      3. Green light signal. is amber.
    1. (Refer to figure 4) Illustration A indicates that the aircraft is Answer **(B)** is correct.

**DISCUSSION:** The two-bar VASI on-glide slope indication is red over white lights.

1. Below the glide slope.
2. On the glide slope.
3. Above the glide slope.
   * 1. (Refer to figure 4) VASI lights as shown by illustration C Answer **(B)** is correct.

indicate that the airplane is **DISCUSSION:** The two-bar VASI above-glide slope indication is white over white lights.

1. Off course to the left.
2. Above the glide slope.
3. Below the glide slope.
   * 1. (Refer to figure 4) While on final approach to a runway Answer **(B)** is correct.

equipped with a standard 2-bar VASI, the lights appear **DISCUSSION:** The below-glide slope indication from a two-bar as shown by illustration D. This means that the aircraft is VASI is red over red lights.

* + - 1. Above the glide slope.
      2. Below the glide slope.
      3. On the glide slope.
    1. An above glide slope indication from a tri-color VASI is Answer **(C)** is correct.

**DISCUSSION:** A tri-color VASI normally is a single light unit

A. A white light signal. projecting a three-color visual approach path. Below the glide

B. A green light signal. path is red, on the glide path is green, and above the glide path

C. An amber light signal. is amber.

* + 1. On a glide slope indication from a tri-color VASI is Answer **(B)** is correct.

**DISCUSSION:** A tri-color VASI normally is a single light unit

A. A white light signal. projecting a three-color visual approach path. Below the glide

B. A green light signal. path is red, on the glide path is green, and above the glide path

C. An amber light signal. is amber.

* + 1. A glide slope indication from a pulsating approach slope Answer **(C)** is correct.

indicator is a **DISCUSSION:** Pulsating visual approach slope indicators normally consist of a single light unit projecting a two-color

* + - 1. Pulsating white light. visual approach path. The below-glide path indication is red
      2. Steady white light. or pulsating red. The one-glide path indication is a steady
      3. Pulsating red light. White light for one type of system, while for another system it is an alternating red and with light.
    1. While operating in Class D airspace, each pilot of an aircraft Answer **(B)** is correct.

approaching to land on a runway served by a visual approach **DISCUSSION:** An airplane approaching to land on a runway slope indicator (VASI) shall serve by a visual approach indicator, shall maintain an

altitude at or above the glide slope until a lower altitude is

1. Maintain a 3° glide until approximately 1/2 mile to the runway necessary. before going below the VASI.
2. Maintain an altitude at or above the glide slope until a lower altitude is necessary for a safe landing.
3. Stay high until the runway can be reached in a power-off landing.
   * 1. An airport’s rotating beacon operated during daylight hours Answer **(B)** is correct.

indicates. **DISCUSSION:** In Class B, C, D or E airspace, operation of the

airport beacon during the hours of daylight often indicates that

1. There are obstructions on the airport. the weather in the airspace is below basic VFR weather
2. That weather at the airport located in class D airspace is below minimums (ground visibility is less than 3 miles and/or the basic VFR weather minimums. ceiling is less than 1,000 feet).
3. The Air Traffic Control tower is not in operation.
   * 1. Airport taxiway edge lights are identified at night by Answer **(B)** is correct.

**DISCUSSION:** A taxiway-edge lighting system consists of

* + - 1. White directional lights. Omni-directional blue lights which outline the usable limits
      2. Blue Omni-directional lights. of taxi paths.
      3. Alternate red and green lights.
    1. To set the high intensity runway lights on medium intensity Answer **(C)** is correct.

the pilot should click the microphone seven times, and the click it **DISCUSSION:** To save money at low-usage airports, pilot-

controlled lighting is installed. Key the mike seven times to

1. One time within four seconds. set the highest level, then adjust to medium with five clicks.
2. Three times within three seconds.
3. Five times within five seconds.
   * 1. A lighted heliport may be identified by a Answer **(A)** is correct.

**DISCUSSION:** A lighted heliport has a green, yellow and white

* + - 1. Green, yellow, and white rotating beacon. beacon flashing 30 to 60 times per minute. A flashing yellow
      2. Flashing yellow light. light identifies a lighted water port.
      3. Blue lighted square landing area.
    1. A military air station can be identified by a rotating beacon Answer **(B)** is correct.

that emits **DISCUSSION:** Military airport beacons flash alternately white and green, but are differentiated from civil beacons by dual-

* + - 1. White and green alternating flashes. peaked (two quick) white flashes between the green flashes.
      2. Two quick, white flashes between green flashes.
      3. Green, yellow, and white flashes.
    1. How can a military airport be identified at night ? Answer **(B)** is correct.

**DISCUSSION:** Military airport beacons flash alternately white

* + - 1. Alternate white and green light flashes. and green, but are differentiated from civil beacons by dual-
      2. Dual peaked (two quick) white flashes between peaked (two quick) white flashes between the green flashes. green flashes.
      3. White flashing lights with steady green at the same location.
    1. (Refer to Figure 6) Select the proper traffic pattern and Answer **(B)** is correct.

runway for landing. **DISCUSSION:** The small end of the tetrahedron points into the wind, indicating the direction of landing. The wind is coming

* + - 1. Left-hand traffic and Runway 18. from the southwest. However, The runway most nearly aligned
      2. Right-hand traffic and Runway 18. into the wind is closed (X), leaving RWY 18 as the most suitable
      3. Left-hand traffic and Runway 22. runway. The traffic pattern indicators on a segmented circle are used to indicate the direction of turns. The traffic pattern indicators

,shown as extensions from the segmented circle, present

the base and final approach legs. The traffic pattern indicator shows right traffic for RWY 18.

* + 1. (Refer to figure 6) If the wind is as shown by the landing Answer **(A)** is correct.

direction indicator, the pilot should land on **DISCUSSION:** The small end of the tetrahedron points into the wind indicating the direction of landing. landing to the

* + - 1. Runway 18 and expect a crosswind from the right. south or RWY 18, the pilot could expect a right crosswind.
      2. Runway 22 directly into the wind
      3. Runway 36 and expect a crosswind from the right.
    1. What does the outbound destination sign identify ? Answer **(B)** is correct.

**DISCUSSION:** Outbound destination signs provide information

* + - 1. Identifies entrance to the runway from a taxiway for locating the departure runway.
      2. Identifies direction to take-off runways.
      3. Identifies runway on which an aircraft is located.
    1. (Refer to figure 5) That portion of the runway identified Answer **(B)** is correct.

by the letter A may be used for **DISCUSSION:** Thresholds are marked at the beginning of a full-strength runway surface able to endure landing impacts

* + - 1. landing. or at a point on the runway which will encourage pilots to
      2. Taxiing and takeoff. avoid short approaches due to hidden noise or obstacle problems
      3. Taxiing and landing. Area A of ICAO figure 5 is marked with arrows which point to- wards a displaced threshold. Thus, the paved surface prior to

the threshold is available for taxi, takeoff and landing rollout, but not for touchdown.

1. (Refer to figure 5) According to the airport diagram, which Answer **(B)** is correct.

statement is true ? **DISCUSSION:** Thresholds are marked at the beginning of a full-strength runway surface able to endure landing impacts

* 1. Runway 30 is equipped at position E with emergency arresting or at a point on the runway which will encourage pilots to

gear to provide a means of stopping military aircraft. avoid short approaches due to hidden noise or obstacle problems.

* 1. Takeoffs may be started at position A or Runway 12, and the landing Area A of ICAO Figure 5 is marked with arrows which portion of this runway begins at position B. point towards a displaced threshold. Thus, the paved surface
  2. The takeoff and landing portion of Runway 12 begins at position B. prior to the threshold is available for taxi, takeoff and landing

rollout, but not for touchdown.

1. (Refer to figure 5) What is the difference between area A Answer **(A)** is correct.

and area E on the airport depicted ? **DISCUSSION:** The paved area behind the displaced threshold is available for taxiing, landing rollout, and takeoff. The stop-

* 1. “A” may be used for taxi and takeoff; “E” may be used only as way, extending beyond the usable runway, is unusable due an overrun. to the nature of its construction. Area E of ICAO Figure 5,
  2. “A” may be used for all operations except heavy aircraft landings; marked with chevrons, is used for overrun only. “E” may be used only as an overrun.
  3. “A” may be used only for taxing ;”E” may be used for all operations except landings.

1. (Refer to figure 5) Area C on the airport depicted is classified as a Answer **(C)** is correct.

**DISCUSSION:** An “X” painted on the end of runway means

* 1. Stabilized area. it is closed.
  2. Multiple heliport.
  3. Closed runway.

1. (Refer to figure 5) The arrows that appear on the end of the north/ Answer **(C)** is correct.

south runway indicate that the area **DISCUSSION:** The paved area behind the displaced runway threshold is available for taxiing, landing rollout, and the take-

* 1. May be used only for taxiing. off aircraft.
  2. Is usable for taxiing, takeoff, and landing.
  3. Cannot be used for landing, but may be used for taxiing and takeoff.

1. When approaching taxiway holding lines from the side with the Answer **(B)** is correct.

continuous line, the pilot **DISCUSSION:** When approaching the holding line from the side with the continuous lines, a pilot should not across the holding

* 1. May continue taxiing. line without ATC clearance at a controlled airport, or without
  2. Should not cross the lines without ATC clearance. making sure of adequate separation from other aircraft at
  3. Should continue taxiing until all parts of the aircraft uncontrolled airports. have crossed the lines.

1. What is the purpose of the runway/runway hold position Answer **(C)** is correct.

sign ? **DISCUSSION:** Mandatory instruction signs are used to denote n entrance to a runway or critical area and areas where an

* 1. Denotes entrance to runway from a taxiway. aircraft is prohibited from entering. The runway holding position
  2. Denotes area protected for an aircraft approaching or departing sign is located at the holding position on taxiways that

a runway. intersect a runway or no runways that intersect other runways.

* 1. Denotes intersecting runways.

1. The numbers 9 and 27 on a runway indicate that the runway Answer **(C)** is correct.

is oriented approximately **DISCUSSION:** The runway number is the whole number nearest one tenth magnetic azimuth of the centerline of the runway,

* 1. 009° and 027° true. measured clockwise from magnetic north. for example :
  2. 090° and 270° true. 272° = RWY 27;087° = RWY 9
  3. 080° and 260° magnetic

1. The numbers 8 and 26 on the approach ends of the runway Answer **(C)** is correct

indicate that the runway is oriented approximately **DISCUSSION:** The runway number is the whole number nearest

one tenth magnetic azimuth of the centerline of the runway,

1. 008° and 026° true. measured clockwise from magnetic north.
2. 080° and 260 °true.
3. 080° and 260° magnetic.
4. (Refer to the Runway Incursion Figure 8) You have requested Answer **(A)** is correct.

taxi instructions for takeoff using Runway 16. The controller **DISCUSSION:** When ATC clears an aircraft to “Taxi to” an issues the following taxi instructions : “N123, Taxi to runway 16” assigned takeoff runway, the absence of holding instructions where are you required to stop in order to be in authorizes the aircraft to “cross” all runways which the taxi

compliance with the controller's instructions ? route intersects except the assigned takeoff runway. It does not include authorization to “taxi onto” or “cross” the assigned

1. 5 (Five). takeoff runway at any point. You should taxi and hold short
2. 6(Six). of runway 16, which is position 5.
3. 9(Nine).
4. (Refer to figure 7) Which runway and traffic pattern should Answer **(C)** is correct.

be used as indicated by the wind cone in the segmented circle? **DISCUSSION:** The large end of the wind cone ( wind sock)

points into the wind. The wind cone in ICAO Figure 7

1. Right-hand traffic on Runway 9. indicates a wind from northwest landing into the wind can be
2. Right-hand traffic on Runway 18. accomplished on either Runway 27 or Runway 36. The traffic
3. Left-hand traffic on Runway 36. pattern indicators require right traffic to runway 27 and left traffic to Runway 36.
4. VFR approaches to land at night should be accomplished Answer **(C)** is correct.

**DISCUSSION:** Inexperienced pilots often have a tendency to

* 1. At a higher airspeed. make approaches and landings at night with excessive air-
  2. With a steeper descent. speed. Every effort should be made to execute the approach
  3. The same as during daytime. and landing in the same manner as during the day.

1. Which is the correct traffic pattern departure procedure to Answer **(C)** is correct.

use at a non-controlled airport ? **DISCUSSION:** In the case of an aircraft departing an airport without an operating control tower, comply with any ICAO

* 1. Depart in any direction consistent with safety, after crossing traffic pattern for that airport. the airport boundary.
  2. Make all turns to the left.
  3. Comply with any ICAO traffic pattern established for the airport

1. The recommended entry position to an airport traffic pattern is Answer **(B)** is correct.

**DISCUSSION:** The recommended entry position for an airport

* 1. 45° to the base leg just below traffic pattern altitude. traffic pattern is 45° to the midpoint of the downwind leg at
  2. To enter 45° at the midpoint of the downwind leg at traffic pattern traffic pattern altitude. altitude.
  3. To cross directly over the airport at traffic pattern altitude and join the downwind leg.

1. (Refer to figure 7) The segmented circle indicates that Answer **(A)** is correct.

the airport traffic is. **DISCUSSION:** The traffic pattern indicators on a segmented circle are used to indicate the direction of turns. The traffic

* 1. Left-hand for Runway 36 and right-hand for Runway 18. pattern indicators, shown as extensions from the segmented
  2. Left-hand for Runway 18 and right-hand for Runway 36. circle, represent the base and final approach legs.
  3. Left-hand for Runway9 and right-hand for Runway27.

1. (Refer to figure 7) The traffic patterns indicated in Answer **(C)** is correct.

the segmented circle have been arranged to avoid flights **DISCUSSION:** No flight cross the southeast area of the airport. over an area to the

* 1. South of the airport.
  2. North of the airport.
  3. Southeast of the airport.

1. (Refer to figure 7) The segmented circle indicates Answer **(A)** is correct.

that a landing on Runway 26 will be with a **DISCUSSION:** The large end of the wind cone ( wind sock) points into the wind. The wind cone in ICAO figure 7indicates

* 1. Right-quartering headwind. a wind from the northwest. When landing on RWY 26, this
  2. Left-quartering headwind. would be a right quartering headwind.
  3. Right-quartering tailwind.

1. When turning onto a taxiway from another taxiway, the Answer **(B)** is correct.

“taxiway directional sign” indicates **DISCUSSION:** Direction signs consist of black lettering on a yellow background. These signs identify the designations

* 1. Direction the take-off runway. Of taxiways leading out of an intersection. An arrow next to
  2. Designation and direction of taxiway leading each taxiway designation indicates the direction that an out of an intersection. aircraft must turn in order to taxi onto that taxiway
  3. Designation and direction of exit taxiway from runway.

55.(Refer to figure 12) Use the sign and taxiway diagram you are Answer **(B)** is correct.

approaching the intersection on taxiway 5 and see the sign at **DISCUSSION:** The taxiway diagram shows that taxiway 2 is the left of the intersection. Taxiway number 2 is identified as forward and to the left (Which is not to be confused with

directly to the left). The sign shows that the taxiway to the

1. A. forward left is taxiway foxtrot.
2. F.
3. T.
4. (Refer to figure 13).The taxiway ending marker Answer **(A)** is correct.

**DISCUSSION:** A taxiway ending marker sign consists of

* 1. Indicates taxiway does not continue. alternating yellow and black diagonal stripes. Taxiway
  2. Identifies area where aircraft are prohibited. ending marker signs indicate that the taxiway does not
  3. Provides general taxiing direction to named taxiway. continue beyond the sign.

1. (Refer to figure 16) The pilot generally calls ground control Answer **(C)** is correct.

after landing when the aircraft is completely clear of the **DISCUSSION:** The middle symbol is a runway boundary runway. This is when the aircraft. sign that has a yellow background with a black inscription

and graphic depicting the pavement holding position marking.

1. Passes the red symbol shown at the top of the figure. This sign, which faces the runway and is visible to the pilot
2. Is on the dashed-line side of the middle symbol. exiting the runway, is located adjacent to the holding
3. Is past the solid-line side of the middle symbol. position marking on the pavement. The sign is intended to provide you with another visual cue. to use as a guide to determine when you are clear of the runway. Thus, you are clear of the runway when you either airplane is on the solid

-line site of the holding marking.

1. (Refer to figure 16) The red symbol at the top would most Answer **(B)** is correct.

likely be found. **DISCUSSION:** The symbol at the top (red background with white inscription) is a mandatory instruction sign that prohibits

* 1. Upon exiting all runways prior to calling ground control an aircraft from entering an area. Typically, This sign
  2. At an intersection where a roadway may be mistaken is located on a taxiway intended to be used in only one directions as a taxiway. or at an intersection of vehicle roadways with runways,
  3. Near the approach end of ILS runways. taxiways or aprons where the roadway may be mistaken as a taxiway or other aircraft movement surface.

1. (Refer to figure 16) While clearing an active runway Answer **(C)** is correct.

you are most likely clear of the ILS critical area when you **DISCUSSION:** The bottom symbol is an ILS critical area pass which symbol ? boundary sign, which has a yellow background with a black

8inscription and graphic depicting the ILS pavement holding

1. Top red. position marking. The sign is located adjacent to the ILS holding
2. Middle yellow. position making on the pavement and can be seen by pilots
3. Bottom yellow. leaving the critical area. The sign is intended to provide you with another visual cue to use as a guide in deciding when you are clear of the ILS critical area.
4. (Refer to figure 16) When taxiing up to an active runway, Answer **(A)** is correct.

you are likely to be clear of the ILS critical area when short **DISCUSSION:** The bottom symbol is an ILS critical area boundary

of which symbol ? sign, which has a yellow background with a black inscription depicting the ILS pavement holding position marking.

1. Bottom yellow. The sign located adjacent to the ILS holding position marking
2. Top red. on the pavement and can be seen by pilots approaching the
3. Middle yellow. ILS critical area. Thus, you will be clear of the ILS critical area, when taxiing to an active runway, when short of the ILS critical area boundary sign.
4. (Refer to figure 16) which symbols does not directly Answer **(A)** is correct.

address runway incursion with other aircraft ? **DISCUSSION:** The symbol at the top (red background with white inscription) is a mandatory instruction sign that prohibits

* 1. Top red an aircraft from entering an area. Typically, This sign
  2. Middle yellow. is located on a taxiway intended to be used in only one directions
  3. Bottom yellow. or at an intersection of vehicle roadways with runways, taxiways or aprons where the roadway may be mistaken as a taxiway or other aircraft movement surface .Thus, it does not directly address runway incursion with other aircraft.

1. (Refer to figure 14) You are holding short for an intersection Answer **(B)** is correct.

departure on Runway 8 with the sign in front of you. After turning **DISCUSSION:** You would turn to the left because the runway onto the runway you should holding position sign shown in figure 14 shows the actual

runway layout. Therefore, you would turn away from the

1. Turn right. position of the runway designation on the sign just like
2. Turn left. you would If you were taxiing onto the end of the runway
3. Insufficient information is given. for takeoff.
4. (Refer to figure 17) Sign “1” is an indication Answer **(B)** is correct.

**DISCUSSION:** A taxiway ending marker sign consists of

* 1. Of an area where aircraft are prohibited. alternating yellow and black diagonal stripes. Taxiway ending
  2. That the taxiway does not continue. marker signs indicate that the taxiway does not continue
  3. Of the general taxiing direction to a taxiway. beyond the sign.

1. How can you determine if another aircraft is on a collision Answer **(C)** is correct.

course with your aircraft ? **DISCUSSION:** Any aircraft that appears to have no relative motion and stays in one scan quadrant is likely to be on a

* 1. The nose of each aircraft is pointed at the same point in space. collision course . Also if a target shows no lateral or vertical
  2. The other aircraft will always appear to get larger and closer at a Movements but increases in size, take evasive action. rapid rate.
  3. There will be no apparent relative motion between your aircraft and the other aircraft.

1. What is the general direction of movement of the other aircraft Answer **(A)** is correct.

during a night flight you observe a steady white light and a **DISCUSSION:** A steady white light is the tail light. The other rotating red light ahead and at your altitude ? The other aircraft is airplane is heading away from you. The rotating red light is

the beacon light. The red and green wingtip position lights

1. Headed away from you. cannot be seen from the rear.
2. Crossing to your left.
3. Approaching you head-on.
4. When in the vicinity of a VOR which is being used for navigation on Answer **(B)** is correct.

VFR flight, it is important to **DISCUSSION:** When operating VFR in highly congested areas

such as in the vicinity of a VOR that is being used for VFR

1. make 90° left and right turns to scan for other traffic. navigation, you should exercise constant vigilance to avoid
2. exercise sustained vigilance to avoid aircraft that may be converging aircraft that may be converging on the VOR from other on the VOR from other directions. directions.
3. pass the VOR on the right side of the radial to allow room for aircraft flying in the opposite direction on the same radial.
4. During a takeoff made behind a departing large jet airplane, the pilot Answer **(A)** is correct.

can minimize the hazard of wingtip vortices by **DISCUSSION:** When departing behind a larger aircraft, you should rotate prior to the larger aircraft’s rotation point and

* 1. Being airborne prior to reaching the jet’s flight path until able to turn climb above its climb path until turning clear of its wake. clear of its wake.
  2. Maintaining extra speed on takeoff and climb out.
  3. Extending the takeoff roll and not rotating until well beyond the jet’s rotation point.

1. To avoid possible wake turbulence from a large jet aircraft Answer **(A)** is correct.

that has just landed prior to your takeoff, at which point on the **DISCUSSION:** When taking off on a runway on which a large runway should you plan to become airborne ? jet aircraft has just landed, plan to become airborne past the

point where the jet touched down.

1. Past the point where the jet touched down.
2. At the point where the jet touched down, or just prior to this point
3. Approximately 500 feet prior to the point where the jet touched down.
4. Choose the correct statement regarding wake turbulence. Answer **(B)** is correct.

**DISCUSSION:** The usual hazard associated with wake turbulence

* 1. Vortex generation begins with the initiation of the takeoff roll. is the induced rolling movements, which can exceed
  2. The primary hazard is loss of control because of induced roll. the rolling capability of the encountering aircraft.
  3. The greatest vortex strength is produced when the generating air- plane is heavy, clean, and fast.

1. Which procedure should you follow to avoid wake turbulence Answer **(A)** is correct.

if a large jet crosses your course from left to right approximately **DISCUSSION:** To avoid the wake turbulence of a large jet at 1 mile ahead and at your altitude ? your altitude, you should increase your altitude slightly to

get above the flight path of the jet.

1. Make sure you are slightly above the path of the jet.
2. Slow your airspeed to VA and maintain altitude and course.
3. Make sure you are slightly below the path of the jet and perpendicular to the course
4. When landing behind a large aircraft, which procedure should be Answer **(A)** is correct.

followed for vortex avoidance ? **DISCUSSION:** When landing behind a large aircraft, stay above its final approach flight path all the way to touchdown ;i.e.,

* 1. Stay above its final approach flight path all the way to touchdown. touchdown beyond the touchdown point of the large aircraft.
  2. Stay below and to one side of its final approach flight path.
  3. Stay well below its final approach flight path and land at least 2,000 feet behind.

1. With respect to vortex circulation, which is true ? Answer **(C)** is correct.

**DISCUSSION:** In forward flight, helicopters produce a pair of

* 1. Helicopters generate downwash turbulence , no vortex circulation high velocity trailing vortices similar to wing tip vortices of
  2. The vortex strength is greatest when the generating aircraft is flying large fixed wing aircraft. fast.
  3. Vortex circulation generated by helicopters in forward flight trail behind in manner similar to wingtip vortices generated by airplanes.

1. Which is true with respect to vortex circulation ? Answer **(B)** is correct

**DISCUSSION:** The greatest vortex strength occurs when the

* 1. Helicopters generate downwash turbulence only not vortex circulation. generating aircraft is heavy ,clean, and slow
  2. The vortex strength is greatest when the generating aircraft is heavy , . clean and slow
  3. When vortex circulation sinks into ground effect, it tends to dissipate rapidly and offer little danger.

1. Who has the final authority to accept or decline any Answer **(C)** is correct.

“land and hold short” (LAHSO) clearance ? **DISCUSSION:** The pilot-in-command has the final authority to accept or decline any land and hold short (LAHSO) clearance

* 1. ATC tower controller. The safety and operation of the airplane remain the responsibility.
  2. Airplane owner/operator of the pilot. Pilots are expected to decline a LAHSO clearance if
  3. Pilot-in-command. they determine it will compromise safety.

1. When should pilots decline a “land and hold short” Answer **(A)** is correct.

(LAHSO) clearance ? **DISCUSSION:** The pilot in command has the final authority

to accept or decline any land and hold short (LAHSO) clearance.

1. When it will compromise safety. The safety and operation of the airplane remain the responsibility
2. If runway surface is contaminated. of the pilot. Pilots are expected to decline a LAHSO clearance if
3. Only when the tower controller concurs. they determine it will compromise safety.
4. What is the minimum visibility and ceiling required for a pilot Answer **(A)** is correct.

to receive a “land and hold short” clearance ? **DISCUSSION:** you should only receive a LAHSO clearance when there is a minimum ceiling of 1,ooo ft and 3 SM visibility.

* 1. 3 statute miles and 1,000 feet. The intent of having “basic” VFR weather conditions is to
  2. 3 nautical miles and 1,000 feet. allow pilots to maintain visual contact with other aircraft
  3. 3 statute miles and 1,500 feet. and ground vehicle operation.

1. Once a pilot-in-command accepts a “land and hold short” Answer **(A)** is correct.

(LAHSO) clearance, the clearance must be adhered to, just any **DISCUSSION:** If , for any reason, the pilot elects to request other ATC clearance, unless. to land on the full length of the runway, to land on another

runway, or to decline LAHSO, a pilot is expected to promptly

1. an amended clearance is obtained or an emergency occurs. inform air traffic, ideally even before the clearance is issued
2. the wind changes or Available Landing Distance decreases. A LAHSO clearance, once accepted must be adhered to, just as
3. Available Landing Distance decreases or density altitude increases. any other ATC clearance unless an amended clearance

obtained or an emergency occurs. A LAHSO clearance does not preclude a rejected landing.

1. When an aircraft is operating its secondary Surveillance Radar Answer **(A )** is correct.

In Mode C an air traffic controllers presentation gives information **DISCUSSION:** In mode C the altitude reporting facility transmits regarding the aircraft's indicated flight level that is accurate to information direct from a pressure altitude sensor (such as an within: encoding altimeter or air data computer). The altitude information

is relative to the 1013,25 hPa level (it is pressure altitude). The

1. ±50 ft. altitude information sent is in the hundreds of feet (= accuracy
2. ±75 ft. to ± 50 ft): for example an altitude on 35,064 ft will be encoded
3. ±100 ft. as ‘’ 351’’ = 35,100 ft ( rounded to the nearest hundred).
4. The accuracy of SSR height as displayed to the air traffic controller Answer **(B )** is correct.

is: **DISCUSSION:** In mode C the altitude reporting facility transmits

information direct from a pressure altitude sensor (such as an

1. ±25ft. encoding altimeter or air data computer). The altitude information
2. ±50ft. is relative to the 1013,25 hPa level (it is pressure altitude). The
3. ±75ft. altitude information sent is in the hundreds of feet (= accuracy to ± 50 ft): for example an altitude on 35,064 ft will be encoded as ‘’ 351’’ = 35,100 ft ( rounded to the nearest hundred).
4. The spacing between the two pulses transmitted by an SSR Answer **(B )** is correct.

interrogator decides: **DISCUSSION:** the pilot sets the transponder to the mode and code are instructed by ATC. If the transponder is set to the ‘’ON’’

* 1. The identification of that SSR. position, the unit will respond to mode A interrogations, providing
  2. What mode is used. only the identification code. If set to ‘’ALT’’ , the transponder will
  3. What service may be provided by the SSR. respond to mode A and C interrogations, sending identification code

+ automatic altitude information. The transponder's response will be in the form of a pulse train. This consists of two ‘’framing’’ pulses separated by 20.3µs. between those two framing pulses there

is a facility for up to13 coding pulses to be transmitted. Pulse ‘’X” is not used at this time, so only 12 pulses are available. The “A” pulses from the first digit of the four-figure code. “B” the second, “C” the third and “D” the fourth. Figure below shows the possible arrangement of A, B, C, and D pulses for sending the digits. For each of the 4 digits, by combining the pulses available there are 8 possibilities ranging from 0 to 7. This lead to a total 4096 selectable codes.

Excluding mode “S” there are 2 basic modes of transponder operation. Mode A and mode C. the signal received by the aircraft transponder includes coding of the mode in which the request is being mode – this coding consists of spacing of the first and the third pulse of the request pulse train. In mode A the spacing is 8µs while in mode C the spacing is 21µs. based on the received requested the transponder then sends the appropriate pulse train back to the ground interrogator. : in

mode A only the four digit identification code is sent, while in mode C both the four digit identification code as well as barometric altitude information is sent. In mode C the altitude reporting facility transmits information direct from a pressure altimeter sensor.

1. The selection of code 7600 on an aircraft SSR transponder indicates: Answer **(C)** is correct.

**DISCUSSION:** The special codes are as follows:

* 1. An emergency. Code 7500 = Unlawful interference
  2. Unlawful interference with the planned operation of the flight. Code 7600 = Radio failure
  3. Radio communication failure. Code 7700 = Emergency

Before departure the aircraft transponder equipment should beset to “SBY” (standby). The test function should then be activated in order to establish the operational status of the equipment. When instructed by ATC, set the mode and code given by ATC, and when told to “squawk” set the controller to ON or ALT as appropriate. In order to avoid causing interference, do not change the mode or code without first selecting STBY on the mode controller.

When in an abnormal situation, there are three codes that you may set to alert the ATC controllers. These codes have their predefined meaning and, with one of these selected, a signal indicating a special condition will be triggered on the controller's screen. The aircraft symbol may

change colour to attract his attention. On some radar systems, an audio alarm will be triggered together will the visual signal.

There are 3 other standardized transponder codes that the pilot can set in certain situations that are not considered abnormal:

* + 1. Code 0000 = transponder ( or altitude reporting) malfunction.
    2. Code 2000 = aircraft entering ATC airspace, but has not been assigned transponder code, or entering from a region where transponder operation was not required.
    3. Code 7000 = conspicuity code – when operating above FL 100 and specific transponder code has not been assigned.

For time to time the ATC controller may ask you to SQUAWK IDENT. By pushing the IDENT button, the transponder is activated to transmit the additional pulse. This is shown at the radar display as a flashing target. This function, when first enabled, will continue for approximately 20 seconds. Never pressing the IDENT button unless you are instructed to by the air traffic controller.

1. The ATC transponder system, excluding Mode S, contains: Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question #82

1. Four modes, each 1024 codes.
2. Two modes, each of 4096 codes.
3. Four modes, each 4096 codes.
4. why do clouds not appear on secondary radar screens: Answer **(C)** is correct

**DISCISSION:** The primary radar operates on the echo-principle:

* 1. Too high a frequency. ground radar facility transmits pulses of radio wave of radio wave
  2. Too low a frequency. That are reflected from the aircraft back to the radar facility. the
  3. The transmit and receive signals are on different frequency. pulses must have sufficient energy to travel to the aircraft and back

there is no equipment required on board the aircraft as the radio wave get reflected from the aircraft structure itself. The SSR works on the transponder principle: ground facility transmits pulses of radio waves to the aircraft. when these pulses are received by the aircraft

transponder, the transponder sends a response on a different frequency back to the ground facility. It is possible to determine the bearing and range of the target just like with the primary radar system. The main advantages of using SSR over the primary radar are the following:

* + 1. Target response is not dependent on target size, aspect, shape or material.
    2. Responses can be coded to carry identification and other related information – the ground facility can therefore receive a signal that clearly identifies a specific aircraft ( transponder codes) and if equipped with mode C also its altitude.
    3. As each signal (interrogation and response) has only one path to follow attenuation is considerably reduced and lower power out- put is required.
    4. Since the signals of the SSR are much stronger than those of primary radar this system also does not suffer from atmospheric attenuation or signal distortion such as from storms.

The practice the ATC uses both the primary and secondary radar systems together. Primary radar is a very useful equipment in determining the aircraft bearing and range, but it has limitations. For these reason the ATC uses both the primary and secondary radars – the SSR supplements the primary radar. When use in conjunction, the primary radar is more accurate in determining the bearing and range of the targets than the SSR, but the SSR provides multitude of additional information – the ATC controllers are therefore able to see the squawk code, flight level (provided by the transponder in mode C), ground speed calculated by the SSR ground facility based on the change of bearing of the aircraft and the call-sign (provided by the transponder in mode S or assigned by the ground facility to a specific squawk code). Some questions asks why the clouds do not appear on the SSR screens.

It is because the SSR dies not operate on the principle of echoes, but uses a different frequency for the interrogation signal and a different frequency for the response signal. If the interrogation signals gets reflected back to the radar facility from clouds, it will be ignored because it will not be at the correct listening frequency.

1. SSR is not affected by weather clutter because: Answer **(A)** is correct.

**DISCUSSION:** For explanation refer to question # 85.

1. It uses different frequencies for transmission and reception.
2. The wavelength is too short to be reflected from cloud droplets.
3. The equipment uses a moving target indicator.
4. What most affects the range available from a secondary radar? Answer **(C)** is correct.

**DISCUSSION:** The ground based SSR interrogators have a nominal

* 1. The transmission power of aircraft interrogator. range of around 200 NM. But the wave propagation is line of sight
  2. The transmission power of ground transponder. , therefore the height of the aircraft also determines the range
  3. The height of aircraft and height of ground interrogate.

1. Which one of the following is an advantage of a SSR when Answer **(B)** is correct.

compared to a primary radar system? **DISCUSSION:** For explanation refer to question # 85.

* 1. The relatively small ground antenna transmits no side lobes, thus eliminating the danger of false replies from the airborne transponder.
  2. The required power of transmission from the ground equipment is reduced.
  3. Possibility of obtaining speed information for aircraft within Rang

1. When both SSR and primary radar is presented on the controller's Answer **(C)** is correct.

display: **DISCUSSION:** For explanation refer to question # 85.

* 1. The SSR information is more accurate in bearing and distance.
  2. The primary radar information is superfluous.
  3. The primary radar information is more accurate in bearing and distance.

1. With regard to SSR: Answer **(B)** is correct.

**DISCUSSION:** SSR operates on secondary radar principles. SSR uses

* 1. The interrogator is on the ground and the transponder is on one ground based transmitter and receiver, called the interrogator, and on the ground. An airborne transmitter and receiver referred to as the ATC
  2. The interrogator is on the ground and the transponder is in transponder, or simply transponder. in the aircraft. The sequence of events is as follows;
  3. The interrogator is in the aircraft and the transponder is on 1. The ground interrogator transmits a pulse coded signal.

is on the ground. 2. The aircraft transponder responds by transmitting a pulse train back to the interrogator.

3. A receiver within the interrogator's beam receives these pulses and decodes them.

The pulse train contains information in accordance with the interrogator's pulse coded signal. SSR operates on two different frequencies: one on which the pulses are transmitted by the interrogator

and one on which the response pulses are received. All interrogations are transmitted at a frequency of 1030 MHz and all aircraft transponder responses are transmitted at a frequency of 1090 MHz. the SSR antenna consists of a radiator and reflector similar to that used in the primary radar but, because the return is much stronger than that of a primary radar reflection, it is much smaller.

1. Why is a secondary radar display screen free of storm clutter? Answer **(A)** is correct.

**DISCUSSION**: For explanation refer to question # 85

1. The principle of each return is not used is secondary radar.
2. The frequencies employed are too high to give returns from moisture sources.
3. A moving target indicator facility suppresses the display of static or near static returns.
4. When the ATC transponder ‘’IDENT’’ button is pressed by the Answer **(B)** is correct.

pilot: **DISCUSSION:** from time to time the ATC controller may ask you to SQUAWK IDENT. The IDENT function changes the appearance

* 1. The airplane's identification will be sent to all SSRs within of the aircraft target on the ATC controller's screen – the IDENT range. function helps the ATC controller to find your aircraft on his screen.
  2. The airplane's echo on the controller's display will flash or by pushing the IDENT button, the transponder is activated to

‘’fill in’’. transmit the additional pulse at the end of the normal response. pulse

* 1. Mode A will automatically be selected. train. this is shown at the radar display as a flashing target. This function, when first enabled, will continue for approximately 20 seconds. Never press the IDENT button unless you are instructed to by the air traffic controller

1. SSR in ATC use: Answer **(A)** is correct.

**DISCUSSION:** For explanation refer to question # 85.

1. In complementary to primary radar.
2. Suffers from greater attention (than primary radar) due to the higher frequency used.
3. Replaces primary radar.
4. Why is the effect of returns from storms not a problem with SSR? Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question # 85.

1. The frequency is too high.
2. SSR does not use the echo principle.
3. The PRF is jittered.
4. In the SSR response, the operation of the transponder IDENT button: Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question #92

1. Transmits the aeroplanes registration or flight number as a data Coded sequence.
2. Sends a special pulse after the normal response pulse train.
3. Sends a special pulse before the normal response pulse train.
4. A transponder capable of mode A or mode C operation only will: Answer **(B)** is correct.

**DISCUSSION:** Mode S is the most advanced mode of operation of

1. Not respond to interrogations made on mode S. aircraft SSR transponders. As we know the transponder in mode A
2. Respond to mode S interrogations but cannot send data. can only provide response including the aircraft identification (4-
3. Respond to mode S interrogations with limit data. digit transponder/ squawk code). Transponders in mode C, in addition

to the identification, can also provide an altitude information in the response. Transponders in mode S can provide all of this information

+ multitude of additional data, such as:

* + Call sign.
  + Specific aircraft identification/ registration address
  + Altitude information in 25 ft increments ( as opposed to 100 ft increments for mode C).

Mode S interrogator and receiver operate on the same frequency as standard SSR. the initial part of the interrogation signal is such that the standard SSR modes will be recognised by the normal airborne transponder unit. The second part of the mode S interrogation consists of a message of up to 112 data bits within which 24 bits are allocated to aircraft address. This permits the controller to interrogate a specific aircraft. If the controller wishes to address all the transponder equipped aircraft in range, a special feature known as SSR/mode S “ALL CALL” is broadcast at intervals. Normal SSR transponders respond to this in

Mode A or C. Mode S transponders will recognise the special character of the “ALL CALL” interrogation as a roll call request and will transmit a response which will include the aircraft's identity/ address along with details of the capability of the relevant on board equipment.

Since the SSR operation in mode S works on the principle of interrogating a specific aircraft, the problems of fruiting and garbling are also eliminated.

When an interrogation in mode S is received by an aircraft equipped by a transponder operating only in modes A or C, the transponder will return a correct response, but only in mode A or C, depending on its capabilities, without the additional data provided by mode S transponders. If an interrogation in mode A or C is received by a mode S transponder, it will return a correct response in the respective mode A or C.

1. A mode S transponder will: Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question #96.

1. Not respond to interrogations made on mode A.
2. Respond to normally to mode A or C interrogations.
3. Respond to mode A interrogations but not mode C.
4. The selection of code 7700 on an aircraft SSR transponder indicates: Answer **(A)** is correct.

**DISCUSSION:** The special codes are as follows:

* 1. An emergency. Code 7500 = Unlawful interference.
  2. Radio communication failure. Code 7600 = Radio failure
  3. Unlawful interference with the planned operation of the flight. Code 7700 = Emergency.

1. The code transmitted by a SSR transponder consists of: Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question #82

1. Phases differences.
2. Pulses.
3. Frequency differences.
4. Amplitude differences.
5. Which one of the following switch positions should be Answer **(B)** is correct.

used when selecting a code on the transponder? **DISCUSSION:** For explanation refer to question #83.

1. NORMAL.
2. STBY (standby).
3. IDENT (identification).
4. With regard to the advantages of SSR which of the Answer **(D)** is correct.

following statements is correct? **DISCUSSION:** For explanation refer to question # 85.

* 1. Little power is required to enable a relatively long range.
  2. No aircraft manoeuvres are necessary for identification.
  3. Range, bearing and height can be calculated from reply signals.
  4. All of the above.

1. With SSR, interrogation and response signals: Answer **(C)** is correct.

**DISCUSSION:** For explanation refer to question #90.

1. Are separated by 63 MHZ.
2. Must be set by the pilot but are always 60 MHZ apart.
3. Are standard frequencies separated by 60 MHZ.
4. Which of the following statements regarding Mode S is most Answer **(C)** is correct.

correct: **DISCUSSION:** For explanation refer to question #96.

* 1. Mode S is used to assist in GPS calculations.
  2. Mode S transponders are used with the radio altimeters.
  3. Mode S transponders reduced R/T traffic and also provide the aircraft with the data link facility.

1. Which statement regarding Mode S transponders is most correct? Answer **(A)** is correct.

**DISCUSSION:** For explanation refer to question #96.

1. Mode S transponders reduced RT traffic and provide a data link facility.
2. Mode S transponders are used with TCAS III.
3. Mode S transponders are used to assist GPS positioning.
4. Data transmission and exchange is conducted in: Answer **(C)** is correct.

**DISCUSSION:** For explanation refer to question #96.

1. Mode A.
2. Mode C.
3. Mode S.
4. A secondary radar can provide up to 4.096 different codes. These Answer **(C)** is correct.

4.096 codes can be used in: **DISCUSSION:** For explanation refer to question #82

1. Mode C and A only.
2. Mode S only.
3. All modes.
4. In SSR, the interrogation use different modes. If altitude reporting Answer **(C)** is correct.

is required, the aeroplane's transponder should be set to ‘’ALT’’ **DISCUSSION:** For explanation refer to question #82. and will respond to:

* 1. Mode C interrogation only.
  2. Mode A interrogation only.
  3. Mode C and A interrogations.

1. What SSR modes are frequently in use by ATC? Answer **(C)** is correct.

**DISCUSSION:** For explanation refer to question #82.

1. Mode S and mode D.
2. Mode A and mode B.
3. Mode A and mode C.
4. In special condition signals, to signify radio failure, which Answer **(C)** is correct.

of the following codes should you select on your transponder? **DISCUSSIOON:** The special codes are as follows:

Code 7500 = unlawful interference.

1. 7700. Code 7600 = Radio failure
2. IDENT. Code 770 = Emergency.
3. 7600.
4. which of the following equipment works on the interrogator/ Answer **(A)** is correct.

transponder principle? **DISCUSSION:** For explanation refer to question #85.

* 1. Secondary Surveillance Radar (SSR).
  2. Global Positioning System (GPS).
  3. Airborne Weather Radar (AWR)

1. On a typical computer generated SSR display the following Answer **(A)** is correct.

data on a particular flight will be shown: **DISCUSSION**: For explanation refer to question #85.

* 1. Squawk code, flight level, ground speed and airborne call-sign.
  2. Destination, flight level, ground speed and airborne call-sign.
  3. Squawk code, magnetic heading, ground speed and airborne call-sign.

1. A radar which employs an interrogator/transponder Answer **(C)** is correct.

technique is: **DISCUSSION:** For explanation refer to question # 85.

* 1. Primary radar.
  2. Continuous wave radar.
  3. Secondary radar.

1. The two main design functions of Secondary Surveillance Radar Answer **(C)** is correct.

(SSR) mode S are: **DISCUSSION:** For explanation refer to question #96.

* 1. The elimination of ground to air communications and the introduction of automatic separation between aircraft using TCAS II.
  2. Collision avoidance using TCAS II and improved long

range communication capability.

* 1. Air to ground and ground to air data link communications and improved ATC aircraft surveillance capability.

1. The availability of 4096 codes in SSR is applicable to mode: Answer **(D)** is correct.

**DISCUSSION:** For explanation refer to question #82.

1. A.
2. C.
3. S.
4. All answer are correct.
5. When a mode C interrogation is responded to, vertical position Answer **(C)** is correct.

of the aircraft is coded and transmitted. This vertical position **DISCUSSION:** For explanation refer to question #82. is referred to:

* 1. The sub-scale of the altimeter.
  2. Area QNH.
  3. 1013,2 hPa.

1. The selection of code 2000 on an aircraft SSR transponder Answer **(C)** is correct.

indicates: **DISCUSSION:** For explanation refer to question #83.

* 1. Unlawful interference with the planned operation of the flight.
  2. Transponder malfunction.
  3. Entry into airspace from an area where SSR operation has not been required.

1. The selection of code 7500 on an aircraft SSR transponder Answer **(A)** is correct.

indicates: **DISCUSSION:** The special codes are as follows:

Code 7500 = Unlawful interference.

1. Unlawful interference with the planned operation of the Code 7600 = Radio failure. flight. Code 7700 = Emergency.
2. An emergency.
3. Transponder malfunction
4. When mode C is selected on the aircraft SSR transponder the Answer **(C)** is correct.

additional information transmitted is: **DISCUSSION:** For explanation refer to question #82.

* 1. Height based on QFE.
  2. Altitude based on regional QNH.
  3. Flight level based on 1013,25 hPa.

1. What information may be displayed on an ATC radar screen Answer **(A)** is correct.

connected only to a primary radar system? **DISCUSSION:** In practice the ATC uses both the primary and secondary radar systems together. Primary radar is a very useful

* 1. Aircraft position only. equipment in determining the aircraft bearing and range, but it has
  2. Aircraft position and SSR code. limitations – for example, if the target is too small, targets can not be
  3. Aircraft position, SSR code and altitude. directly identified as a specific aircraft or the radar signals suffer

attenuation due to adverse weather such as storms. For these reasons the ATC uses both the primary and secondary radars- the SSR supplements the primary radar. When used in conjunction, the primary radar is more accurate in determining the bearing and range of the targets than the SSR, but the SSR provides multitude of additional information – the ATC controllers are therefore able to see the squawk code (transponder code), flight level (provided by the transponder in mode C), ground speed calculated by the SSR ground facility based on the change of bearing of the aircraft and a call sign ( provided by the transponder in mode S or assigned by the ground facility to a specific squawk code).

1. Selection of mode C on the SSR provides ATC with Answer **(C)** is correct.

information based on: **DISCUSSION:** For explanation refer to question #82.

* 1. Aircraft height above the QFE.
  2. Aircraft altitude as indicated in the captains altimeter.
  3. Aircraft pressure altitude.

1. Consider the following statements on SSR mode S: Answer **(D)** is correct.

**DISCUSSION:** For explanation refer to question #96.

1. Mode S will have the ability to transmit short messages from the ground to a particular aircraft.
2. A mode S interrogator, when installed, will also collect data from old mode A and C transponders.
3. Mode S will be able to address any particular of some 16 million aircraft.
4. All statements are correct.
5. In order to indicate radio failure the aircraft SSR Answer **(B)** is correct.

transponder should be selected to code: **DISCUSSION:** The special codes are as follows: Code 7500 = unlawful interference.

* 1. 7000. Code 7600 = Radio failure
  2. 7600. Code 7700 = Emergency.
  3. 7500.

1. The SSR code for a total radio failure is: Answer **(B)** is correct.

**DISCUSSION:** The special codes are as follows:

* 1. 7500. Code 7500 = unlawful interference
  2. 7600. Code 7600 = Radio failure
  3. 7500 plus mode C. Code 7700 = Emergency

1. In order to indicate unlawful interference with the planned Answer **(B)** is correct.

operation of the flight, the aircraft SSR transponder **DISCUSSION:** The special codes are as follows: should be selected to: Code 7500 = unlawful interference

Code 7600 = Radio failure

1. 7600. Code 770 = Emergency.
2. 7500.
3. 7700.
4. If an aircraft is hijacked it is recommended that the Answer **(B)** is correct.

pilot set transponder code: **DISCUSSION:** The special codes are as follows: Code 7500 = unlawful interference

* 1. 7700. Code 7600 = Radio failure
  2. 7500. Code 7700 = Emergency.
  3. 7600.

1. In order to indicate an emergency situation, the aircraft Answer **(C)** is correct.

SSR transponder should be set to: **DISCUSSION:** The special codes are as follows: Code 7500 = unlawful interference

* 1. 7600 Code 7600 = Radio failure
  2. 7500 Code 7700 = Emergency.
  3. 7700

1. What is the maximum number of usable SSR transponder Answer **(A)** is correct.

codes? **DISCUSSION:** For explanation refer to question #82.

* 1. 4096
  2. 3600
  3. 1000

1. The SSR conspicuity code is: Answer **(A)** is correct.

**DISCUSSION:** For explanation refer to question #83.

1. 7000
2. 2000
3. 0033
4. Which one of the following SSR codes should be used Answer **(C)** is correct.

by aircraft entering airspace from an area where SSR **DISCUSSION:** For explanation refer to question # 83. operation has not been required?

* 1. 0000
  2. 7000
  3. 2000

1. The ground SSR equipment incorporates a transmitter and Answer **(C)** is correct.

receiver respectively operating in the following frequencies **DISCUSSION:** For explanation refer to question #90. (transmitter; receiver):

* 1. 1090 MHz; 1090 MHz
  2. 1090 MHz; 1030 MHz
  3. 1030 MHz; 1090 MHz

1. The frequency of an SSR ground transmitter is: Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question #90.

1. 1050 ± 0,5 MHz
2. 1030 ± 0,2 MHz
3. 1090 ± 0,3 MHz
4. The SSR ground transceiver interrogates on……and Answer **(B)** is correct.

receivers responses on…….. **DISCUSSION:** For explanation refer to question #90.

* 1. 1030 MHZ; 1030 MHz
  2. 1030 MHz; 1090 MHz
  3. 1090 MHz; 1030 MHz
  4. 1090 MHz; 1090 MHz

1. What are the frequencies used for interrogation and Answer **(B)** is correct.

response for SSR? **DISCUSSION:** For explanation refer to question #90.

* 1. 1090 MHz for interrogation from the ground, 1030 MHz for response from the aircraft.
  2. 1030MHz for interrogation from the ground, 1090 MHz for response from the aircraft.
  3. 1090 MHz for interrogation from the aircraft, 1030 MHz for response from the ground.

1. The vertical position provided by SSR mode C is referenced to: Answer **(B)** is correct.

**DISCUSSION:** For explanation refer to question #82.

1. QNH unless QFE is in use.
2. 1013,25 HPa.
3. QNH.
4. When an aircraft is operating its SSR in mode C an air Answer **(B)** is correct.

traffic controller's presentation gives information **DISCUSSION:** For explanation refer to question #81. regarding the aircraft's indicated flight level in

increments of:

1. 200 ft.
2. 100 ft.
3. 250 ft.
4. With reference to SSR, what code is used to indicate Answer **(B)** is correct.

transponder altitude failure **DISCUSSION:** For explanation refer to question # 83.

* 1. 9999
  2. 0000
  3. 4096

1. Using SSR, the normal transmission from the ATC Answer **(B)** is correct.

Transponder in the aircraft consists of: **DISCUSSION:** For explanation refer to question # 82

* 1. The two pulses received plus the aircraft identification.
  2. The two pulses received plus an additional number of pulses between them.
  3. The aircraft identification plus pulses giving the altitude.
  4. Pulses giving the altitude, plus any ident pulse.

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# CHAPRET 3

## AIRCRAFT SYSTEMS AND PERFORMENCE

* **Pitot-Static Instruments**
* **Gyroscopic Instruments**
* **Engine and Propeller**
* **Fuel and Electrical Systems**
* **Predicting Performance**
* **Weight and Balance**

1. You are flying in the northern hemisphere on 270 heading, and Answer **(B)** is correct.

you notice that your compass swings toward the…….when **DISCUSSION:** In the northern hemisphere, if an airplane is you accelerate your aircraft: accelerated on an easterly or westerly heading, the compass

swings toward the north. This error is greatest when flying

1. South. on a heading of east or west, and decreases to zero on a north
2. North. or south heading.
3. East.
4. In the northern hemisphere, the compass turns toward Answer **(C)** is correct.

the south when: **DISCUSSION:** in the northern hemisphere, if an airplane is decelerated on an east or west heading, the compass swings

* 1. An airplane enters a left turn from an east heading. toward the south. This error does not occur when you are
  2. An airplane enters a right turn from a west heading. flying on a north or south heading.
  3. an aircraft is decelerated and flying on an easterly or westerly heading.

1. When an airplane decelerates on a heading of east in the Answer **(A)** is correct.

northern hemisphere: **DISCUSSION:** In the northern hemisphere, if an airplane is decelerated on an east or west heading, the compass swings

* 1. The compass swings toward the south. toward the south. This error does not occur while on a north
  2. The compass swings toward the north. or south heading.
  3. The compass swings toward the east.

1. You are flying on 090 heading in the northern hemisphere, Answer **(B)** is correct.

if your airplane is accelerated, your compass: **DISCUSSION:** In the northern hemisphere, if an airplane is accelerated while on an east or west heading, the compass

* 1. Indicates a turn toward the south. swings toward the north.
  2. Swings toward the north.
  3. Doesn’t swing and remains on the same heading.

1. In the northern hemisphere, a magnetic compass will …… when Answer **(B)** is correct.

entering a turn from a north heading. **DISCUSSION:** In the northern hemisphere, when making

a turn from a heading of north, the compass initially indicates

1. Initially lead the turn. a turn in opposite direction. As the turn proceeds, the
2. Initially swing in the opposite direction. compass card begins to turn in the correct direction, but it lags
3. Initially swing toward the east. behind the actual heading of the aircraft. the amount of lag decreases as the turn continues, and disappears as

the airplane reaches a heading of east or west.

1. An airplane begins rolling into a turn toward west from a Answer **(B)** is correct.

southerly heading. The magnetic compass in that airplane **DISCUSSION:** In the northern hemisphere, when you begin will: a turn from a southerly heading, the compass begins to turn in

the correct direction, but leads the actual heading.

1. Initially indicate a turn toward the east.
2. Swing in the correct direction but will lead the turn.
3. Indicate no error when turning from a southerly heading.
4. An airplane is flying in the northern hemisphere, in what Answer **(C)** is correct.

condition the airplane will initially indicate a turn toward **DISCUSSION:** In the northern hemisphere, if the airplane begins the west. to turn right from a heading of north, the compass will initially

indicate a turn toward the west.

1. An airplane is accelerated while flying on a northerly heading.
2. An airplane rolls into a left turn from a heading of south .
3. An airplane rolls into a right turn from a heading of north.
4. The angle between the magnetic north and true north is called: Answer **(B)** is correct.

**DISCUSSION:** The angle between the magnetic north and true

* 1. Deviation north is called the magnetic variation.
  2. Variation.
  3. Magnetic dip.

1. The difference between the direction indicated by a magnetic Answer **(C)** is correct.

compass installed in an airplane, and one not installed in **DISCUSSION:** magnetic deviation is the error caused by

an airplane ,is: disturbances from magnetic fields produced by aircraft metal components and electrical equipment.

1. Dip.
2. Variation.
3. deviation.
4. Southerly turning error.
5. What causes deviation in a magnetic compass? Answer **(B)** is correct.

**DISCUSSION:** Magnetic deviation is the error caused by

* 1. The angular difference between the true north and magnetic north. disturbances from magnetic fields produced by metal
  2. Magnetic fields produced by metal components and electrical components and electrical equipment within the aircraft. equipment within the aircraft.
  3. The defective components of the magnetic compass.

1. The pitot system is connected to: Answer **(A)** is correct.

**DISCUSSION:** Pitot pressure, also called ram or impact

* 1. Airspeed indicator. pressure, is provided for airspeed indicator by the pitot
  2. Altimeter. system .
  3. Vertical speed indicator.

1. Which instrument will become inoperative by a Answer **(B)** is correct.

pitot tube blockage? **DISCUSSION:** The pitot system provides ram or pitot pressure only for the airspeed indicator. Hence, a pitot

* 1. Altimeter. tube blockage only affects the airspeed indicator.
  2. Airspeed indicator.
  3. Vertical speed indicator.

1. What type of blockage will cause the airspeed indicator Answer **(A)** is correct.

to read zero? **DISCUSSION:** When the pitot tube becomes clogged and the drain hole remains open, the ram pressure in the system

* 1. When only the ram air inlet becomes clogged and the drain will vent out through the drain hole, causing the airspeed hole remains open. indicator to show zero.
  2. When both the ram air inlet and drain hole become clogged.
  3. When the static port becomes clogged.

1. Which instrument(s) would be affected when Answer **(C)** is correct.

the static port becomes clogged? **DISCUSSION:** Static port provides static pressure or ambient pressure to airspeed indicator, altimeter, and vertical speed

* 1. Altimeter. indicator. Therefore, if the static port becomes
  2. Vertical speed indicator, and altimeter. clogged all three instruments will become inoperative.
  3. Altimeter, vertical speed indicator, and airspeed indicator.

1. If both the ram air inlet and drain are clogged. Answer **(B)** is correct.

How will the airspeed indicator react in a climb? **DISCUSSION:** If both ram air inlet and drain hole of the

pitot tube become clogged, the ram pressure in the pitot

1. Shows a decrease in airspeed. system will be trapped. When the static port remains open,
2. Shows an increase in airspeed. the airspeed indicator will react as an altimeter.
3. This type of blockage will cause the airspeed indicator to Therefore, the indicated airspeed increases when register zero. climbing and decreases when descending.
4. Assume that the static port of your airplane became clogged Answer **(B)** is correct.

(pitot tube remains open) at 2500 feet and you climbed. **DISCUSSION:** If the static port becomes clogged but the How does this affect the readings on your airspeed pitot system remains open, the airspeed indicator continues indicator at higher altitudes? to operate, but the readings will be inaccurate. If airplane

operates above the altitude where the static port became

1. It has no effect on the airspeed indicator’s readings. blocked, the airspeed indicator will display lower than
2. Airspeed indicator will read lower than actual. actual airspeed. In this example the static port became
3. Airspeed indicator will read higher than actual. clogged at 2500 feet, and then the airplane climbed. This results in slower than actual indications.
4. Assume that the static port of your airplane became clogged Answer **(C)** is correct.

at 5500 feet (pitot tube remains open) and you have to **DISCUSSION:** If the static port becomes clogged but the pitot descend your airplane. How does this affect the system remains open, the airspeed indicator continues to

readings on your airspeed indicator at lower operate, but the readings will be inaccurate. If airplane operates

altitudes? operates below the attitude where the static port became clogged the airspeed indicator will display higher than actual airspeed.

1. It has no effect on the airspeed indicator’s readings. In this example, the static port became clogged at 5500
2. Airspeed indicator will read lower than actual. feet. and then the airplane descended. This results in faster
3. Airspeed indicator will read higher than actual. than actual indication.
4. What is the green arc on the airspeed indicator called? Answer **(C)** is correct.

**DISCUSSION:** The green arc on the airspeed indicator

* 1. Maneuvering speed identifies the normal operating range.
  2. Stalling speed or the minimum steady flight speed.
  3. Normal operating range.

1. What does the white arc on the airspeed indicator represents? Answer **(B)** is correct.

**DISCUSSION:** The white arc represents the flap operating

* 1. Normal operating range. range of the airspeed indicator.
  2. Flap operating range.
  3. Maximum structural cruising speed.

1. What does the red line on the airspeed indicator denotes? Answer **(A)** is correct.

**DISCUSSION:** The red line on the airspeed indicator

* 1. Never-exceed airspeed. identifies the never-exceed speed. Operating above this speed
  2. Maximum structural cruising speed. may result in structural damage.
  3. Caution range.

1. What does the yellow arc on the airspeed indicator represent? Answer **(B)** is correct.

**DISCUSSION:** The yellow arc represents the caution range

1. Normal operating range. of the airspeed indicator. Airplane may only operate in this
2. Caution range and only operate in smooth air. range.
3. Maximum structural cruising speed.
4. What does VNO denote? Answer **(B)** is correct.

**DISCUSSION:** The upper limit of green arc is VNO, which

* 1. Never exceed speed. identifies the maximum structural cruising speed. You
  2. Maximum structural cruising speed. should never operate above this airspeed except in smooth
  3. Maximum flap extended speed. air.

1. What is an important airspeed limitation that is no Answer **(B)** is correct.

it color-coded on the airspeed indicator? **DISCUSSION:** Manoeuvring speed, or VA, is the maximum speed at which full and abrupt deflection of airplane controls

* 1. Stalling speed in landing configuration. can be made without causing structural damage.
  2. Maneuvering speed.
  3. Maximum structural cruising speed.

1. The lower limit of white arc of the airspeed indicator Answer **(A)** is correct.

represents: **DISCUSSION:** The lower limit of white arc, or VSO, indicates the stalling speed or the minimum steady flight speed in

* 1. Stalling speed in landing configuration (VSO). the landing configuration.
  2. Stalling speed in a specified configuration (VS1).
  3. Maximum speed with flaps fully extended (VFE).

1. What is the maximum structural cruising speed of this airplane Answer **(A)** is correct.

(refer to figure 36)? **DISCUSSION:** The maximum structural cruising speed is indicated as the upper limit of green arc on the airspeed

* 1. 165 KIAS. indicator You may operate above this speed only in smooth air.
  2. 208 KIAS.
  3. 100 KIAS.

1. The flap operating range of this airplane (refer to figure 18)? Answer **(A)** is correct.

**DISCUSSION:** The white arc identifies the normal

* 1. 60-100 KIAS. flap operating range. The lower limit of the white arc
  2. 65-165 KIAS. identifies the stalling speed in landing configuration (VSO),
  3. 165-208 KIAS. and its upper limit corresponds to corresponds to

1. What is the stalling speed, or minimum steady flight speed, Answer **(B)** is correct.

in the landing configuration for this airplane (refer to figure 18)? **DISCUSSION:** Stalling speed or the minimum steady flight

speed in landing configuration, or VSO, is identified by the

1. 65 KIAS. lower limit of the white arc.
2. 60 KIAS.
3. 100 KIAS.
4. What is the maximum flap extended speed of this airspeed Answer **(B)** is correct.

Indicator (refer to figure 18) **DISCUSSION:** The maximum flap extended speed is identified by the upper limit of the white arc on the airspeed indicator.

1. 165 KIAS.
2. 100 KIAS.
3. 65 KIAS.
4. What is the normal operating range of this airplane Answer **(C)** is correct.

(refer to figure 18)? **DISCUSSION:** Normal operating range is identified by the green arc on the airspeed indicator.

1. 60-165 KIAS.
2. 60-100 KIAS.
3. 65 165 KIAS.
4. What altitude is indicated in this altimeter (Figure19)? Answer **(C)** is correct.

**DISCUSSION:** The altimeter has three pointers. The

* 1. 1500 feet. longest pointer indicates hundreds of feet, the middle-length
  2. 11500 feet. pointer shows thousands of feet, and the shortest pointer
  3. 10500 feet. indicates tens of thousands of feet.

1. What altitude is indicated in this altimeter (Figure20)? Answer **(B)** is correct.

**DISCUSSION:** The altimeter has three pointers. The

* 1. 4500 feet. longest pointer indicates hundreds of feet, the middle-length
  2. 14500 feet. pointer shows thousands of feet, and the shortest pointer
  3. 1500 feet. indicates tens of thousands of feet.

1. What altitude is indicated in this altimeter Answer **(C)** is correct.

(Figure 21)? **DISCUSSION:** The altimeter has three pointers. The The longest pointer indicates hundreds of feet, the middle-

* 1. 1500 feet. length pointer shows thousands of feet, and the shortest
  2. 10950 feet. pointer indicates tens of thousands of feet.
  3. 9500 feet.

1. What is pressure altitude? Answer **(B)** is correct.

**DISCUSSION:** Pressure altitude is indicated on the

* 1. The indicated altitude corrected for nonstandard temperature altimeter when it is set to standard sea level pressure of 29.92
  2. The altitude indicated on altimeter when it is set to standard in. Hg. or 1013.25 millibars. sea level pressure of 29.92 in. Hg.
  3. It is indicated altitude corrected for instrument errors.

1. The ……… is the actual height of an object above mean sea level. Answer **(A)** is correct.

**DISCUSSION:** True altitude is defined as the actual height of

* 1. True altitude. an object above sea level.
  2. Absolute altitude.
  3. Pressure altitude.

1. Absolute altitude is: Answer **(A)** is correct.

**DISCUSSION:** Absolute altitude is defined as the height of

* 1. The height of the aircraft above the earth’s surface. the aircraft above the earth’s surface.
  2. The elevation above mean sea level.
  3. The altitude displayed on the altimeter with 29.92 in. Hg. or 1013.25 millibars set in the Kollsman window.

1. What is calibrated altitude? Answer **(B)** is correct.

**DISCUSSION:** Calibrated altitude is the indicated altitude

* 1. Pressure altitude corrected for nonstandard temperature. corrected for instrument error.
  2. Indicated altitude corrected for instrument errors.
  3. Vertical distance above the standard datum plan.

1. Density altitude will be equal to pressure altitude: Answer **(A)** is correct.

**DISCUSSION:** Density altitude will be equal to pressure

* 1. At standard temperature. altitude at standard temperature.
  2. At sea level, when temperature is equal to 15° F.
  3. Always when you set your altimeter to standard sea level level pressure of 29.92 in. Hg.

1. Pressure altitude is equal to true altitude when: Answer **(A)** is correct.

**DISCUSSION:** Pressure altitude is equal to true altitude

* 1. Standard atmospheric conditions exist. when standard atmospheric conditions exist.
  2. When the sea level pressure is 29.92 in. Hg. and temperature is 5° F.
  3. Pressure altitude is corrected for non-standard temperature.

1. What condition(s) must exist for true altitude to be equal to Answer **(B)** is correct.

indicated altitude? **DISCUSSION**: True altitude will be equal to indicated altitude when you have the correct altimeter setting and temperature

* 1. When temperature conditions match International conditions match International Standard Atmosphere. Standard Atmosphere.
  2. When you have the correct altimeter setting and temperature conditions match International Standard Atmosphere.
  3. When Indicated altitude is corrected for installations errors.

1. Approximately how many percent lower the true altitude will be Answer **(B)** is correct.

than your indicated altitude, if the temperature is 10°C colder **DISCUSSION:** When the temperature is 10C lower than than standard? standard, the true altitude will be approximately 4% lower

than the indicated altitude.

1. 8%.
2. 4%.
3. 12%.
4. If you change the altimeter setting from 30.12 in. Hg. to 29.82, Answer **(C)** is correct.

what would be the change in the indicated altitude? **DISCUSSION:** A change of one inch in the altimeter

setting will change the indicated altitude by 1000 feet.

1. Indicated altitude would increase 300 feet. A decrease in the altimeter setting causes the altimeter
2. Indicated altitude would decrease 30 feet. indicate a decrease. In this example, the altimeter setting
3. Indicated altitude would decrease 300 feet. decreases from 30.12 to 29.82 that is equal to 0.3 in. or 300 feet. Therefore, the altimeter reading decreases by 300 feet.
4. A pilot changes the altimeter setting from 29.75 to 30.10. Answer **(B)** is correct.

What would be the change in the indicated altitude? **DISCUSSION:** A change of one inch in the altimeter setting

will change the indicated altitude by 1000 feet. An increase

1. Indicated altitude would increase 35 feet. in the altimeter setting causes the altimeter to indicate an
2. Indicated altitude would increase 350 feet. increase. In this example, the altimeter setting increases
3. Indicated altitude would decrease 350 feet. increases from 29.75 to 30.10 that is equal to 0.35 in or 300 feet. Therefore, the altimeter reading increases by 350 feet.
4. You are cruising at 5500 feet indicated altitude from point A Answer **(B)** is correct.

where air temperature is much lower than standard to point B **DISCUSSION:** When your airplane is flying in air that is where air temperature is much warmer than standard. warmer than standard, your indicated altitude will be lower

than your airplane’s true altitude.

1. Over point B Your True altitude will be lower than point A.
2. Over point B your True altitude will be higher than point A.
3. Your true altitude will not change in this case.
4. Assume that you are flying from an area of high pressure to Answer **(B)** is correct.

an area low pressure without resetting your altimeter, **DISCUSSION:** When you fly from an area of high pressure to your indicated altitude will be: an area of low pressure without resetting your altimeter, your

indicated altitude will be higher than your true altitude.

1. Equal to your actual altitude above sea level.
2. Higher than true altitude.
3. Lower than true altitude.
4. Assume that you are flying from an area of low pressure to Answer **(C)** is correct.

an area of high pressure without resetting your altimeter, **DISCUSSION:** When you fly from an area of low pressure to your indicated altitude will: an area of high pressure without resetting your altimeter, your

indicated altitude will be lower than your true altitude.

1. Equal to your actual altitude above sea level.
2. Higher than true altitude.
3. Lower than true altitude.
4. When air temperature is colder than standard: Answer **(A)** is correct.

**DISCUSSION:** In colder-than-standard air temperature

* 1. The true altitude is lower than the indicated altitude. your true altitude will be lower than your indicated altitude.
  2. The indicated altitude is lower than the true altitude.
  3. Density altitude is higher than indicated altitude.

1. When air temperature is warmer than standard: Answer **(A)** is correct.

**DISCUSSION:** When the air temperature is warmer than

* 1. The true altitude will be higher than the indicated altitude. standard, your true altitude will be higher than your indicated
  2. The true altitude will be lower than the indicated altitude. altitude.
  3. The density altitude will be lower than indicated altitude.

1. What are the three gyroscopic instruments of your airplane? Answer **(C)** is correct.

**DISCUSSION:** The three gyroscopic instruments in the

* 1. Turn coordinator, heading indicator, and altimeter. airplanes are the attitude indicator, heading indicator,
  2. Heading indicator, attitude indicator, and vertical speed indicator. and the turn coordinator. The attitude indicator and heading
  3. Turn coordinator, heading indicator, and attitude indicator. indicator are powered by the vacuum system in most

small airplanes, and the turn coordinator is power by the airplane’s electrical system.

1. A gyro tends to remain fixed in the plane in which it is spinning. Answer **(B)** is correct.

This principle is called: **DISCUSSION:** Rigidity in space refers to the principle that a spinning wheel with a heavily weighted rim tends

* 1. Bernoulli’s principle. to remain fixed in the plane in which it is spinning.
  2. Rigidity in space.
  3. Precession.

1. When an outside force acts to tilt a spinning gyro, the gyro Answer **(C)** is correct.

responds as if the force had been applied in 90 º further in **DISCUSSION:** When an outside force is applied to the direction of rotation. This principle is called: tilt a spinning gyro, the effect of this force is felt 90 º

further around in the direction of rotation.

1. Bernoulli’s principle.
2. Rigidity in space.
3. Precession.
4. In order to receive accurate heading from a heading indicator Answer **(C)** is correct.

during flight, it is necessary to: **DISCUSSION:** Due to gyro precession the heading drifts from the correct setting, therefore, it is required to realign

* 1. Set the instrument to the runway heading prior to takeoff. your heading indicator with the magnetic compass
  2. Calibrate the instrument on a compass rose at 30 minute intervals. periodically (approximately every 15 minutes during
  3. To align the heading indicator with the magnetic compass flight). at 15 minute intervals.

1. What information is obtained from a turn coordinator? Answer **(A)** is correct.

**DISCUSSION:**The miniature airplane of the turn coordinator

* 1. A turn coordinator indicates the rate of turn and the rate directly indicates rate of turn and rate of roll of your airplane, of roll of the airplane. and it indirectly indicates the bank attitude.
  2. It indicates the bank angle of your aircraft.
  3. Attitude of the aircraft with reference to the vertical axis.

1. A turn-and-slip indicator is an instrument that directly Answer **(B)** is correct.

indicates the: **DISCUSSION:** A turn-and-slip indicator only indicates the rate of turn, and it indirectly indicates the bank attitude.

* 1. Rate of roll. However, it does not indicate the rate of roll.
  2. Rate of turn.
  3. Bank attitude.

1. An abnormally high engine oil temperature could be Answer **(A)** is correct.

due to: **DISCUSSION:** With the oil level being too low, transferring of engine heat to the engine’s oil cooler is prevented.

* 1. Operating with an excessively low oil level. Additionally, insufficient oil may damage an engine
  2. Operating with an excessively rich mixture. from friction within the cylinders and other metal parts
  3. Operating with a high viscosity oil. against each other.

1. What will happen as a result of an excessively Answer **(C)** is correct.

high engine temperature? **DISCUSSION:** Operating the engine at excessively high temperatures will result in loss of power, excessive oil

* 1. Nothing will happen to the aircraft engine. consumption, detonation, and also results in serious
  2. Heat-conducting hoses and warping of the cylinder cooling permanent damage. fins will be damaged.
  3. Loss of power, excessive oil consumption, detonation, and will also lead to serious permanent internal engine damage.

1. The internal cooling of the reciprocating aircraft engines is Answer **(B)** is correct.

accomplished by: **DISCUSSION:** Flow of oil through the lubricating system

is vital to the internal cooling of reciprocating aircraft engines.

1. Air flow over fins attached to the cylinder.
2. Flow of oil through the lubricating system.
3. Air flow over the exhaust manifold and throttle body.
4. A pilot notices that the cylinder head temperature and engine Answer **(C)** is correct.

oil temperature have exceeded their normal range, what could **DISCUSSION:** Excessively high temperature indicated can

have caused this high temperature indication? can be caused when operating with very high power setting and with the low fuel to air mixture ratio.

1. Operating with an excessively rich mixture.
2. Oil pressure being too high.
3. Operating with too high power setting and the mixture set too lean.
4. One procedure that helps in cooling an overheating engine is to: Answer **(C)** is correct.

**DISCUSSION:** Decreasing rate of climb causes the airspeed

* 1. Increase the rate of climb and add power. to increase. Increasing the airspeed increases the airflow
  2. Decrease you rate of climb and add power. into the engine compartment which results in decreasing
  3. Reduce your rate of climb and increase the airspeed. of engine temperature.

1. In order to reduce the temperature of an engine that is overheating Answer **(B)** is correct.

a pilot must: **DISCUSSION:** Enriching the fuel to air ratio (mixture), adds extra fuel to the mixture which increases the cooling

* 1. Increase the rate of climb and decrease the airspeed. effect.
  2. Increase the fuel to air ratio by enriching the fuel mixture.
  3. Increase the RPM and lean the fuel mixture.

1. If the pilot does not adjust the mixture setting, the fuel to Answer **(B)** is correct.

air ratio becomes rich as the altitude increases. **DISCUSSION:** When the altitude increases the density of

Why does it happen? air entering the carburettor decreases while the density of fuel remains constant. Therefore if the pilot doesn’t lean the mixture to adjust the fuel to air ratio, the mixture

1. The density of fuel decreases but the density of air decreases less. becomes excessively rich.
2. The density of fuel remains the same while the density of air decreases.
3. The density of fuel remains the same and the volume of air decreases.
4. A pilot is performing the run-up checks at a high- elevation Answer **(B)** is correct.

airport, and he notes that the engine runs slightly rough **DISCUSSION:** As the altitude increases, the air becomes that is not caused by the magneto check but becomes less dense and the use of carburettor heat makes the air even worse when carburetor heat is checked. What initial less dense (heated air is less dense) which causes the fuel action should this pilot take? /air mixture to become too rich. Therefore, leaning the

mixture should solve this problem.

1. Shut down the engine and restart the engine.
2. Lean the mixture to establish the correct fuel to air ratio.
3. Turn the electric fuel pump on to provide fuel under pressure to the engine generally .
4. As the altitude increases the pilot needs to adjust the ratio of Answer **(C)** is correct.

fuel to air mixture in order to: **DISCUSSION:** The higher the altitude, the lower the density of air becomes. Therefore, the pilot needs to adjust

* 1. Decrease the fuel flow to compensate for the increased the mixture setting to decrease the fuel flow (fuel density) air density. in order to establish the correct fuel to air ratio.
  2. Increase the fuel density to compensate for the increased air density.
  3. Decrease the fuel density to compensate for the decreased air density.

1. An airplane is cruising at 3500 feet and the mixture is Answer **(C)** is correct.

properly set. What will happen if the airplane **DISCUSSION:** When the altitude increases the density climbs to 7500 feet without adjusting the mixture? of air entering the carburetor decreases while the density

fuel remains constant. Therefore, the mixture adjustments

1. The fuel/air mixture will become too rich and this will cause are required during climb and descent to maintain the the cylinder head temperature to increase which consequently proper fuel/air ratio.

results in detonation.

1. The fuel to air ratio becomes excessively lean, therefore, the mixture must be enriched during climb.
2. The fuel air mixture will become rich, hence, to maintain the correct fuel to air ratio the mixture must be leaned during climb.
3. The fuel to air ratio is the: Answer **(B)** is correct.

**DISCUSSION:** The fuel to air ratio is defined as the ratio

* 1. Ratio between the density of fuel and volume of air between the density (weight) of the fuel and the density of air entering the cylinder entering the cylinder.
  2. Ratio between the density of fuel and the density of air entering the cylinder.
  3. Ratio between the density of fuel and the density of air entering the carburetor.

1. The ratio between the air and fuel that enters the engine Answer **(C)** is correct.

cylinders is controlled by: **DISCUSSION:** Mixture control adjusts the ratio between fuel and air that enters into the cylinders. However, the

* 1. Throttle. throttle controls the total volume of fuel and air that
  2. Electric fuel pump. enters the cylinders.
  3. Mixture.

1. The use of carburetor heat: Answer **(B)** is correct.

**DISCUSSION:** When carburettor heat is applied, the heated

* 1. Enriches the Fuel/air mixture because the heated air is denser air which is less dense than the outside air is introduced into than the outside air that had been entering the cylinder. the engine. Therefore, the fuel/air mixture becomes richer
  2. Enriches the Fuel/air mixture because the heated air is less dense because the amount of fuel remains unchanged and the than the outside air that had been entering the cylinder. air gets less dense.
  3. Will not enrich the fuel/air mixture.

1. Applying carburetor heat causes: Answer **(C)** is correct.

**DISCUSSION:** When carburettor heat is applied, the heated

* 1. The engine RPM to decrease slightly, because the heated air is more air which is less dense than the outside air is introduced into dense than the outside air that had been entering the cylinders. the engine. Therefore, the fuel/air mixture becomes richer
  2. The fuel/air mixture to become leaner. because the amount of fuel remains unchanged and the
  3. The fuel/air mixture to become richer. air gets less dense.

1. The use of carburetor heat generally: Answer **(B)** is correct.

**DISCUSSION:** The use of carburettor introduces hot air

* 1. Increases engine performance. that is less dense into the engine. The heated air reduces the
  2. Decreases engine performance. engine performance and also increases the operating
  3. Has no effect on engine performance. temperature of the engine. Therefore, the use of carburettor heat is not recommended during phases that full power is required (such as takeoff).

1. With regard to carburetor ice, float-type carburetor systems in Answer **(B)** is correct.

comparison to fuel injection systems are generally considered **DISCUSSION:** Float-type carburettors are more prone to to be: icing than fuel injection systems. Carburettor icing forms

in the carburettor venturi. Carburettor icing is most

1. less susceptible to icing. most likely to occur when the outside air temperature is
2. more susceptible to icing. between -7º C and 21º C and relative humidity is above
3. susceptible to icing when there is visible moisture in the air. 80% or there is visible moisture in the air.
4. The operating principle of the float-type carburetor is Answer **(B)** is correct.

based the: **DISCUSSION:** When air flows into the carburettor,

it passes through a venturi. This increases the velocity of

1. decrease in air velocity in the throat of a venturi, causing the air and decreases its pressure. As the air flows faster an increase in air pressure. though the venturi, a low pressure area is created which
2. difference in air pressure at the venturi throat and the air inlet. draws the fuel form a main fuel jet located at the throat
3. the shape of the venturi that creates an area of high pressure. of the carburettor and into the airstream, where it is mixed

with flowing air.

1. What would be the first indication of carburetor icing in Answer **(C)** is correct.

an aircraft with a fixed-pitch propeller and a float-type **DISCUSSION:** In an airplane with a fixed-pitch propeller carburetor? and a float-type carburettor, the first indication of carburettor

icing would be a decrease in engine RPM, followed by

1. Engine roughness. engine roughness.
2. A decrease in cylinder head temperature.
3. A reduction in engine RPM.
4. Ice has formed in the carburetor of an airplane that is equipped Answer **(B)** is correct.

with a fixed-pitch propeller, and the pilot applies the **DISCUSSION:** The presence of carburettor ice in an carburetor heat to eliminate ice. How does the airplane with a fixed-pitch propeller can be verified when

change in this situation? the pilot applies the carburettor head and he notes that there is a slight decrease in RPM, and then a gradual

1. A slight decrease in RPM, and then remains constant. increase in RPM as the ice eliminates. When the pilot
2. A slight decrease in RPM, followed by a gradual applies the carburettor heat, there will be a slight decrease increase in RPM. in RPM because the heated air is less dense than the
3. An increase in RPM, followed by a gradual decrease in RPM. outside air that had been entering the engine.

This reduces the power output.

1. Under which conditions carburetor icing is more likely to occur? Answer **(C)** is correct.

**DISCUSSION:** Carburettor icing is more like to happen

* 1. When temperature is below freezing and humidity is when temperature is between -7º C and 21º C and humidity less than 40%. is above 80%. However, due to the sudden cooling
  2. When temperature is between 0º C and 20º C and that can occur in the carburettor, ice can form even at humidity is high. high temperatures like 38º C and humidity as low as 50%.
  3. When temperature is between -7º C and 21º C and humidity is above 80%.

1. When does detonation occur in reciprocating engines? Answer **(B)** is correct.

**DISCUSSION:** Detonation occurs when fuel/air mixture

* 1. When there is an explosive increase of fuel due in the cylinders explode instead of burning. to an excessively rich mixture setting.
  2. When the fuel/ air mixture in the cylinder’s combustion chamber explodes instead of burning normally.
  3. It occurs when there is an electrical short in spark plugs wires.

1. What can cause detonation? Answer **(A)** is correct.

**DISCUSSION:** Detonation is an uncontrolled,

* 1. Operating at high power settings and the mixture being too lean. explosive ignition within the cylinders instead.
  2. Low engine temperatures. Detonation causes extreme temperatures
  3. An extremely rich mixture. and pressures, and if allowed to continue, can lead to severe damage and failure of

affected parts. Detonation may be caused by the following conditions: the engine operating at excessively high temperatures, operating at high RPM and low airspeed, using lower-than-specified-fuel grade, and extremely lean mixture.

1. If detonation is suspected on climb-out after takeoff, Answer **(A)** is correct.

what initial corrective action would you take in **DISCUSSION:** If detonation is suspected during your

this situation? climb-out, it is recommended to decrease the rate of climb in order to increase your airspeed and reduce

1. Reduce your rate of climb to increase airspeed the power. and retard the throttle.
2. Lean the mixture.
3. Increase your rate of climb to reduce your airspeed.
4. What will most likely happen if you use a fuel that is lower Answer **(B)** is correct.

than specified grade? **DISCUSSION:** If you use a lower-than-specified fuel grade, it will most likely cause detonation. The

* 1. The engine oil temperature will remain lower-grade fuel ignite at lower temperature, at the normal operating range.
  2. Detonation will occur. therefore, an engine that has reached high
  3. A mixture of fuel and air will form that is not uniform temperatures may cause a lower- than-specified in the cylinders. grade fuel to explode (detonate) instead

of burning smoothly.

1. Detonation may lead to another problem, known as ……. Answer **(A)** is correct.

**DISCUSSION:** Detonation can often lead to another

* 1. Pre-ignition. problem known as pre-ignition.
  2. Vapor lock.
  3. Combustion.

1. The uncontrolled combustion of fuel/air mixture in advance Answer **(B)** is correct.

of normal ignition is known as: **DISCUSSION:** Pre-ignition is defined as the uncontrolled combustion of fuel/air mixture in advance of normal ignition.

* 1. Detonation Pre-ignition can be caused by a residual hot spot in the
  2. Pre-ignition. cylinder such as a carbon particle on a spark plug, a cracked
  3. Spark plug fouling. ceramic spark plug insulator, or almost any damage around the combustion chambers.

1. What is the main purpose of incorporating a dual ignition Answer **(A)** is correct.

system on an aircraft engine? **DISCUSSION:** The incorporation of the dual ignition system into the aircraft engine increases safety and

* 1. To improve engine performance combustion of the fuel/air mixture, which results in
  2. Uniform heat distribution. improved engine performance.
  3. To balance cylinder head pressure.

1. Before engine shutdown, when the power is at idle, Answer **(B)** is correct.

the ignition key is momentarily turned off. **DISCUSSION:** When an engine continues to run

The engine continues to run without even after the ignition switch has been turned off,

any interruption; this: you can conclude that it is most likely due to a broken magneto ground wire. The ignition switch is unable to

1. Is normal because the engine is usually stopped ground the magneto to stop the generation of electrical by moving the mixture to idle. impulses that provide electricity to the spark plug.
2. Won’t normally happen. It indicates that a magneto not grounding in OFF position.
3. This indicates that there is nothing wrong with the ignition system.
4. How can you conclude that the magneto ground wire Answer **(A)** is correct.

is broken? **DISCUSSION:** You can detect a broken magneto

ground wire when an engine continues to run even

1. Bring the power to idle, and momentarily after the ignition switch has been turned off. turn the ignition switch off.
2. Turn the ignition switch from BOTH to only One magneto, lean the mixture, and look for an increase in manifold pressure.
3. Hold the brakes, apply full power, and momentarily turn the ignition switch off.
4. What is most likely to cause an engine to continue running Answer **(D)** is correct.

after the ignition switch is turned off? **DISCUSSION:** A broken magneto ground wire causes the engine to continue running even after you turn

* 1. Overheated exhaust manifold. the ignition switch off.
  2. Carbon deposits glowing on the spark plugs.
  3. Magneto ground wire is in contact with engine casing.
  4. A broken magneto ground wire.

1. How is the engine of an airplane equipped with a Answer **(B)** is correct.

constant-speed propeller controlled? **DISCUSSION:** The engine of an aircraft equipped with a constant- speed propeller is controlled directly by the

* 1. The throttle controls power output which is indicated on the propeller and indirectly by the propeller control. The throttle manifold pressure gauge and propeller control adjusts a controls engine power output which is indicated on the constant blade angle. manifold pressure gauge, and the propeller control
  2. The throttle controls power output which is indicated on regulates the engine RPM (by changing the pitch of manifold pressure gauge and the propeller control regulates the propeller blades) which is indicated on the on the the engine RPM which is indicated on the tachometer. tachometer.
  3. The throttle controls engine RPM which is indicated on

the tachometer and the propeller control regulates the power output which is indicated on manifold pressure gauge.

* 1. The throttle adjusts the propeller blades angle to control the RPM, and the mixture control regulates the power output.

1. The engine of an airplane equipped with a constant-speed Answer **(B)** is correct.

propeller is controlled directly by the…….and indirectly **DISCUSSION:** The engine of an airplane equipped with by the …….. . a constant- speed propeller is controlled directly by the

throttle and indirectly by the propeller control.

1. propeller control – throttle.
2. throttle – propeller control.
3. throttle – mixture control.
4. propeller control – mixture control.
5. To prevent internal stress on the engine of an airplane equipped Answer **(B)** is correct.

with a constant-speed propeller you should: **DISCUSSION:** On the engine of airplanes equipped with a constant-speed propeller, you should avoid low RPM

* 1. Avoid high RPM settings with low manifold pressure. settings with high manifold pressure to prevent
  2. Avoid low RPM settings with high manifold pressure. internal engine stress.
  3. Always use a rich mixture with high RPM settings.
  4. Always use a rich mixture with high manifold pressure.

1. An advantage of a constant-speed propeller is that it: Answer **(C)** is correct.

**DISCUSSION:** A constant speed propeller, also referred

* 1. Allows the pilot to select a high blade angle and high RPM to as a variable-pitch or controllable- pitch propeller, setting for takeoffs. allows the pilot to select the blade angle that provides
  2. Allows the pilot to select and maintain a desired cruising speed. the most efficient performance. For instance, a low blade
  3. Allows the pilot to select the blade angle that provides the most angle and a lower pitch, reduces the propeller drag efficient performance. which allows higher RPM for maximum thrust on
  4. Allows the airplane to operate smoother with stable RPM and takeoffs. After the airplane reaches the cruising flight eliminates vibrations. conditions, the pilot can select a higher pitch and a

lower RPM to maintain adequate thrust for the selected airspeed. This process is similar to using a low gear in an automobile to accelerate, then shifting to high gears for cruising speed.

1. A propeller with a low blade angle provides the best performance Answer **(B)** is correct.

for takeoff and climb is known as a ……………. and one **DISCUSSION:** A propeller with a low blade angle provides with a high blade angle provides the best performance the best performance for takeoff and climb is known a climb for high cruise speed and high altitude flight referred propeller and one with a high blade angle provides the

to as a …............... best performance for high cruise speed and high altitude flight is referred to as a cruise propeller.

1. takeoff propeller – cruise propeller.
2. climb propeller – cruise propeller.
3. constant-speed propeller – variable-pitch propeller.
4. cruise propeller – climb propeller.
5. The…………… is much more efficient than a Answer **(C)** is correct.

fixed-pitch propeller. **DISCUSSION:** A constant-speed propeller, also referred to as a variable-pitch or controllable-pitch propeller is more more efficient as compared to a fixed-pitch propeller. A

* 1. Climb propeller. constant-speed propeller allows the pilot to adjust the
  2. Cruise propeller. blade angle for the most efficient performance.
  3. Constant-speed propeller.
  4. three-blade propeller.

1. Under what condition a vapor lock may occur? Answer **(C)** is correct.

**DISCUSSION:** On an airplane equipped with fuel pumps,

* 1. When operating with an excessively rich mixture. running a tank completely dry can allow air to enter the fuel
  2. Anytime the cylinder head temperature exceeds the system and cause vapor lock. When this happens, it normal operating range can be difficult, or impossible, to restart the engine.
  3. When you run a fuel tank completely dry.
  4. Anytime you use the carburetor heat for more than 5 minutes.

1. What type of fuel may be substituted if the recommended Answer **(B)** is correct.

grade of fuel is not available? **DISCUSSION:** If the recommended fuel grade is not available for an airplane, the next higher grade aviation gas may be

* 1. The next lower grade of fuel. airplane, the next higher grade aviation gas may be used.
  2. The next higher grade of fuel.
  3. Automobile gas of the same octane rating.
  4. You should never use other than the recommended grade.

1. What can cause the cylinder head temperature and engine Answer **(D)** is correct.

oil temperature to exceed their normal operating limits? **DISCUSSION:** Using a lower-than-specified fuel grade can

cause the cylinder head temperature and engine temperature

1. Operating with a very high viscosity oil. to exceed their normal operating limits.
2. Operating with an extremely rich fuel/air mixture.
3. Using a higher-than specified fuel grade.
4. Using a lower-than specified fuel grade.
5. On an airplane equipped with fuel pumps, when should a Answer **(D)** is correct.

pilot use the electric driven pump? **DISCUSSION:** An electric driven pump provides fuel under pressure for engine starting and also as a backup

* 1. Electric driven pumps should be always used to help the engine if the engine driven fuel pump fails driven fuel pumps in providing fuel to the engine.
  2. It should always be used except for the engine start.
  3. Must be used when the RPM is reduced below 2000.
  4. When the engine-driven fuel pumps fails

1. Which component of the fuel system allows air pressure Answer **(D)** is correct.

inside the tank to remain the same as the outside the tank? **DISCUSSION:** The fuel tanks contain a vent which allows

air pressure inside the tank to remain equal to the air pressure

1. Fuel strainer. outside the tank. This prevents the formation of vacuum
2. Primer. which would restrict fuel flow out of the tank. The vent can
3. Fuel filler cap. be located in the filler caps, or the tank may be vented
4. Fuel tank vents. through a small tube extending through the wing surface.
5. Why is it considered good practice to fill the fuel tanks Answer **(B)** is correct.

after the last flight of the day? **DISCUSSION:** It is considered good practice to fill the fuel tanks after the last flight of the day, because it prevents

* 1. To force any existing water to the top of the moisture condensation by eliminating air from the tanks. tank away from the fuel lines.
  2. To prevent moisture from condensing by eliminating air from the tanks.
  3. To prevent expansion of fuel by eliminating air from the tanks.

1. The process of converting the……............. in fuel Answer **(B)** is correct.

into ……………. Takes place in the cylinder of **DISCUSSION:** The process of converting the chemical

reciprocating engine. energy in fuel into the mechanical energy takes place in

the cylinder of reciprocating engine.

1. mechanical energy – chemical energy.
2. chemical energy – mechanical energy.
3. thermal energy – chemical energy.
4. Most reciprocating engines use a four-stroke operating cycle. Answer **(C)** is correct.

What is the correct order of the steps in this cycle? **DISCUSSION:** The four stroke operating cycle consists

of the following steps:

1) Intake: In this phase, the piston moves away from

* 1. Compression – Intake – Power – Exhaust. the cylinder head, the intake valve opens and the fuel
  2. Intake – Power – Compression – Exhaust. and air mixture are drawn into the cylinder.
  3. Intake – Compression – Power – Exhaust. 2) Compression: In this stroke, the piston starts
  4. Compression – Power – Intake – Exhaust. moving upward, the intake valve closes, and the fuel and air mixture is compressed. When the compression is nearly complete, the spark plugs fire to ignite the compressed mixture.

1. Power: In this phase, the high pressure gases from the controlled burning of the air and fuel mixture moves the piston away from the cylinder head, therefore providing power to rotate the crankshaft.
2. Exhaust: In this step of the cycle, the piston moves back toward the cylinder head and the burned gases are expelled through the opened exhaust valve.
3. When you operate an airplane equipped with a reciprocating Answer **(D)** is correct.

engine at high altitudes, efficiency of the engine decreases **DISCUSSION:** As the altitude increases the amount of fuel as a result of reduced ……………, even though remains the same, while the density of air decreases (fuel/air the ……………. remains the same. mixture becomes richer). The volume of air does not

change with an increase in altitude.

1. fuel flow – air density.
2. volume of air – fuel flow.
3. volume of air – density
4. air density – volume of air.
5. What should be the pilot’s first action after starting Answer **(C)** is correct.

an aircraft engine? **DISCUSSION:** After starting the engine, a pilot should adjust RPM and check engine gauges for proper indications

1. Turn the avionics master switch on.
2. Test the brakes and set the parking brakes.
3. Adjust RPM and check engine gauges for proper indications
4. Turn the beacon light on.
5. When hand-starting an airplane engine, it is very important Answer (B) is correct.

that a competent pilot: DISCUSSION: When hand-starting an airplane engine, it is very important that a competent pilot be at the controls.

1. be in the cockpit and call out all the commands.
2. be at the controls.
3. hand-prop the airplane.
4. What is essential for internal cooling of an airplane engine? Answer **(B)** is correct.

**DISCUSSION:** Engine oil system is essential to internal

* 1. Outside air flowing around the engine. cooling of the engine. In order to maintain normal
  2. Engine oil system. temperatures, additional cooling is also required. Much
  3. Water cooling. of the remaining heat is dissipated in the exhaust gases
  4. Opening the cowl flaps. And through outside air flowing around the engine.

1. What method is helpful in reducing the engine temperature? Answer **(D)** is correct.

**DISCUSSION:** Engine temperature may be reduced by

* 1. Leaning the mixture. decreasing the rate of climb, increasing airspeed, enriching
  2. Increasing the rate of climb. the fuel/air mixture, and reducing power.
  3. Reducing the airspeed.
  4. Reducing power.

1. What is the primary purpose of the battery in aircraft Answer **(B)** is correct.

electrical system? **DISCUSSION:** fuel/air mixture, and reducing power aircraft electrical system is the battery. The primary

* 1. Providing a means of starting the engine purpose of the battery is to provide the means of
  2. To provide standby or emergency electrical power starting the engine. However, battery allows limited in the event of alternator malfunction. operation of electrical components without starting the

1. Operation of electrical components without starting the engine. engine. It also provides standby or emergency

electrical power in the event of alternator malfunction.

1. The standard temperature and pressure values at sea level are: Answer **(B)** is correct.

**DISCUSSION:** The standard temperature and pressure

* 1. 15 ºF and 29.92 in. Hg. at sea level are 15 ºC and 29.92 in. Hg. These values are
  2. 15 ºC and 29.92 in. Hg. equivalent to 59º F and 1013.2 millibars of mercury.
  3. 59 ºC and 1013.2 millibars.
  4. 15 º and 1013.2 millibars.

1. Which factor will cause an increase in density altitude Answer **(C)** is correct.

at a given airport? **DISCUSSION:** As atmospheric pressure decreases, the air becomes less dense which results in an increase in density

* 1. A decrease in temperature. altitude. low ambient pressure, high humidity, and high
  2. A decrease in humidity. temperature would tend to decrease air density. The
  3. A decrease in ambient pressure. decreased air density causes an increase in density altitude.

1. Which factor will cause a decrease in density altitude Answer **(A)** is correct.

at a given airport? **DISCUSSION:** When the ambient temperature decreases, the air density increases which results in a decrease in

* 1. A decrease in temperature. density altitude.
  2. A decrease in atmospheric pressure.
  3. An increase in humidity.

1. How does high humidity affect the aircraft performance? Answer **(B)** is correct.

**DISCUSSION:** As the humidity increases the air density

* 1. It does not affect the performance. decreases This is because a given volume of air that
  2. It decreases the performance. contains water vapor weighs less than the same volume
  3. It increases the performance. of dry air. When air density decreases the performance diminishes.

1. Density altitude varies directly with ………… and Answer **(C)** is correct.

……………, and inversely with …………….. . **DISCUSSION:** Density altitude varies directly with humidity and temperature, and inversely with barometric

* 1. Humidity – atmospheric pressure – temperature. pressure.
  2. Temperature – atmospheric pressure – humidity.
  3. Humidity – temperature – atmospheric pressure.

1. How does the propeller efficiency change as Answer **(C)** is correct.

the density altitude increases? **DISCUSSION:** The propeller produces thrust in proportion to the mass of air being accelerated through the rotating

* 1. Efficiency increases due to less friction on the propeller blades. propeller. As the air density decreases (higher density
  2. Efficiency is reduced because the propeller exerts more force altitude) the propeller efficiency decreases as well. as the air density decreases.

1. Efficiency diminishes because the propeller exerts less force at high density altitudes.
2. An increase in density altitude results in: Answer **(B)** is correct.

**DISCUSSION:** As density altitude increases,

* 1. An increase in engine performance. the airplane’s overall performance decreases.
  2. A diminished climb performance.
  3. An increase in takeoff performance.
  4. An increase in propeller efficiency.

1. Under which set of atmospheric conditions the aircraft Answer **(D)** is correct.

takeoff and climb performance are reduced? **DISCUSSION:** Takeoff and climb performance are reduced with an increase in density altitude. Density

* 1. High temperature, low humidity, and low density altitude. altitude increasesdue to high temperature, high humidity,
  2. High temperature, high humidity, and low density altitude. and low atmospheric pressure.
  3. low temperature, high humidity, and low density altitude.
  4. High temperature, high humidity, and high density altitude.

1. On a day that temperature is above standard Answer **(B)** is correct.

at a given altitude, the density altitude is: **DISCUSSION:** Air expands when heated and therefore becomes less dense. This decrease in air density causes

* 1. lower than pressure altitude. the density altitude to increase. Pressure altitude is based
  2. higher than pressure altitude. on standard temperature. Therefore, density altitude will
  3. equal to pressure altitude. be higher than pressure altitude when the air temperature is above standard.

1. (Refer to Figure 23) Determine the density altitude for Answer **(A)** is correct.

the following conditions: **DISCUSSION:** With an altimeter setting of 30.10 in. Hg., we must subtract 165 feet from the field elevation to

Altimeter setting: 30.10 in. Hg obtain the pressure altitude of 500 feet. Note that in this

Temperature: 27 ºC (80 ºF) example, the pressure altitude will be less than the true

Airport elevation: 665 ft. MSL altitude because of the higher-than-normal pressure of

1. 2000 feet MSL. 30.10. Now that you have found the pressure altitude,
2. 500 feet MSL. enter the chart at the bottom, just above the
3. 1500 feet MSL. temperature of 27 ºC. Proceed up the chart vertically until you intercept 500 feet pressure altitude. Finally, move horizontally to the left to reach the density altitude of 2000 feet. Since the air temperature is warmer than standard, the density altitude is higher than pressure altitude. This means your airplane will

perform as if it were at 2000 feet MSL on a standard day.

1. (Refer to Figure 23) Determine the density altitude for Answer **(C)** is correct.

the following conditions: **DISCUSSION:** With an altimeter setting of 30.15 in. Hg., we should subtract 211 feet from the field elevation to obtain a pressure altitude of 2000 feet. Interpolation was used

Altimeter setting: 30.15 in. Hg to find 211 feet: 30.10 on the graph is -165 feet, and

Temperature: 32 ºC (90 ºF) 30.20 is -257 ft. Subtract -165 feet from -257 feet to

Airport elevation: 2211 ft. MSL get -92 feet difference, and then add one-half the -92 feet (-46 ft.) to -165 feet to get -211 feet. Note that in

1. 1800 feet MSL. this example, the pressure altitude will be less than the
2. 3500 feet MSL. true altitude because of the higher-than-normal
3. 4500 feet MSL. pressure of 30.15. Now that you have found the
4. 4800 feet MSL. pressure altitude, enter the chart at the bottom, just above the temperature of 32 ºC. Proceed up the chart vertically until you intercept 2000-foot pressure altitude line. Finally, move horizontally to the left to reach the density altitude of 4500 feet. Since the air temperature is warmer than standard, the density altitude is higher than pressure altitude. This means your airplane will perform as if it were at 4500 feet MSL on a standard day.
5. (Refer to figure 23) Temperature increases from 16 ºC to 21 ºC Answer **(B)** is correct.

and pressure altitude remains at 2000 feet. What effect does it **DISCUSSION:** On the density altitude chart, just above have on the density altitude? the temperature of 16 ºC proceed up the chart vertically

and intercept the diagonal 2000-foot pressure altitude line,

1. 650-foot decrease. and then move horizontally to the left to reach the density
2. 650-foot increase. altitude of 2500 feet. Use the same instructions to plot
3. 850-foot increase. 2000 feet pressure altitude at 21 ºC, to reach 3150 feet
4. 850-foot decrease. density altitude. Therefore, when temperature rises from 16 ºC to 21 ºC at the pressure altitude of 2000 feet, the density altitude increases from 2500 ft.

to 3150 ft. This a 650-foot increase in density altitude.

1. (Refer to figure 23) Temperature decreases from 27 ºC to 16 ºC Answer **(D)** is correct.

and pressure altitude remains at 3000 feet. What effect does **DISCUSSION:** On the density altitude chart, just above it have on the density altitude? the temperature of 27 ºC proceed up the chart vertically

and intercept the diagonal 3000-foot pressure altitude

1. 1100-foot increase line, and then move horizontally to the left to reach the
2. 1500-foot increase density altitude of approximately 4900 feet. Use the
3. 1100-foot decrease same instructions to plot 3000 feet pressure altitude at
4. 1300-foot decrease 16 ºC, to reach the density altitude of approximately 3600 feet. Therefore, when temperature decreases from 27 ºC to 16 ºC at the pressure altitude of 3000 feet, the density altitude decreases from 4900 ft. to 3600 ft. This a 1300-foot decrease in density altitude.
5. (Refer to figure 23) What is the pressure altitude at an airport Answer **(B)** is correct.

that is 2500 feet MSL with an altimeter setting of 29.85 in Hg.? **DISCUSSION:** Pressure altitude is determined by setting

the altimeter to the standard sea level pressure of 29.92 in. Hg.

1. 2586 feet MSL. Since 29.85 is not a number given on the conversion
2. 2566 feet MSL. chart, you need to interpolate. On the density altitude
3. 2546 feet MSL. chart, an altimeter setting of 29.80 requires you to add
4. 2648 feet MSL. 112 feet to determine the pressure altitude, and 29.90 requires you to add 20 feet. Subtract 20 ft. from 112 ft. to get 92 feet difference. Since 29.85 is half way between 29.80 and 29.90, you must only add 46 (92/2) to 20 feet, which is 66 ft. Now add 66 ft. to 2500 ft. to obtain a pressure altitude of 2566 ft.
5. (Refer to figure 23) What is the pressure altitude at an airport Answer **(D)** is correct.

that is 1960 feet MSL with an altimeter setting of 29.98 in. Hg.? **DISCUSSION:** Pressure altitude is displayed on the altimeter

when it is adjusted to the standard sea level pressure of 29.92

1. 1920 feet MSL. in. Hg. In this example, you must interpolate because
2. 1935 feet MSL. 29.98 is not given on the conversion chart. On the
3. 1890 feet MSL. density altitude chart, an altimeter setting of 30.00
4. 1905 feet MSL. requires you to subtract 73 feet to determine the pressure altitude. However, with an altimeter setting of 29.92, nothing is subtracted or added because that is pressure altitude. Since 29.98 is 6/8 of the way between 29.92 and 30.00, you must compute 6/8 of - 73 which is equal to 55. Subtract 55 feet from 1960 feet to obtain a pressure altitude of 1905 feet.
5. (Refer to figure 23) What is the pressure altitude at an airport Answer **(A)** is correct.

that is 3850 feet MSL with an altimeter setting of 30.10 in. Hg.? **DISCUSSION:** Pressure altitude is determined by setting the

altimeter to the standard sea level pressure of 29.92 in. Hg. on the density altitude chart, an altimeter setting of 30.10

1. 3685 feet MSL. requires you to subtract 165 feet to determine the
2. 3777 feet MSL. pressure altitude. Hence, subtract 165 feet from 3850
3. 3923 feet MSL. feet to obtain a pressure altitude of 3685 feet MSL.
4. 3870 feet MSL.
5. (Refer to figure 23) What is the pressure altitude at an airport Answer **(C)** is correct.

that is 3850 feet MSL with an altimeter setting of 29.75 in. Hg.? **DISCUSSION:** Pressure altitude is displayed on the

altimeter when it is adjusted to the standard sea level

1. 3870 feet MSL. Pressure of 29.92in. Hg. Since 29.75 is not a number
2. 3906 feet MSL. Given on the conversion chart, you need to interpolate.
3. 4008 feet MSL. On the density altitude chart, an altimeter setting of 29.70
4. 3894 feet MSL. requires you to add 205 feet to determine the pressure altitude, and 29.80 requires you to add 112 feet. Subtract 112 ft. from 205 ft. to get 93 feet difference. Since 29.75 is half way between 29.70 and 29.80, you must only add one-half the 93 ft. difference (46.5 ft.) to 112 to get 158.5 ft. You should now add 158.5 to 3850 to obtain a pressure altitude of approximately 4008 ft. MSL.
5. (Refer to figure 23) Temperature increases and pressure altitude Answer **(D)** is correct.

decreases: from 21 ºC and 2700 feet pressure altitude to 27 ºC **DISCUSSION:** On the density altitude chart, plot the and 1300 feet pressure altitude. What effect does it have on pressure of 2700 ft. at 21 ºC, to reach 4000 feet density the density altitude? altitude. Then, plot the 1300 ft. pressure altitude at

to reach 3000 feet density altitude. The following

1. 700-foot increase. 27 ºC, changes in temperature and pressure altitude
2. 700-foot decrease. results in a 1000-foot decrease (from 4000 ft. to 3000ft.)
3. 1000-foot increase. in density altitude.
4. 1000 foot decrease.
5. (Refer to figure 23) Temperature decreases and pressure altitude Answer **(C)** is correct.

increases: from 10 ºC and 2200 feet pressure altitude to -7 ºC **DISCUSSION:** On the density altitude chart, plot the and 5000 feet pressure altitude. What effect does it have on pressure altitude of 2200 ft. at 10 ºC, to reach 2000 feet

the density altitude? density altitude. Then, plot the 5000 ft. pressure altitude at at -7 ºC, to reach 3550 feet density altitude. The following changes in temperature and pressure altitude results in

1. 1200-foot decrease. a 1550-foot increase (from 2000 ft. to 3550ft.) in
2. 1300-foot decrease. density altitude.
3. 1550-foot increase.
4. 1800 foot increase.
5. (Refer to figure 23) Temperature increases and pressure altitude Answer **(D)** is correct.

decreases: from 10 ºC and 2600 feet pressure altitude to 21 ºC **DISCUSSION:** On the density altitude chart, plot the and 1000 feet pressure altitude. What effect does it have on pressure altitude of 2600 ft. at 10 ºC, to reach 2500 feet the density altitude? density altitude.Then, plot the 1000 ft. pressure altitude

at 21 ºC, to reach 1950 feet density altitude. The following

1. 750-foot increase. changes in temperature and pressure altitude results in
2. 750-foot decrease. a 550-foot decrease (from 2500 ft. to 1950ft.) in
3. 550-foot increase. density altitude.
4. 550 foot decrease.
5. (Refer to Figure 23) Determine the density altitude for Answer **(C)** is correct.

the following conditions: **DISCUSSION:** With an altimeter setting of 29.95 in. Hg., about 27 feet must be subtracted from the field elevation to

Altimeter setting: 29.95 in. Hg obtain the pressure altitude of . Interpolation was

Temperature: 4 ºC (80 ºF) used to find 27 feet because 29.98 is not given on the

Airport elevation: 2327 ft. MSL conversion chart. On the density altitude chart, an altimeter setting of 30.00 requires you to subtract 73 feet to determine the pressure altitude. However, with an altimeter setting of 29.92, nothing is subtracted or

1. 1200 feet MSL. added because that is pressure altitude. Since 29.95 is
2. 1350 feet MSL. 3/8 of the way between 29.92 and 30.00, you must
3. 1500 feet MSL. compute 3/8 of -73 which is 27.
4. 1650 feet MSL. Now that you have found the pressure altitude, enter the chart at the bottom, just above the temperature of 4 ºC. Proceed up the chart vertically until you intercept 2300-foot pressure altitude line. Finally, move horizontally to the left to reach the density altitude of 1500 feet. Since the air temperature is lower than standard, the density altitude is lower than pressure altitude.
5. (Refer to Figure 23) Determine the density altitude Answer **(A)** is correct.

for the following conditions: **DISCUSSION:** With an altimeter setting of 30.65 in. Hg., we should subtract 667 feet from the field elevation to obtain

Altimeter setting: 30.65 in. Hg a pressure altitude of 1200 feet. Interpolation was used

Temperature: 32 ºC (80 ºF) to find 667 feet: 30.60 on the graph is - 622 feet, and

Airport elevation: 1867 ft. MSL 30.70 is -712 ft. Subtract -622 feet from -712 feet to get -90 feet difference, and then add one-half the -90 feet (-45 ft.) to -622 feet to get - 667 feet. Now that

1. 3500 feet MSL. you have found the pressure altitude, enter the chart at
2. 3700 feet MSL. the bottom, just above the temperature of 32 ºC.
3. 3200 feet MSL. Proceed up the chart vertically until you intercept
4. 3100 feet MSL. 1200-foot pressure altitude. Lastly, move horizontally to the left to reach the density altitude of 3500 feet.
5. (Refer to figure 23) Temperature decreases and pressure altitude Answer **(A)** is correct.

increases: from 21 ºC and 2000 feet pressure altitude to - 1 ºC **DISCUSSION:** On the density altitude chart, plot the and 3300 feet pressure altitude. What effect does it have on pressure altitude of 2000 ft. at 21 ºC, to reach 3150 feet the density altitude? density altitude. Then, plot the 3300 ft. pressure altitude

at -1 ºC, to reach 2000 feet density altitude. The following

1. 1150-foot decrease. changes in temperature and pressure altitude results in
2. 1300-foot increase. a 1150-foot decrease (from 3150 ft. to 2000ft.) in
3. 1350-foot decrease. density altitude.
4. 1100 foot increase.
5. (Refer to figure 23) What is the pressure altitude with Answer **(B)** is correct.

an indicated altitude of 566 feet MSL and an altimeter **DISCUSSION:** Pressure altitude is displayed on the setting of 29.55 at standard temperature? altimeter when it is adjusted to the standard sea level

pressure of 29.92in. Hg., i.e., adjusting for nonstandard

1. 4140 feet MSL. Pressure. This is the indicated altitude plus or minus the
2. 4195 feet MSL. pressure altitude conversion factor (based on the current
3. 3890 feet MSL. altimeter setting). Since 29.55 is not a number given
4. 3505 feet MSL. on the conversion chart, you need to interpolate. On the density altitude chart, an altimeter setting of 29.50 requires you to add 392 feet to determine the pressure altitude, and 29.60 requires you to add 298 feet . Subtract 298 ft. from 392 ft. to get 94 feet difference. Adding one-half the 94 ft. difference (47) to 298 ft., results in 345 feet. You must add 345 feet to 3850 ft. to obtain a pressure altitude of 4195 feet.
5. (Refer to figure 22) Determine the total distance required for Answer **(B)** is correct.

takeoff to clear a 50-foot obstacle for the following conditions: **DISCUSSION:** Enter the graph at the bottom, just above

the temperature of 20 ºC. Proceed up the chart vertically

OAT: 20 ºC until you intercept the diagonal 6000-foot pressure

Pressure Altitude: 6000 ft altitude line. Then move horizontally to the first

Takeoff weight: 2600 lb reference line, and then proceed parallel to the closest

Headwind component: calm guideline to the total weight line (2600 lb). From there, move horizontally to the right to the second reference line, and because there is no wind, you may

1. 1200 feet. proceed on the same line to the third reference line.
2. 2050 feet. Finally, move parallel to the closest guideline all the
3. 2700 feet. way to the distance scale and read 2050 feet. This is
4. 2500 feet. the total distance required for takeoff to clear a 50-ft obstacle.
5. (Refer to figure 22) Determine the total distance required for Answer **(D)** is correct.

takeoff to clear a 50-foot obstacle for the following conditions: **DISCUSSION:** On the takeoff distance graph, from the

point where the standard temperature line (represented

OAT: Std by the curved line labelled ISA) crosses the 4000-ft pressure

Pressure Altitude: 4000 ft altitude line, proceed horizontally to the first reference

Takeoff weight: 2400 lb line, and then move parallel to the closest guideline to

Headwind component: calm the total weight line (2400 lb). From there, move horizontally to the right to the second reference line. Since the wind is calm, you may proceed on the same

1. 1100 feet. line to the third reference line. Finally, move parallel
2. 750 feet. to the closest guideline all the way to the distance scale
3. 1500 feet. and read 1300 feet. This is the total distance required for
4. 1300 feet. takeoff to clear a 50-ft obstacle.
5. (Refer to figure 22) Determine the total distance required for Answer **(C)** is correct.

takeoff to clear a 50-foot obstacle for the following conditions: **DISCUSSION:** Enter the graph at the bottom, just

above the temperature of 30 ºC. Proceed up the chart

OAT: 30 ºC vertically until you intercept the diagonal 6000-foot

Pressure Altitude: 6000 ft pressure altitude line. Next, move horizontally to the

Takeoff weight: 2300 lb first reference line, and then proceed parallel to the

Headwind component: 20 kts closest guideline to the total weight line (2300 lb). From there, move horizontally to the right to the

1. 1100 feet. second reference line, and then parallel to the closest
2. 850 feet. guideline to the 20 knots line. Then proceed horizontally
3. 1500 feet to the right to the third reference line. Finally, move
4. 1200 feet. parallel to the closest guideline all the way to the distance scale and read the takeoff distance of 1500 feet. This

is the total distance required for takeoff to clear a 50-ft obstacle.

1. (Refer to figure 22) Determine the approximate Answer **(B)** is correct.

ground roll distance required for takeoff. **DISCUSSION:** Enter the graph at the bottom, just above the temperature of 0 ºC. Proceed up the chart vertically

OAT: 0 ºC until you intercept the diagonal 2000-foot pressure

Pressure Altitude: 2000 ft altitude line. Next, move horizontally to the first reference

Takeoff weight: 2600 lb line, and then proceed parallel to the closest guideline to

Headwind component: Calm the total weight line (2600 lb). From there, move to the right to the second reference line. Since you must proceed

1. 900 feet. horizontally to the right to the end of the graph (skip
2. 700 feet. the third reference line because there is no obstacle to
3. 1100 feet clear) and read the ground roll of 700feet.
4. 1200 feet
5. (Refer to figure 22) Determine the approximate ground roll Answer **(A)** is correct.

distance required for takeoff. **DISCUSSION:** From the intersection of the 8000-foot

OAT: 10 ºC pressure line and 10 ºC in the left section of the graph,

Pressure Altitude: 8000 ft move horizontally to the first reference line, and then

Takeoff weight: 2800 lb proceed parallel to the closest guideline to the total

Headwind component: 10 kts weight line (2800 lb). From there, move horizontally to the right to the second reference line, and then

1. 1450 feet. parallel to the closest guideline to the right to 10 knots.
2. 2300 feet. Then you may proceed horizontally to the right, directly to
3. 1000 feet the end of the graph (skip the third reference line because
4. 1200 feet. there is no obstacle to clear) reference line of 1450 feet.
5. (Refer to figure 22) Determine the approximate ground Answer **(D)** is correct.

roll distance required for takeoff. **DISCUSSION:** From the point at which the standard temperature line (represented by the curved line labelled ISA)

OAT: Std crosses the 2000-ft pressure altitude line, proceed horizontally

Pressure Altitude: 2000 ft to the first reference line, and then move parallel to the closest

Takeoff weight: 2600 lb guideline to the total weight line (2600 lb). From there,

Headwind component: calm move horizontally to the right to the second reference line.

Since the wind is calm, you must proceed horizontally

1. 1400 feet. the right to the end of the graph (skip the third reference
2. 600 feet. line because there no obstacle to clear) and read the ground
3. 950 feet roll of 750 feet.
4. 750 feet.
5. (Refer to figure 24) Determine the fuel, time, and distance Answer **(C)** is correct.

For a normal climb from an airport at a pressure altitude of **DISCUSSION:** Find the given weight of 3400 pounds on 4000 feet to a pressure altitude of 8000 feet? the far left side of the table. Move to the right to the

The outside air temperature at the departing airport is 7 ºC pressure altitude column. Determine the time fuel and above standard, and the weight is 3400 pounds. distance-to-climb to 8000 feet at a weight of 3400

pounds (10 minutes, 21 pounds of fuel, and 20 NM to

1. 5 minutes, 29 pounds, and 11 NM. climb to 8000ft). Then read the time, fuel, and
2. 5 minutes, 11 pounds, and 11 NM. distance to be subtracted for the departing airport at a
3. 5.5 minutes, 30.1 pounds, and 12.1 NM. pressure altitude of 4000 feet (5 minutes, 10 pound of
4. 5.5 minutes, 12.1 pounds, and 12.1 NM. fuel, and 9 NM to climb to 4000).

Subtract the values for the departure altitude from the values for the cruise altitude: time: 10 – 5 = 5 minutes, fuel: 21 – 10 = 11 pounds, and distance: 20 – 9 = 11 NM. Since the temperature is 7 ºC above standard, our findings must be increased by 10% (indicated in the notes section of the chart). After adding 10%, our findings should read 5.5 minutes, 12.1 pounds, and

12.1 NM. In addition, we must add 16 pounds of fuel for engine start, taxi, and takeoff (as indicated in the notes section of the chart), which results in a fuel consumption of 30.1 pounds.

1. (Refer to figure 24) Determine the fuel, time, and distance for Answer **(D)** is correct.

a normal climb from an airport at sea level to a pressure altitude **DISCUSSION:** consumption of 30.1 pounds the left of 8000 feet? The outside air temperature at the departing column. Move to the right to the pressure altitude airport is 29 ºC, and the weight is 3700 pounds. column. Read the time, fuel, and distance-to-climb

that corresponds with the pressure altitude of 8000

1. 12 minutes, 24 pounds, and 23 NM. feet at a weight of 3700 pounds (12 minutes, 24
2. 14.4 minutes, 28.8 pounds, and 27.6 NM. pounds of fuel, and 23 NM). At sea level, the numbers
3. 14.4 minutes, 42 pounds, and 27.6 NM. read zero. Therefore, time, fuel, and distance for a
4. 14.4 minutes, 44.8 pounds, and 27.6 NM. normal climb from sea level to 8000 feet would be 12 minutes, 24 pounds, and 23 nautical miles. Since the temperature is 14 ºC above standard, our findings must be increased by 20% (as indicated in the notes section you are required to add 10% to the findings for each 7º above standard). After adding 20%, the findings should read 14.4 minutes, 28.8 pounds, and 27.6 NM. In addition, we must add 16 pounds of fuel for engine start, taxi, and takeoff (as indicated in the notes

section of the chart), which results in a fuel consumption of 44.8 pounds

1. (Refer to figure 25) Determine the fuel flow at 10000 feet on Answer **(C)** is correct.

a standard day with 65% maximum continuous thrust. **DISCUSSION:** Note that the entire chart applies to 65%

maximum continuous thrust. Locate the pressure altitude

1. 11.3 GPH. Of 10000 feet on the far left column. Follow that line to the
2. 11.8 GPH. middle section of the table under the standard day (ISA)
3. 11.5 GPH. column, and read the fuel flow of 11.5 gallons per hour.
4. 10.5 GPH.
5. (Refer to figure 25) Determine the fuel flow at 11000 feet with Answer **(B)** is correct.

a temperature of 20 ºC above standard and 65% maximum **DISCUSSION:** Note that the entire chart applies to 65% continuous thrust. maximum continuous thrust. Interpolation must be used

for this problem, because the 11000-foot pressure altitude is

1. 11.2 GPH. not a given value on this table. With a temperature of
2. 11 GPH. 20 ºC above standard, the fuel flow at 10000 feet is
3. 11.4 GPH. 11.4 GPH, and the fuel flow at 12000 ft. is 10.6 GPH.
4. 10.6 GPH. The fuel flow at 11000 ft. would be half way between the fuel flow at 10000 ft. and fuel flow at 12000 ft. You must add one-half the difference between 11.4 and 10.6 (0.8/2 GPH) to 10.6 GPH to get the fuel flow

of 11 GPH. Therefore, at 11000 feet with a temperature of 20 ºC above standard and 65% maximum continuous thrust, you should expect a fuel flow of 11 GPH.

1. (Refer to figure 25) Determine the fuel consumption for a Answer **(A)** is correct.

800-nautical mile flight under the following conditions. **DISCUSSION:** To determine the fuel consumption, you

need to know the number of hours the flight will last and

Pressure altitude: 10000 feet. the gallons per hour the airplane will burn. The chart is

Temperature: 18 ºC. divided into three sections based on air temperature. since

Manifold pressure: 20.3" Hg. temperature is 20 degrees above standard, you must use

Wind: Calm. the right section of the chart under the ISA+20 ºC column.

At 10000-foot pressure altitude, 20.3" Hg manifold

1. 54.9 gallons. pressure, and a temperature of 18 ºC, the fuel flow is 11.4
2. 57.8 gallons. GPH, and the true airspeed is 166 kts. Since the wind is
3. 51.3 gallons. calm, this trip will take 4.82 hours (800 NM/166 kts).
4. 58.3 gallons. Multiply the number of hours by gallons per hour to determine the fuel consumption for this flight:

4.82 hrs. × 11.4 GPH. = 54.9 gallons

1. (Refer to figure 25) Determine the fuel consumption for a Answer **(C)** is correct.

500-nautical mile flight under the following conditions. **DISCUSSION:** To determine the fuel consumption, you

need to know the number of hours the flight will last and

|  |  |  |
| --- | --- | --- |
| Pressure altitude: | 8000 feet. | the gallons per hour the airplane will burn. Since it is a |
| Temperature: | 2 ºC. | standard day (temperature is 2 ºC at 8000 feet), you must |
| Manifold pressure: | 20.2" Hg. | use the middle section of the chart under the STANDARD |
| Wind: | Calm. | DAY (ISA) column. |
|  |  | At 8000-foot pressure altitude, 20.2" Hg manifold |
| 1. 32.5 gallons. 2. 37.8 gallons. |  | pressure, and a temperature of 2 ºC, the fuel flow is  11.5 GPH, and the true airspeed is 161 kts. Since the |
| C. 35.8 gallons. |  | wind is calm, this trip will take 3.11 hours |
| D. 31.3 gallons. |  | (500 NM/161 kts). |
|  |  | Multiply the number of hours by gallons per hour to determine the fuel consumption for this flight: |
|  |  | 3.11 hrs. × 11.5 GPH. = 35.8 gallons |

1. (Refer to figure 25) Determine the fuel consumption for a Answer **(D)** is correct.

900-nautical mile flight under the following conditions. **DISCUSSION:** To determine the fuel consumption, you

need to know the number of hours the flight will last and

Pressure altitude: 12000 feet. the per hour the airplane will burn. Since it is a standard

Temperature: -6 º C. day gallons (temperature is 2 ºC at 8000 feet), you must

Manifold pressure: 18.8" Hg. use the middle section of the chart under the STANDARD

Wind: Calm. DAY (ISA) column.

At 12000-foot pressure altitude, 18.8" Hg manifold

1. 58.5 gallons. pressure, and a temperature of -6 ºC, the fuel flow is
2. 61.2 gallons. 10.9 GPH, and the true airspeed is163 kts. Since the
3. 63.5 gallons. wind is calm, this trip will take 5.52 hours
4. 60.2 gallons. (900 NM/163 kts).

Multiply the number of hours by gallons per hour to determine the fuel consumption for this flight:

5.52 hrs. × 10.9 GPH. = 60.2 gallons

1. (Refer to figure 25) What is the manifold pressure of an airplane Answer **(A)** is correct.

flying at a pressure altitude of 10000 feet, with a temperature **DISCUSSION:** You must use the right section of of 20 ºC above standard, and the RPM setting of 2450 to the table under the ISA+20 ºC column, because the achieve 65 percent maximum continuous power? temperature is 20°C above standard.

At a pressure altitude of 10000 feet, with a temperature

1. 20.3" Hg. 18 ºC (20 ºC above standard), and the RPM setting of
2. 20.8" Hg. 2450 to achieve 65% maximum continuous thrust, the
3. 18.8" Hg. manifold pressure will 20.3" Hg.
4. 17.4" Hg.
5. (Refer to figure 25) What is the manifold pressure of an airplane Answer **(C)** is correct.

flying at a pressure altitude of 13000 feet, at standard **DISCUSSION:** Since temperature is standard, you must temperature, and the RPM setting of 2450 to achieve use the middle section of the chart under the STANDARD 65 percent maximum continuous power? DAY (ISA) column. Since 13000-foot pressure

altitude is not given on this table, you must

1. 18.8" Hg. interpolate. The manifold pressure at 13000 ft. would
2. 17.8" Hg. be half way between the manifold pressure at 12000 ft.
3. 18.1" Hg. (18.8" Hg) and the manifold pressure at 14000 ft
4. 18.4" Hg. (17.4" Hg).

You must subtract one-half the difference between

18.8" Hg and 17.4" Hg [(18.8-17.4)/2] from 18.8" Hg

to get the manifold pressure of 18.1" Hg. Therefore, at 13000 feet pressure altitude, at standard temperature, and the RPM setting of 2450 to achieve 65% maximum continuous thrust, you should expect the manifold pressure of 18.1" Hg.

1. (Refer to figure 25) Determine the expected true airspeed of Answer **(D)** is correct.

an airplane flying at a pressure altitude of 7000 feet, with **DISCUSSION:** Since the temperature is 20 ºC below standard a temperature of 20 ºC below standard, and the RPM setting must use the left section of the table under the ISA-20

of 2450 to achieve 65 percent maximum continuous power? ºC. Since the pressure altitude of 7000 feet is not

given on this table, you need to use interpolation. The true airspeed at 7000 feet is half way between the true

1. 155 KTS. airspeed at 8000 ft. (157 kts.) and the true airspeed at
2. 162 KTS. 6000 ft. (155 kts.)
3. 160 KTS. Subtracting one-half the difference between 155 kts
4. 156 KTS. and 157 kts (1 kts) from 157 kts results 156 kts

Therefore, at 7000 feet pressure altitude, with a temperature of 20 ºC below standard, and 2450 RPM to achieve 65% maximum continuous thrust, the true airspeed will be 156 kts.

1. (Refer to figure 25) Determine the expected true airspeed of Answer **(B)** is correct.

an airplane flying at a pressure altitude of 14500 feet, **DISCUSSION:** Since temperature is standard, you must at standard temperature, and the RPM setting of 2450 to use the middle section of the chart under the STANDARD achieve 65 percent maximum continuous power? DAY (ISA) column. Since the pressure altitude of 14,500

feet is not given on this table, you need to use interpolation.

1. 156 KTS. Therefore, subtract 1/4 of the difference between the true
2. 159 KTS. airspeed at 14000 feet (160 kts) and the true airspeed at
3. 160 KTS. 16000 feet (156 kts.) from 160 kts: 160 kts – (160-156/4)
4. 161 KTS. = 159 kts. Therefore, at 14500 feet pressure altitude, at standard temperature, and 2450 RPM, the the true airspeed will be 159 kts.
5. (Refer to figure 26) Determine the crosswind component for Answer **(A)** is correct.

a wind from 260 at 20 knots when you are landing **DISCUSSION:** The crosswind component is the on runway 29. portion of that acts perpendicular to the runway.

it is found on the horizontal axis of the graph. To

1. 10 knots. determine the crosswind component, you must
2. 12 knots. Begin by calculatingthe angle between the wind
3. 18 knots. and the runway (290º -260 º = 30 º). Next, find the
4. 8 knots. intersection of 30° line and the 20-kt. wind velocity

Arc. Then, proceed down vertically to the bottom of

the chart and read the crosswind component of 10 knots.

1. (Refer to figure 26) Determine the crosswind component for Answer **(C)** is correct.

a wind from 195 at 30 knots when you are landing **DISCUSSION:** The crosswind component is the portion on runway 24. of the wind that acts perpendicular to the runway. It is

found on the horizontal axis of the graph. To determine

1. 25 knots. the crosswind component, you must begin by calculating
2. 15 knots. the angle between the wind and the runway (240º -
3. 21 knots. 195 º = 45 º). Next, find the intersection of 45 º line and
4. 30 knots. and 30-kt. wind velocity arc. Then, proceed down

vertically to the bottom of the chart and read the crosswind component of 21 knots.

1. (Refer to figure 26) Determine the headwind component for Answer **(D)** is correct.

a wind from 290 at 20 knots when you are landing **DISCUSSION:** The headwind component refers to the portion on runway 33. of the wind which acts straight down the runway toward the

airplane. The headwind component is found on the vertical axis of the graph. To determine the headwind component,

1. 13 knots. you must begin by calculating the angle between the wind
2. 20 knots. and the runway (330º - 290 º = 40 º). Next, find the
3. 10 knots. intersection of 40 º line and the 20-kt. wind velocity
4. 16 knots. arc. Then, proceed horizontally to the left and read the headwind component of approximately 16 knots.
5. (Refer to figure 26) Determine the headwind and crosswind wind Answer **(C)** is correct.

components for a wind from 270 º at 20 knots when you are **DISCUSSION:** To determine the headwind and crosswind landing on runway 21. components, you must begin by calculating the angle

between the wind and the runway (270º - 210 º = 60 º).

1. Headwind component: 10 konts. Next, find the point at which the 60º line crosses the

Crosswind component: 20 knots. 20-kt wind velocity arc. Then, move horizontally to

1. Headwind component: 17 konts. the left and read the headwind component of 10 knots.

Crosswind component: 10 knots. Lastly, proceed down vertically to the bottom of the

1. Headwind component: 10 konts. chart and read the crosswind component of 17 knots Crosswind component: 17 knots.
2. (Refer to figure 26) Determine the maximum wind velocity for a 60 º Answer **(D)** is correct.

crosswind if the maximum crosswind component for the airplane **DISCUSSION:** Enter the graph at the bottom, just above is 26 knots. the 26-kt crosswind component and move up the graph

vertically until you intercept the 60 º line. Note that the

1. 22 knots. intersection is located on the 30-kt wind velocity arc,
2. 16 knots. which means that the maximum wind velocity for a
3. 35 knots. 60 º crosswind is 30 knots if the airplane has a maximum
4. 30 knots. crosswind component of 26 knots
5. (Refer to figure 26) Determine the maximum wind velocity for a 40 º Answer **(B)** is correct.

crosswind if the maximum crosswind component for the airplane **DISCUSSION:** Enter the graph at the bottom, above the

is 29 knots. 15-kt crosswind component and proceed upward vertically until you intercept the 30-kt wind velocity arc. Note that

1. 40 knots. the intersection is located on the 30 º line, which means
2. 45 knots. that under the given condition (wind from 350º at 30 Knots),
3. 35 knots. the angular difference between runway and wind
4. 49 knots. should not exceed 30º when the airplane has a maximum crosswind component of 15 knots. Therefore, only runway 32 is acceptable for use (350 º- 320 º = 30 º).
5. (Refer to figure 26) At your destination airport the wind is from 350 º Answer **(B)** is correct.

at 30 knots, which runway (03, 30, or 32) is acceptable for use if **DISCUSSION:** Enter the graph at the bottom, above the the maximum crosswind component for your airplane is 15 knots. 25-kt crosswind component and move upward vertically

until you intersect the 35-kt wind velocity arc. Note

1. Runway 03. that the intersection is located on the 45 º line.
2. Runway 30. Therefore, under the given conditions (a 20-kt wind),
3. Runway 32. for an airplane with a 25-kt maximum cross wind component, the angular difference between runway and wind should not exceed 45 º. Hence, only runway 29 is acceptable for use (290 º- 245 º = 45 º).
4. (Refer to figure 26) At your destination airport the wind is from Answer **(B)** is correct.

245 º at 35 knots, which runway (31, 29, or 19) is acceptable **DISCUSSION:** Enter the graph at the bottom, above the for use if the maximum crosswind component for your 25-kt crosswind component and move upward vertically airplane is 25 knots. until you intersect the 35-kt wind velocity arc. Note

that the intersection is located on the 45 º line. Therefore,

* 1. Runway 31. under the given conditions (a 20-kt wind), for an
  2. Runway 29. airplane with a 25-kt maximum cross wind component,
  3. Runway 19. the angular difference between runway and wind should not exceed 45 º. Hence, only runway 29 is acceptable for use (290 º- 245 º = 45 º).

1. (Refer to figure 26) Determine the maximum wind velocity for a Answer **(A)** is correct.

50 º crosswind if the maximum crosswind component for **DISCUSSION:** Enter the graph at the figure 44, the airplane is 19 knots. just above the 19-kt crosswind component and

proceed up the graph vertically until you intercept

* 1. 25 knots. the 50° line. Note that the point where these two lines
  2. 16 knots. meet is located halfway between the 20-kt and the 30-kt
  3. 20 knots. wind velocity arc. Therefore, the maximum wind
  4. 29 knots. velocity for a 50°crosswind is 25 knots if the airplane has a maximum crosswind component of 19 knots.

1. (Refer to figure 26) At your destination airport the wind is Answer **(B)** is correct.

from 160 º at 30 knots, which runway (09, 12, or 21) is **DISCUSSION:** Enter the graph at the figure 44, above acceptable for use if the maximum crosswind the 19-kt crosswind component and move upward vertically

component for your airplane is 19 knots. until you intersect the 30-kt wind velocity arc. Note that the point where these two lines intersect is located

1. Runway 09. on the 40 º line. Therefore, under the given condition
2. Runway 12. (a 20-kt wind) for an airplane with a 19-kt maximum
3. Runway 21. cross wind component, the angular difference between runway and wind should not exceed 40 º. Therefore, only runway 12 is appropriate for landing

(160 º- 120 º = 40 º).

1. (Refer to figure 27) Determine the total distance required Answer **(B)** is correct.

to land over a 50-foot obstacle under the following **DISCUSSION:** Enter the graph at the bottom, just above conditions: the temperature of 20 ºC. Proceed up the chart vertically

until you intercept the diagonal 2000-foot pressure

OAT: 20 ºC altitude line. Next, move horizontally to the first

Pressure Altitude: 2000 ft reference line, and then proceed parallel to the closest

weight: 2300 lb guideline to 2600 lb. From there, move horizontally

Wind component: Calm to the right to the second reference line, and because the wind is calm, you may proceed horizontally on the

1. 1850 feet. same line to the third reference line. Finally, to
2. 1650 feet. determine the total distance required to land over a 50-
3. 1300 feet foot obstacle, move parallel to the closest diagonal
4. 1100 feet. guideline up all the way to the distance scale to find the landing distance of 1650 feet.
5. (Refer to figure 27) Determine the total distance required Answer **(A)** is correct.

to land under the following conditions: **DISCUSSION:** Enter the graph at the bottom, just above the temperature of 14 ºC. Move up vertically until you

OAT: 13 ºC intercept the diagonal 6000-foot pressure altitude line.

Pressure Altitude: 6000 ft Next, move horizontally to the first reference line, and

weight: 2500 lb then proceed parallel to the closest guideline to 2600

Headwind component: 20 kts. lb. From there, move horizontally to the right to the second reference line, and then parallel to the closest

1. 850 feet. guideline to the 20-knots line. Then you may proceed
2. 650 feet. horizontally to the right, directly to the end of the
3. 1050 feet graph (skip the third reference line because there is no
4. 1200 feet obstacle to clear) to read the ground roll distance of

850 feet.

1. (Refer to figure 27) Determine the total distance required to Answer **(C)** is correct.

land over a 50-foot obstacle under the following conditions: **DISCUSSION:** Begin by finding the point where the 8000

foot pressure altitude line and the standard temperature line

|  |  |  |
| --- | --- | --- |
| OAT: | Std | (the line labelled “ISA” on the left section of the graph) |
| Pressure Altitude: | 8000 ft | meet. Next, move horizontally to the right to the first |
| weight: | 2200 lb | reference line, and then proceed parallel to the closest |
| Wind component: | calm. | guideline to 2200 lb. From there, move horizontally to the |
|  |  | right to the second reference line. Since the wind is calm, |
| A. 1800 feet. |  | you may proceed horizontally on the same line to the |
| 1. 1300 feet. 2. 1650 feet. |  | third reference line. Finally, to same line to the distance required to land over a 50- foot obstacle, move |
| D. 1050 feet. |  | parallel to the closest diagonal guideline up all the way |
|  |  | to the distance scale and read1650 feet. |

1. (Refer to figure 27) Determine the total distance required to Answer **(D)** is correct.

land over a 50-foot obstacle under the following conditions: **DISCUSSION:** From the intersection of the 4000-ft

pressure altitude line and the standard temperature line

|  |  |  |
| --- | --- | --- |
| OAT: | Std | (as represented by the line labelled “ISA”), move |
| Pressure Altitude: | 4000 ft | horizontally to the right to the first reference line, |
| weight: | 2400 lb. | and then proceed parallel to the closest guideline to |
| Headwind component: | 20 Knots. | 2400 lb. From that point, move horizontally to the right to the second reference line, and then parallel |
| A. 1450 feet. |  | to the closest guideline to 20 knots. Next, you may |
| B. 900 feet. |  | horizontally to the right to the third reference line. |
| 1. 1350 feet. 2. 1150 feet. |  | proceed Then, to determine the total distance over a  a 50-foot obstacle, move parallel to the closest diagonal |
|  |  | guideline up all the way to the distance scale and read |
|  |  | 1150 feet. |

1. (Refer to figure 27) Determine the total distance required to Answer **(C)** is correct.

land over a 50-foot obstacle under the following conditions: **DISCUSSION:** From the intersection of the 8000-ft

pressure altitude line and the standard temperature line

|  |  |  |
| --- | --- | --- |
| OAT: | Std | (as represented by the line labelled “ISA”), move |
| Pressure Altitude: | 8000 ft | horizontally to the right to the first reference line, |
| weight: | 2600 lb | and then proceed parallel to the closest guideline to |
| Headwind component: | 20 Knots. | 2600 lb. From there, move horizontally to the right |

to the second reference line, and then parallel to the

* 1. 900 feet. closest guideline to 20 knots. Next, you may proceed
  2. 1600 feet horizontally to the right to the third reference line.
  3. 1450 feet. Lastly, to determine the total distance over a 50-foot
  4. 1100 feet. obstacle, move parallel to the closest diagonal

guideline up to the distance scale and read 1450 feet.

1. (Refer to figure 28) Determine the approximate landing Answer **(B)** is correct.

ground roll distance. **DISCUSSION:** At sea level, the required ground roll

is 445 knots. Note 1 at the bottom of the figure, indicates

Pressure altitude: Sea level g that your round roll distance must be decreased by 10%

Headwind: 8 kts. for each 4 knots of headwind. Since we have an 8-kt

Temperature: Std headwind, the ground roll must be reduced by 20%.

Thus, under the following conditions, the landing

1. 470 feet. ground roll distance will be 356 feet.
2. 356 feet.
3. 445 feet.
4. 401 feet.
5. (Refer to figure 28) Determine the approximate landing Answer **(C)** is correct.

ground roll distance. **DISCUSSION:** The pressure altitude of 6250 feet is half way between 5000 ft. and 7500 ft. Therefore,

Pressure altitude: 6250 feet. add the ground roll distance of 495 ft. for 5000 ft.

Headwind: 4 kts to the ground roll distance of 520 ft. for 7500 ft., and

Temperature: Std divide the total by two to obtain the ground roll distance of 507.5 feet for 6250 ft. Since you have a 4-kt headwind,

1. 508 feet. you must apply the correction for the wind. As indicated
2. 485 feet. in the notes section of this table, for each 4-kt of headwind,
3. 457 feet the landing distance is reduced by 10%. As a result,
4. 520 feet. the distance required will be 456.75 feet (508 ft. × 90%).
5. (Refer to figure 28) Determine the total distance required Answer **(B)** is correct.

to land over a 50-ft. obstacle. **DISCUSSION:** The total distance required to land over a 50-ft.obstacle at a pressure altitude of 2500 ft.

|  |  |  |
| --- | --- | --- |
| Pressure altitude: | 2500feet. | is 1135 feet. As indicated in note 2, the distance |
| Headwind: | calm. | must be increased by 10% for a temperature 60 º F |
| Temperature: | 110 º F | above standard. Since the temperature is 110 º F |
| A. 1135 feet. |  | (60 º F above standard), the total distance must be increased by 10%. |
| B. 1249 feet. |  | 1135 ft. × 110 % = 1248.5 ft. |
| C. 1022 feet. |  |  |
| D. 1320 feet. |  |  |

1. (Refer to figure 28) Determine the total distance required Answer **(D)** is correct.

to land over a 50-ft. obstacle. **DISCUSSION:** You must use interpolation to determine the total landing distance to clear a 50-ft obstacle for

|  |  |  |
| --- | --- | --- |
| Pressure altitude: | 6250 feet. | a pressure altitude of 6350 feet. Since 6350 feet is halfway |
| Headwind: | 16 kts | between 5000 ft. and 7500 ft, you must determine the |
| Temperature: | Std | distance that lies halfway between the total distance of |
|  |  | 1195 ft. (at 5000ft.) and the total distance of 1255 ft. |
| A. 1055 feet. |  | (at 7500 ft.). |
| 1. 1225 feet. 2. 858 feet. |  | (1255+1195)/2 = 1225 ft. |
| D. 735 feet. |  | Since we have a 16-kt headwind, the total distance |

must be reduced by 40% (10% for each 4kt.) 60% × 1225 ft. = 735 ft.

1. (Refer to figure 28) Determine the total distance required Answer **(C)** is correct.

to land over a 50-ft. obstacle. **DISCUSSION:** The total distance required to clear a 50-ft obstacle at a pressure altitude of 5000 ft. is

|  |  |  |
| --- | --- | --- |
| Pressure altitude: | 5000 feet. | 1195 ft. According to note 2, the distance must |
| Headwind: | calm | be increased by 10% for temperature 60 º F |
| Temperature: | 101 º F | above standard.  1195 ft. × 110% = 1314.5 ft. |
| A. 1076 feet. |  | |
| B. 1245 feet. |
| 1. 1315 feet. 2. 1420 feet. |

1. (Refer to figure 28) Determine the total distance required Answer **(A)** is correct.

to land over a 50-ft. obstacle. **DISCUSSION:** At sea level, the total distance required to land over a 50-ft obstacle is 1075 ft. The temperature

Pressure altitude: Sea level is standard (59 º F at sea level), requiring no adjustment.

Headwind: 20 kts According to note 1, the headwind of 20 kt. reduces

Temperature: 59 º F the total distance by 50% (10% for each 4kt.).

1. 538 feet. 50% × 1075 = 537.5 ft.
2. 645 feet.
3. 753 feet.
4. What items are included in the empty weight of an airplane? Answer **(B)** is correct.

**DISCUSSION:** The empty weight of an airplane

* 1. Only the airframe, engine, optional equipment, and fixed ballast. includes the weight of the airframe, engines, and
  2. Hydraulic fluid, unusable fuel, and un-drainable oil. all items of operating equipment that have fixed
  3. Usable fuel, and full engine oil. locations and are permanently installed in the aircraft.
  4. Only the airframe, engine, fixed ballast, and hydraulic fluid. It includes optional and special equipment, fixed ballast,

hydraulic fluid, unusable fuel, and un-drainable oil.

1. Ramp weight of an airplane is the: Answer **(A)** is correct.

**DISCUSSION:** Ramp weight is the term used to

* 1. takeoff weight plus the fuel to be burned during engine start, describe the airplane loaded for flight prior to engine run-up, and taxi. start. Therefore, adding the takeoff weight to the fuel
  2. empty weight plus usable fuel. burned during engine start, run-up, and taxi, yields
  3. empty weight plus payload. the ramp weight.
  4. weight of the flight crew, usable fuel, and payload.

1. That items are included in useful load of an aircraft? Answer **(B)** is correct.

**DISCUSSION:** Useful load includes the weight of

* 1. Only flight crew, usable fuel. pilots and crew, usable fuel, passengers, baggage,
  2. pilots and crew, usable fuel, passengers, baggage, cargo, cargo, and engine oil. To determine the useful load, and engine oil. either prior to engine start or at takeoff, you must
  3. Only passengers, baggage, and cargo. subtract the empty weight from ramp weight or
  4. Only usable fuel, and engine oil. takeoff weight respectively.

1. Payload is the term used for the weight of: Answer **(D)** is correct.

**DISCUSSION:** Payload includes the weight of

* 1. the passengers, and usable fuel. only the passengers, baggage, and cargo.
  2. the flight crew and usable fuel.
  3. only the baggage and cargo
  4. only the passengers, baggage, and cargo.

1. …………. is an imaginary vertical plane from which all Answer **(C)** is correct.

horizontal distances are measured for balance purposes. **DISCUSSION:** Reference datum is an imaginary

vertical plane from which all horizontal distances

1. CG limits are measured for balance purposes.
2. Moment.
3. Reference datum.
4. Arm.
5. What constitutes the difference between basic empty weight Answer **(C)** is correct.

and licensed empty weight? **DISCUSSION:** Airplanes manufactured after March 1, 1979 use the term basic empty weight. This is the

* 1. The weight of usable fuel. weight of the standard airplane, optional equipment,
  2. The weight of unusable fuel. unusable fuel, and full operating fluids including full
  3. The weight of usable oil. engine oil. However, older airplanes use the term licensed
  4. The weight of unusable oil. empty weight which is similar to basic empty weight, empty that it doesn’t include full engine oil.

1. If an aircraft exceeds its maximum certificated gross weight by Answer **(B)** is correct.

170 pounds, how many gallons of fuel must be drained to bring **DISCUSSION:** The standard weight of aviation the aircraft weight within limits? gasoline is 6 pounds per gallon. Therefore, if an

aircraft exceeds its maximum certificated gross

* 1. 22.7 gallons. weight by 170 pounds,28.4 gallons (170 lb./6)
  2. 28.4 gallons. must be drained to bring the aircraft weight within
  3. 25.4 gallons. limits.
  4. 24.3 gallons.

1. If an aircraft exceeds its maximum certificated gross weight by Answer **(C)** is correct.

130 pounds, how many gallons of fuel must be drained to bring **DISCUSSION:** The standard weight of aviation the aircraft weight within limits? gasoline is 6 pounds per gallon. Therefore, if an

aircraft exceeds its maximum certificated gross weight

* 1. 17.4 gallons. by 130 pounds,21.4 gallons (130 lb./6) must be drained
  2. 19.2 gallons. to bring the aircraft weight within limits.
  3. 21.7 gallons.
  4. 23.4 gallons

1. …………… is the imaginary point where the aircraft would Answer **(D)** is correct.

balance if it were possible to suspend it at that point. **DISCUSSION:** Center of gravity is the imaginary point

where the aircraft would balance if it were possible to

1. Datum. suspend it at that point.
2. Centrifugal force
3. Arm.
4. Center of gravity.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 175. Given: |  |  |  | Answer **(B)** is correct. |
|  | Weight | Arm | Moment | **DISCUSSION:** Begin by multiplying each weight by the arm to find begin by multiplying each weight by |
|  | (lbs.) | (in.) | (lb. – in.) | the arm to find the moment. Note that we have 40 |

Empty weight 1750 42.5 74375 gallons of fuel. To get the weight of fuel, multiply Pilot and front passenger: 320 45.6 ……. the 40 by 6 pound per gallon.

Fuel (40 gal. usable fuel): .….. 49.2 .……

(40 × 6) = 240 pounds.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Determine the center of gravity (CG) position in inches  from the datum. |  | Weight | Arm | Moment |
| A. 42.23 inches | Empty weight: | (lbs.) 1750 | (in.) 42.5 | (lb. – in.) 74375 |
| B. 43.63 inches | Pilot and front passenger: | 320 | 45.6 | 14592 |
| C. 45.46 inches | Fuel (40 gal. usable fuel): | 240 | 49.2 | 11808 |
| D. 46.87 inches. |  | 2310 |  | 100775 |

Next, add the weights and moments. Then, to determine the CG, you must divide the total moment by the total weight.

100775 ÷ 2310 = 43.63 in.

Answer **(D)** is correct.

|  |  |  |  |
| --- | --- | --- | --- |
| 176. Given: |  | | |
|  | Weight | Arm | Moment |
|  | (lbs.) | (in.) | (lb. – in.) |
| Empty weight: | 2950 | 105.2 | 310340 |
| Pilot and front passenger: | 340 | 58.0 | ……. |
| Fuel (120 gal. usable fuel): | .….. | 102.3 | .…… |

**DISCUSSION:** Begin by multiplying each weight by the arm to find the moment. Note that we have 120

gallons of fuel To get the weight of fuel, multiply the 120 by 6 pound per gallon.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | (120 × 6) = 720 lbs. |  | | |
| Determine the center of gravity (CG) position in inches from the datum. | | | |  | Weight | Arm | Moment |
|  | | | |  | (lb.) | (in.) | (lb. – in.) |
| A. 96.23 inches | | | | Empty weight: | 2950 | 105.2 | 310340 |
| B. 97.44 inches | | | | Pilot and front passenger: | 340 | 58.0 | 19720 |
| C. 98.82 inches | | | | Fuel (120 gal. usable fuel): | 720 | 102.3 | 73656 |
| D. 100.68 inches. | | | |  | 4010 |  | 403716 |
|  |  |  |  | Next, add the weights and moments. Then, to determine the CG, you must divide the total moment | | | |
|  |  |  |  | by the total weight. | | | |
|  |  |  |  | 403716 ÷ 4010 = 100.68 in. | | | |
| 177. Given: |  |  |  | Answer **(C)** is correct. | | | |
|  | Weight | Arm | Moment | **DISCUSSION:** Begin by multiplying each weight by | | | |
| Empty weight: | (lbs.) 2245 | (in.) 70.4 | (lb. – in.) 158048 | the arm to find the moment. Note that we have 80 gallons of fuel. To get the weight of fuel, multiply | | | |
| Pilot and front passenger: | 370 | 53.0 | ……. | the 80 by 6 pound per gallon. | | | |
| Rear passengers: | 350 | 88.0 | ……. |  | | | |
| Fuel (80 gal. usable fuel): | …… | 72.0 | …….. | (80 × 6) = 480 lbs. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Determine the center of gravity (CG) position in inches  from the datum. | Weight  (lbs.) | Arm  (in.) | Moment  (lb. – in.) |
|  | Empty weight: 2245 | 70.4 | 158048 |
| A. 68.34 inches. | Pilot and front passenger: 370 | 53.0 | 19610 |
| B. 69.12 inches. | Rear passengers: 350 | 88.0 | 30800 |
| C. 70.54 inches. | Fuel (80 gal. usable fuel): 480 | 72.2 | 34560 |
| D. 71.88 inches. | 3445 |  | 243018 |

Next, add the weights and moments. Then, to determine the CG, you must divide the total moment by the total weight.

243018 ÷ 3445 = 70.54 in.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 178. Given: |  |  |  | Answer **(B)** is correct. |
|  | Weight  (lbs.) | Arm  (in.) | Moment  (lb. – in.) | **DISCUSSION:** Begin by multiplying each weight by  the arm to find the moment. Note that we have 25 gallons |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Empty weight: | 1455 | 74.0 | 107607 | of fuel. To get the weight of fuel, multiply the 25 by 6 | | | |
| Pilot and front passenger: | 290 | 68.0 | ……. | pound per gallon. | | | |
| Rear passengers: | 270 | 99.0 | ……. | (25 × 6) = 150 lbs. | | | |
| Fuel (25 gal. usable fuel): | …… | 72.0 | …….. |  | | | |
|  |  |  |  | Weight Arm Moment | | | |
| Determine the center of gravity (CG) position in inches  from the datum. | | | | Empty weight: | (lbs.)  1455 | (in.)  74.0 | (lb. – in.)  107607 |
|  | | | | Pilot and front passenger: | 290 | 68.0 | 19720 |
| A. 75.11 inches. | | | | Rear passengers: | 270 | 99.0 | 26730 |
| B. 76.15 inches. | Fuel (25 gal. usable fuel): 150 | | | | | 72.0 | 10800 |
| C. 77.98 inches. | 2165 | | | | |  | 164857 |
| D. 78.85 inches. |  | | | | |  |  |

Next, add the weights and moments. Then, to determine the CG, you must divide the total moment by the total weight.

164857 ÷ 2165 = 76.15 in.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 179. Given: |  |  |  | Answer **(A)** is correct. |
|  | Weight | Arm | Moment | **DISCUSSION:** Begin by multiplying each weight |
| Empty weight: | (lbs.)  3145 | (in.) (lb 95.4 | .-in.) 300033 | by the arm to find the moment. Note that we have 140 gallons of fuel. To get the weight of fuel, multiply the |
| Pilot and front passenger: | 330 | 55.0 | ……. | 140 by 6 pound per gallon. |
| Center passengers: | 345 | 88.0 | ……. | (140 × 6) = 840 lbs. |
| Aft passengers: | 290 | 123.0 | ….… |  |
| Fuel (140 gal. usable fuel): | .….. | 82.0 | .…… | Weight Arm Moment |
|  |  |  |  | \_ (lbs.)\_ (in.)\_ (lb.-in.) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Determine the center of gravity (CG) position in inches Empty weight: | | 3145 | 95.4 | 300033 |
| from the datum. Pilot and front passenger: | | 330 | 55.0 | 18150 |
| Center passengers: | | 345 | 88.0 | 30360 |
| A. 91.53 inches. | Aft passengers: | 290 | 123.0 35670 | |
| B. 92.88 inches. | Fuel (180 gal. usable fuel): | 840 | 82.0 | 68880 |
| C. 94.12 inches. |  | 4950 |  | 453093 |
| D. 95.35 inches. | Next, add the weights and moments. Then, to determine the | | | |
|  | CG, you must divide the total moment by the total weight. | | | |

453093 ÷ 4950 = 91.53 in.

1. (Refer to figure 29) Find the maximum amount of baggage that Answer **(B)** is correct.

may be loaded aboard the airplane for the CG to remain within **DISCUSSION:** To determine the maximum amount of allowable limits. baggage that may be loaded aboard the airplane, you

must find the moment for the items you intend to have Weight (lbs.) MOM/1000 aboard the airplane by using the loading graph and add (lbs.) (lb.-in.) them. First, begin by finding the moment for the pilot and

Empty weight: 1445 55.2 front seat passenger. The total weight of pilot and

Pilot and front passenger: 280 ……. front seat passenger is 290 lb. Find 290 on the vertical

Rear passengers: 320 ……. axis of the loading graph (Load weight). From that

Baggage …… …….. point, proceed horizontally to the right until you

Fuel, 25gal. …… …….. intercept the diagonal line that identifies the pilot and

Oil, 8 Qt. …... -0.2 front passenger. From there, proceed vertically to the bottom of the graph and read the moment of 10.5.

1. 80 pounds. Repeat the same process for the rear passengers to find
2. 90 pounds. the moment of 23.5.
3. 100 pounds. To determine the moment of fuel, you must begin by
4. 110 pounds. finding the weight of the fuel. Multiply 25 gallons by 6 to find a total fuel weight of 150 pounds. Locate the value of 150 pounds on the vertical axis at the left side of the loading graph. Then, proceed horizontally until

the 150-lb. line intersects a diagonal that represents the fuel.

From there, move vertically downward to the bottom of the graph to read the moment of 7.5.

According to note 2 at the bottom of the loading

graph, 8 qt. of oil weighs 15 pounds and a moment of -0.2.

Add the weights and the moments.

Total weight: 1445+280+320+150+15 = 2210 lbs.

Total moment: 55.2+10.5+23.5+7.25-0.2 = 96.25 lb.-in.

With this information, refer to the center of gravity moment envelop graph, note that the weight must be kept under 2300 lb. to remain within the envelop. Therefore, subtracting 2210 from 2300, leaves a maximum of 90 lb. for baggage. You need to make sure that adding 90 pounds of baggage does not exceed the 109 moments allowed.

Refer to loading graph, 90 lb of baggage indicates 8.5 moments. Add 8.5 to 96.25 to obtain a total of 104.75 moments. Note that the intersection of the 2300-lb.

line and the line that represents 105.75 moment is within the envelope.

1. (Refer to figure 29) Determine the moment of the airplane. Answer **(C)** is correct.

**DISCUSSION:** First we need to calculate the fuel weight.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Weight (lbs.) | MOM/1000 | Since one gallon of fuel weighs 6 lb, multiply 45 gallons |
| (lbs.) | (lb.-in.) | by 6 to get 270 lb. of fuel. |
| Empty weight: | 1320 | 49.5 | Use the loading graph in figure 29 to find the moment |
| Pilot and front passenger: | 360 | ……. | of each useful load item. The empty weight moment |
| Rear passengers: | 110 | ……. | is 49.5 lb.-in. Determine the moment for the pilot and |
| Fuel, 45 gal | …… | …….. | front seat passenger as 13.5, the rear seat passenger as |
| Oil, 8 Qt. | …... | -0.2 | 8, the fuel as 13 Lastly, add all the moments to arrive at the |
|  |  |  | total moment of 83.8 lb.-in. |

1. 81.4 pound-inches
2. 82.6. pound-inches.
3. 83.8 pound-inches.
4. 84.4 pound-inches.

Weight (lbs.) MOM/1000 (lbs.) (lb.-in.)

Empty weight: 1320 49.5

Pilot and front passenger: 360 13.5

Rear passengers: 110 8

Fuel, 45 gal 270 13

Oil, 8 Qt. 15 -0.2

2075 83.8

1. During weight and balance computations for a flight, you find that Answer **(D)** is correct. the proposed loading places the CG 1.2 inches behind the aft **DISCUSSION:**

CG limit. The total weight of the airplane is 1850 pounds. We use the weight-shift formula to solve this problem.

Determine how much cargo must be shifted from the aft baggage area at station 160 to the forward baggage area at station 130 to bring the CG within allowable limits.

1. 60 pounds.
2. 64 pounds.
3. 70 pounds.
4. 74 pounds.

Weight Moved Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

Weight Moved 1.2

——————— = ———————— 1850 (160-130)

Weight Moved 1.2

——————— = ———————— 1850 30

Weight to be shifted = 74 pounds

1. During weight and balance computations for a flight, you find Answer **(D)** is correct. that the proposed loading places the CG 1.5 inches behind the **DISCUSSION:**

aft CG limit. The total weight of the airplane is 3540 pounds. We use the weight-shift formula to solve this problem.

Determine how much weight must be shifted from the rear seat at station 125 to the center seats at station 95 to bring the CG within allowable limits.

1. 145 pounds.
2. 156 pounds.
3. 165 pounds.
4. 177 pounds.

Weight Moved Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Location

Weight Moved 1.5

——————— = ———————— 3540 (125-95)

Weight Moved 1.5

——————— = ———————— 3540 30

Weight to be shifted = 177 pounds

1. Assume that the total weight of an airplane is 6630 pounds and Answer **(A)** is correct. its CG is located at station75. Determine the location of the CG **DISCUSSION:**

if 120 pounds of cargo is added to station 165.

1. 76.6 inches.
2. 75.2 inches.
3. 73.4 inches
4. 78.0 inches.

Added Weight Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

120 ΔCG

———— = ———— 6630+120 165-75

120 ΔCG

———— = ———— 6750 90

ΔCG = 1.6 inches

New CG = Old CG + ΔCG = 75+1.6 = 76.6 in.

1. Assume that the total weight of an airplane is 1820 pounds and Answer **(C)** is correct. its CG is located at station 45. Determine the location of the CG **DISCUSSION:**

if 180 pounds of weight is added to the rear seat at 70 station.

* 1. 43.0 inches.
  2. 45.45 inches.
  3. 47.25 inches
  4. 48.75 inches.

Added Weight Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

180 ΔCG

———— = ———— 1820+180 70-45

180 ΔCG

———— = ———— 2000 25

ΔCG = 2.25 inches

New CG = Old CG + ΔCG = 45+2.25 = 47.25 in.

1. Assume that the total weight of an airplane is 2717 pounds and Answer **(B)** is correct. its CG is located at station 60. Determine the location of the CG **DISCUSSION:**

if 55 pounds of weight is added to the baggage area B at 123 station.

1. 59.75 inches.
2. 61.25 inches.
3. 62.50 inches.
4. 58.75 inches.

Added Weight Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

55 ΔCG

———— = ———— 2717+55 123-60

55 ΔCG

———— = ———— 2772 63

ΔCG = 1.25 inches

New CG = Old CG + ΔCG = 60+1.25 = 61.25 in.

1. Assume that the total weight of an airplane is 2170 pounds and its Answer **(D)** is correct. CG is located at station 42. Determine the location of the CG if **DISCUSSION:**

70 pounds of weight is removed from the rear seat at 78 station.

* 1. 38.8 inches.
  2. 39.5 inches.
  3. 40.2 inches.
  4. 40.8 inches.

Weight Removed Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

70 ΔCG

———— = ———— 2170-70 78-42

70 ΔCG

———— = ———— 2100 36

ΔCG = 1.2 inches

New CG = Old CG - ΔCG = 42 - 1.2 = 40.8 in.

1. Assume that the total weight of an airplane is 8200 pounds and Answer **(A)** is correct.

its CG is located at station 93. Determine the location of the CG **DISCUSSION:**

if 200 pounds of weight is removed from the aft baggage area at 193 station.

1. 90.50 inches.
2. 90.75 inches.
3. 91.25 inches.
4. 91.50 inches.

Weight Removed Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

200 ΔCG

———— = ———— 8200-200 193-93

200 ΔCG

———— = ———— 8000 100

ΔCG = 2.5 inches

New CG = Old CG - ΔCG = 93 - 2.5 = 90.5 in.

1. Assume that the total weight of an airplane is 3425 pounds and its Answer **(C)** is correct. CG is located at station 68. Determine the location of the CG if **DISCUSSION:**

75 pounds of weight is removed from the aft baggage area at

135 station. Weight Removed Distance CG Moves

—————————— = ——————————

* 1. 65.25 inches. Total Airplane Weight Distance Between Arm
  2. 65.75 inches. Locations
  3. 66.50 inches. 75 ΔCG
  4. 67.25 inches. ———— = ————

3425-75 135-68

75 ΔCG

———— = ———— 3350 67

ΔCG = 1.5 inches

New CG = Old CG - ΔCG = 68 - 1.5 = 66.5 in.

1. An airplane has a total weight of 4650 pounds and a CG Answer **(D)** is correct.

located at 62 inches. This airplane is loaded with 130 **DISCUSSION:** In this example, you are asked to find the CG gallons of fuel at station 57 inches. Assume the airplane location after 4 hours and 10 minutes (250 minutes) of flight. burns 15 gallons per hour (fuel weighs 6 lb. per gal.), This airplane burns 14 gallons per hour (g.p.h.). You can where will the CG be located after 4 hours and divide 15 gallons per hour by 60 minutes to get 0.25 gallons

10 minutes of flight? per minute fuel consumption. Next, to determine the amount of fuel that the airplane burns during this flight,

* 1. 61.65 inches aft of datum. multiply 0.25 g.p.m. by 250 minutes during this flight,
  2. 61.35 inches aft of datum. get 62.5 gallons. Then, multiply 62.5 gallons by 6
  3. 62.65 inches aft of datum. pounds per gal. to get 375 pounds of fuel.
  4. 62.35 inches aft of datum.

Weight Removed Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

375 ΔCG

———— = ———— 4650-375 62-57

375 ΔCG

———— = ———— 4275 5

ΔCG = 0.35 inches

Since the CG is moving aft, the ΔCG is added to the old CG. New CG = Old CG + ΔCG = 62 + 0.35 = 62.35 in.

1. An airplane has a total weight of 2820 pounds and a CG located Answer **(B)** is correct.

at 45 inches. This airplane is loaded with 80 gallons of fuel **DISCUSSION:** In this example, you are asked to find the

at station 42 inches. Assume the airplane burns 12 gallons CG location after 3 hours (180 minutes) of flight. This airplane per hour (fuel weighs 6 lb. per gal.), where will the CG be burns 12 gallons per hour (g.p.h.). You need to divide

located after 3 hours of flight? 12 gallons per hour by 60 minutes to get 0.2 gallons per minute fuel consumption. Next, to determine the

1. 45.85 inches aft of datum. amount of fuel that the airplane burns during this
2. 45.25 inches aft of datum. flight, multiply 0.2 g.p.m. by 180 minutes (0.2 × 180)
3. 44.75 inches aft of datum. to get 36 gallons. Then, multiply 36 gallons by 6
4. 44.20 inches aft of datum. pounds per gal. to get 216 pounds of fuel.

Weight Removed Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

216 ΔCG

———— = ———— 2820-216 45-42

216 ΔCG

———— = ———— 2604 3

ΔCG = 0.25 inches

Since the CG is moving aft, the ΔCG is added to the old CG.

1. An airplane has a total weight of 4360 pounds and a CG located Answer **(B)** is correct.

at 67 inches. This airplane is loaded with 160 gallons of fuel **DISCUSSION:** In this example, you are asked to find the at station 62 inches. Assume the airplane burns 24 gallons CG location after 2 hours and 30 minutes (150 minutes) per hour (fuel weighs 6 lb. per gal.), where will the CG of flight. This airplane burns 24 gallons per hour (g.p.h.). be located after 2 hours and 30 minutes of flight? You need to divide 24 gallons per hour by 60 minutes to

get 0.4 gallons per minute fuel consumption. Next, to

1. 67.82 inches aft of datum. determine the amount of fuel that the airplane burns
2. 67.45 inches aft of datum. during this flight, multiply 0.4 g.p.m. by 150 minutes
3. 66.48 inches aft of datum. (0.4 × 150) to get 60 gallons. Then, multiply 60
4. 66.25 inches aft of datum. gallons by 6 pounds per gal. to get 360 pounds of fuel.

Weight Removed Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

360 ΔCG

———— = ———— 4460-360 67-62

360 ΔCG

———— = ———— 4000 5

ΔCG = 0.45 inches

Since the CG is moving aft, the ΔCG is added to the old CG. New CG = Old CG + ΔCG = 67 + 0.45 = 67.45 in.

1. An airplane has a total weight of 5750 pounds and a CG located Answer **(C)** is correct.

at 72 inches. This airplane is loaded with 180 gallons of fuel **DISCUSSION:** In this example, you are asked to find the at station 75 inches. Assume the airplane burns 30 gallons CG location after 4 hours and 40 minutes (200 minutes) per hour (fuel weighs 6 lb. per gal.), where will the CG of flight. This airplane burns 30 gallons per hour (g.p.h.). be located after 4 hours and 40 minutes of flight? You need to divide 30 gallons per hour by 60 minutes to

get 0.5 gallons per minute fuel consumption. Next, to

1. 71.11 inches aft of datum. determine the amount of fuel that the airplane burns
2. 71.32 inches aft of datum. during this flight, multiply 0.5 g.p.m. by 200 minutes
3. 71.79 inches aft of datum. (0.5 × 200) to get 100 gallons. Then, multiply 100
4. 72.21 inches aft of datum. gallons by 6 pounds per gal. to get 600 pounds of fuel.

Weight Removed Distance CG Moves

—————————— = ——————————

Total Airplane Weight Distance Between Arm

Locations

600 ΔCG

———— = ———— 5750-600 75-72

360 ΔCG

———— = ———— 5150 3

ΔCG = 0.21 inches . Since the CG is moving forward, the ΔCG is subtracted from the old CG.

New CG = Old CG + ΔCG = 72 - 0.21 = 71.79 in.

1. What flight characteristic could be expected when the CG of Answer **(A)** is correct.

the airplane is located near the forward limit? **DISCUSSION:** Forward CG effects:

- More stable.

* 1. The airplane becomes more stable. - Higher stall speed.
  2. The airplane will have a lower takeoff speed and ground roll. - Higher takeoff speed and longer ground roll.
  3. The airplane will have a lower stall speed. - Reduced pitch authority.
  4. The airplane performance is reduced due to decreased - Slower cruise speed.

tail-down force. - Decrease in performance due to increased tail-down loading.

- reduced maneuverability.

1. What flight characteristic could be expected when the CG of Answer **(C)** is correct.

the airplane is located at the aft limit? **DISCUSSION:** - Increased risk of stall.

- Increased risk of spin that may be difficult or

* 1. The airplane will have a lower cruise speed for the power setting. impossible to recover.
  2. The airplane will become more stable. - Decreased stability.
  3. Increased risk of stalls and spins. - Higher cruise speed.
  4. The airplane will have a tendency to pitch-down due to the aft CG position.

INTENTIONALLY

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# CHAPTER 4

## METEROLOGY FOR PIOLTS

* **Basic Weather Theory**
* **Weather Patterns**
* **Weather Hazards**

1. A characteristics of the stratosphere is. . . . . . Answer **(C)** is correct.

**DISCUSSION:** Above the tropopause is the

1. An overall decrease of temperature with an increase stratosphere. This layer is typified by relatively in altitude. small changes in temperature with height expect
2. A relatively even base altitude of approximately for a warming trend near the top. 35,000 feet.
3. Relatively small changes in temperature with an increase in altitude.
4. The average height of the troposphere in the Answer **(C)** is correct.

middle latitudes is **DISCUSSION:** The height of the troposphere varies with latitude and seasons. It slopes from

* 1. 20,000 feet. about 20,000 feet over the poles, to an average
  2. 25,000 feet. of 37,000 feet over the mid-latitudes, to about
  3. 37,000 feet. 65,000 feet over the Equator, and it is higher in

summer than in winter.

1. Which feature is associated with the tropopause ? Answer **( C )** is correct.

**DISCUSSION:** Temperature over the tropical tropopause

* 1. Absence of wind and turbulent conditions. increases remain almost constant. an abrupt change in
  2. Absolute upper limit of cloud formation. temperature lapse rate characterizes tropopause .
  3. Abrupt change in temperature lapse rate.

1. The primary cause of all changes in the Earth’s Answer **(A)** is correct.

weather is **DISCUSSION:** Every physical process of weather

is accompanied by or is the result of a heat

1. Variation of solar energy received by the Earth’s exchange. Differences in solar energy create regions temperature variations. these temperature
2. Changes in air pressure over the Earth’s surface. variations create forces that drive the atmosphere
3. Movement of the air masses. in its endless motion.
4. If the air temperature is +8°C at an elevation of Answer **(B)** is correct.

1,350 feet and a standard (average) temperature **DISCUSSION:** temperature normally decreases

lapse rate exists, what will be the approximate with increasing altitude throughout the troposphere.

freezing level ? This decrease of temperature with altitude

is defined as lapse rate. The average decrease of

1. 3,350 feet MSL. temperature ( average lapse rate ) in the troposphere
2. 5,350 feet MSL. is 2°C per 1,000 feet. An 8°C loss is necessary
3. 9,350 feet MSL. to reach 0°C, or freezing, in this situation. At

2°/1,000 feet the amount of altitude gain necessary would be:

* 1. 8°C ÷ 2 = 4 or 4,000 ft
  2. 1,350 ft MSL ( altitude at +8°C )

+4,000 ft (altitude gain necessary to reach 0°C)

5,350 ft (approximate freezing level)

1. A common type of ground or surface based Answer **(C)** is correct.

temperature inversion is that which is produced by **DISCUSSION:** an increase in temperature with altitude is defined as an inversion. an inversion

* 1. Warm air being lifted rapidly aloft in the vicinity of often develops near the ground on clear, cool mountainous terrain. nights when wind is light. The ground radiates
  2. The movement of colder air over warm air, or the and cools much faster than the overlying air. Air movement of warm air under cold air. in contact with the ground becomes cold while
  3. Ground radiation on clear, cool night when the wind the temperature a few hundred feet above change is light. very little. Thus temperature increases with height.

1. The most frequent type of ground or surface- Answer **(A)** is correct.

based temperature inversion is that produced by **DISCUSSION:** An inversion often develops near the ground on clear, cool nights when wind is light.

* 1. Radiation on a clear, relatively still night. The ground radiates and cools much faster than
  2. Warm air being lifted rapidly aloft in the vicinity than the overlying air. Air in contract with the of mountainous terrain. ground becomes cold while the temperature a
  3. The movement of colder air under warm air, or few hundred feet above changes very little. the movement of warm air over cold air. Thus temperature increases with height.

1. What feature is associated with a temperature Answer **(A)** is correct.

inversion ? **DISCUSSION:** A temperature inversion occurs

when the temperature increases with altitude. A

1. A stable layer of air. stable layer of air is characterize by warmer air
2. An unstable layer of air. lying above colder air. With an inversion, the
3. Air mass thunderstorms. layer is stable and convection is suppressed.
4. A temperature inversion will normally from only Answer **(A)** is correct.

**DISCUSSION:** If the temperature increases with

* 1. In stable air. altitude through a layer (an inversion), the layer
  2. In unstable air. is stable and convection is suppressed. Air may be
  3. When a stable form layer merges with a cumuliform mass. unstable beneath the inversion.

1. Which weather conditions should be expected Answer **(A)** is correct.

beneath a low-level temperature inversion layer **DISCUSSION:** A ground-based inversion favors

when the relative humidity high ? poor visibility by trapping fog, smoke, and other restrictions into low levels of the atmosphere.

1. Smooth air and poor visibility due to fog, haze, wind just above the inversion may be relatively or low clouds. Strong . A wind shear zone develops between the
2. Light wind shear and poor visibility due to haze and the clam and the stronger winds above. Eddies light than. in the shear zone cause airspeed fluctuations as
3. Turbulent air and poor visibility due to fog, low stratus an aircraft climbs or descends through the inversion . type cloud, and showery precipitation.
4. What causes surface winds to flow across the isobars Answer **(B)** is correct.

at angle rather than parallel to the isobars ? **DISCUSSION:** Friction between the wind and the surface slows the wind. As frictional force slows

* 1. Coriolis force. the wind speed, Coriolis force decreases. however
  2. Surface friction. friction does not affect pressure gradient force.
  3. The greater density of the air at the surface. pressure gradient and coriolis force are no longer in balance. The stronger pressure bars toward lower pressure until the three forces balance

the angle of surface wind to isobars is about 10° over water, increasing with roughness of terrain .

1. Winds at 5,000 feet AGL on a particular flight are Answer **(B)** is correct.

southwesterly while most of the surface winds are **DISCUSSION:** Surface winds and winds at

southerly. This difference in direction is primarily altitude can differ due to friction. Friction

due to: between the wind and the surface slows the

wind.

1. A stronger pressure gradient at higher altitudes.
2. Friction between the wind and the surface.
3. Stronger Coriolis force at the surface.
4. What relationship exists between the winds at Answer **(B)** is correct.

2,000 feet above the surface and the surface winds ? **DISCUSSION:** Close to the earth, wind direction

is modified by the contours over which it passes

1. The winds at 2,000 feet and the surface winds flow and wind speed is reduced by friction with the in the same direction, but the surface winds surface are at an angle across the isobars due

are weaker due to friction. to the stronger pressure gradient. At levels 2,000

1. The winds at 2,000 feet tend to parallel the isobars feet above the surface, the speed is greater and while the surface winds cross the isobars at an the direction is usually parallel to the isobars. angle toward lower pressure and are weaker.
2. The surface winds tend to veer to the right of the winds at 2,000 feet and are usually weaker.
3. Which force, in the northern Hemisphere, acts Answer **(C)** is correct.

at a right angle of the wind and deflects it to the right **DISCUSSION:** Coriolis force is at a right angle to until parallel to the isobars ? wind speed. In the Northern Hemisphere, the air is

deflected to the right.

1. Centrifugal.
2. Pressure gradient.
3. Coriolis.
4. Clouds , fog or dew will always from when Answer **(A)** is correct.

**DISCUSSION:** When temperature reaches the

* 1. Water vapor condenses. dew point, water vapor can no longer remain
  2. Water vapor is present. invisible but is forced to condense, becoming
  3. The temperature and dew point are equal. visible on the ground as dew, appearing in the air as fog or clouds, or falling to the earth as rain.

1. To which meteorological condition does the term Answer **(A)** is correct.

“dew point” refer ? **DISCUSSION:** Dew point is the temperature to which air must be cooled to become saturated by the water

* 1. The temperature to which air must be cooled to water vapor already present in the air aviation weather become saturated. reports normally include the air temperature and dew
  2. The temperature at which condensation and point temperature. dew point, when rated to air evaporation are equal. temperature, reveals qualitatively how close the air
  3. The temperature at which dew will always from. is to saturation.

1. The amount of water vapor which air can hold largely Answer **(B)** is correct.

depends on **DISCUSSION:** Temperature largely determines the

maximum amount of water vapor air can hold.

1. Relative humidity. Warm air can hold more water vapor than cool air .
2. Air temperature.
3. Stability of air.
4. What enhances the growth rate of precipitation ? Answer **(B)** is correct.

**DISCUSSION:** Cloud particles collide and merge into

* 1. Advection action. a larger drop in the more rapid growth process. This
  2. Upward currents. process produces larger precipitation particles and dose
  3. Downward movement. so more rapidly than the simple condensation growth process. Upward currents enhance the growth rate and also support larger drops.

1. What temperature condition is indicated if wet Answer **(A)** is correct.

snow is encountered at your flight altitude ? **DISCUSSION:** Wet snow at your altitude means that the temperature is above freezing since the snow

* 1. The temperature is above freezing at your altitude. has begun to melt. For snow to from, water vapor must
  2. The temperature is below freezing at your altitude. go from the vapor state to the solid state (known as
  3. You are flying from a warm air mass into a cold air sublimation) with the temperature below freezing.

mass. Since melting snow has been encountered, the

freezing level must be at a higher altitude.

1. The presence of ice pellets at the surface is evidence Answer **(C)** is correct.

that. . . **DISCUSSION:** Rain falling through colder air may

become super cooled, freezing on impact as freezing

1. There are thunderstorms in the area. rain; or it may freeze during its descent, falling as
2. A cold front has passed. ice pellets. Ice pellets always indicate freezing rain
3. There is freezing rain at a higher altitude. at higher altitude.
4. Which precipitation type normally indicates freezing Answer **(C)** is correct.

rain at higher altitudes ? **DISCUSSION:** ice pellets always indicate freezing rain at higher altitudes.

1. Snow
2. Hail.
3. Ice pellets.
4. Stability can be determined from which measurement Answer **(B)** is correct.

of the atmosphere ? **DISCUSSION:** A change in ambient temperature lapse rate of an air mass can tip the balance between

* 1. Low-level winds stable or unstable air. The ambient lapse rate is the
  2. Ambient lapse rate. rate of decrease in temperature with altitude.
  3. Atmospheric pressure.

1. What determines the structure or type of clouds Answer **(B)** is correct.

which from as a result of air being forced to ascend ? **DISCUSSION:** Clouds type or structure is determined

by whether the air is stable or unstable within the

1. The method by which air is lifted. layer forced upward, when stable air is forced up-
2. The stability of the air before lifting occurs. ward, the air tends to retain horizontal flow and
3. The amount of condensation nuclei present after any cloudiness is flat and disturbance grows, and lifting occurs. stratified. when unstable air is forced upward, the

disturbance grows, and resulting cloudiness shows “head ped” or cumulus development.

1. Unsaturated air flowing up slope will cool that the Answer **(A)** is correct.

rate of approximately (dry adiabatic lapse rate). **DISCUSSION**: Unsaturated air flowing up slope will cools and warms at about 3°C (5.4 °F) per 1,000 feet.

1. 3°C per 1,000 feet.
2. 2°C per 1,000 feet.
3. 2.5°C per 1,000 feet.
4. What type of clouds will be formed if very stable Answer **(C)** is correct.

moist air is forced up slope ? **DISCUSSION:** When stable air is forced upward the air tends to retain horizontal flow and any

* 1. First stratified clouds and then vertical clouds. cloudiness is flat and stratified. when unstable
  2. Vertical clouds with increasing height. air is forced upward, the disturbance grows and
  3. Stratified clouds with little vertical development. any resulting cloudiness show extensive vertical development.

1. When type clouds can be expected when an un- Answer **(C)** is correct.

stable air mass is forced to ascend a mountain slope ? **DISCUSSION:** When stable air is forced upward,

the air tends to retain horizontal flow and any

1. Layered clouds with little vertical development. cloudiness is flat and stratified. When unstable
2. Stratified clouds with considerable associated air is forced upward, the disturbance grows and turbulence. any resulting cloudiness shows extensive vertical
3. Clouds with extensive vertical development. development.
4. Which of the following combinations of weather Answer **(C)** is correct.

producing variables would likely result in cumuliform **DISCUSSION:** Unstable air favors convection. type clouds, good visibility, rain showers, and A cumulus cloud forms in a convective updraft

possible clear-type icing in clouds ? and builds upward. The initial lifting that triggers a cumuliform cloud can be either orographic

1. Unstable, moist air, and no lifting mechanism. (topographical, i.e., mountains) or by surface
2. Stable, dry air, and orographic lifting. heating. For convective cumuliform clouds to
3. Unstable, moist air, and orographic lifting. develop, the air must be unstable after saturation.
4. The suffix “nimbus”, used in naming clouds. Answer **(B)** is correct.

means a **DISCUSSION:** The prefix “nimbus -“ or suffix

“-nimbus” means raincloud. Thus, stratified clouds

1. Cloud with extensive vertical development. from which rain is falling are called nimbostratus.
2. Rain cloud. A heavy, swelling cumulus-type cloud which
3. Huge massive, towering cloud. produces precipitation is a cumulonimbus.
4. What are four families of clouds ? Answer **(C)** is correct.

**DISCUSSION:** For identification purposes, cloud

* 1. Stratus, Cumulus, nimbus, and cirrus. types are divided into four “families”. The families
  2. Clouds formed by updrafts, fronts, cooling layers of are high clouds, middle clouds, low clouds, and air, and precipitation into warm air. clouds with extensive vertical development.
  3. High, middle, low, and those with extensive vertical development.

1. A high cloud is composed mostly of Answer **(C)** is correct.

**DISCUSSION:** The high cloud family is cirrus form

* 1. Ozone. and includes cirrus, cirrocumulus, and cirrostratus
  2. Condensation nuclei. they are composed almost entirely of ice crystals.
  3. Ice crystals.

1. Which family of clouds is least likely to contribute Answer **(B)** is correct.

to structural icing on an aircraft ? **DISCUSSION:** Tow conditions are necessary for structural icing in flight :

* 1. Low clouds. 1. The aircraft must be flying through invisible
  2. High clouds. water such as rain or cloud droplets, and
  3. Clouds with extensive vertical development. 2. The temperature, at the point where the moisture strikes the aircraft must be 0°C or colder.

The high cloud family is composed almost entirely of ice crystals. Because ice crystals are already frozen, they most likely won’t stick to an aircraft.

1. Which clouds have the greatest turbulence ? Answer **(B)** is correct.

**DISCUSSION:** Cumulonimbus clouds are the ultimate

* 1. Towering cumulus. manifestation of instability. They are vertically
  2. Cumulonimbus. developed clouds of large dimensions with dense
  3. Altocumulus castellans. boiling tops, often crowned with thick veils of

cirrus ( the anvil). nearly the entire spectrum of flying hazard are contained in these clouds , including violent turbulence. They should be avoided at all times.

1. Standing lenticular clouds, in mountainous areas, Answer **(C)** is correct.

indicate **DISCUSSION:** Standing lenticular altocumulus

clouds are formed on the crests of waves created

1. An inversion. by barriers to the wind flow. The clouds show little
2. Unstable air. movement, hence the name “standing.” However,
3. Turbulence. wind can be quite strong blowing through such

clouds. The presence of these clouds is a good indication of very strong turbulence and should be avoided.

1. The presence of standing lenticular altocumulus clouds Answer **(B)** is correct.

is a good indication of **DISCUSSION:** Standing lenticular altocumulus clouds are formed on the crests of waves created

1. A jet stream. by barriers to the wind flow. the clouds show little
2. Very short turbulence. movement, hence the name “standing” However
3. Heavy icing conditions. wind can be quite strong blowing through such clouds. The presence of these clouds is a good indication of very strong turbulence and they should be avoided.
4. Fair weather cumulus clouds often indicate Answer **(A)** is correct.

**DISCUSSION:** Fair weather cumulus clouds often

* 1. Turbulence at and below the cloud level. indicate bumpy turbulence beneath and in the
  2. Poor visibility. clouds but good visibility. The cloud tops indicate
  3. Smooth flying conditions. the approximate upper limit of convection; flight above is usually smooth.

1. Fog is usually prevalent in industrial areas Answer **(B)** is correct.

because of **DISCUSSION:** Abundant condensation nuclei enhance the formation of fog . Thus , fog is prevalent in industrial area where byproducts of these nuclei.

1. Atmospheric stabilization around cities.
2. An abundance of condensation nuclei from combustion products.
3. Increased temperatures due to industrial heating.
4. Under which condition does advection fog usually form? Answer **(A)** is correct.

**DISCUSSION:** Advection fog forms when moist air

* 1. Moist air moving over colder ground or water. moves over colder ground or water.
  2. Warm, moist air settling over a cool surface under no-wind conditions.
  3. A land breeze blowing a cold air mass over a warm water water current.

1. In which situation is advection fog most likely to form ? Answer **(A)** is correct.

**DISCUSSION:** Advection fog forms when moist air

* 1. An air mass moving inland from the coast in winter. moves over colder ground or water. During the
  2. A light breeze blowing colder air out to sea. winter, Advection fog over the central and eastern
  3. Warm, moist air settling over a warmer surface under United State results when moist air from the gulf no-wind conditions. of Mexico spreads northward over cold ground.

the fog may extend as far north as the Great lakes.

1. In what localities is advection fog most likely to occur ? Answer **(A)** is correct.

**DISCUSSION:** Advection fog forms when moist air

* 1. Coastal areas. moves over colder ground or water. It is most
  2. Mountain slopes. common along coastal areas but often develops
  3. Level inland areas. deep into continental areas.

1. What types of fog depend upon a wind in order Answer **(C)** is correct.

or exist ? **DISCUSSION:** Advection fog forms when moist

air moves colder ground or water. Upslope fog

1. Steam fog and down slope fog. forms as a result of moist, stable air being cooled
2. Precipitation-induced fog and ground fog adiabatically as it moves up sloping terrain.
3. Advection fog and up slope fog.
4. What situation is most conducive to formation Answer **(A)** is correct.

of radiation fog ? **DISCUSSION:** Conditions favorable for radiation fog are clear skies little or no wind, and small

* 1. Warm, moist air over low, flatland areas on clear, temperature/dew point spread (high relative clam nights. humidity). The fog forms almost exclusively
  2. Moist, tropical air moving over cold, offshore water. at night or near daybreak.
  3. The movement of cold air over much warmer water.

1. Which conditions are favorable for the formation of Answer **(C)** is correct.

radiation fog ? **DISCUSSION:** Conditions favorable for radiation fog are clear skies, little or no wind, and small

* 1. Moist air moving over colder ground or water. temperature/dew point spread (high relative
  2. Cloudy sky and a light wind moving saturated warm humidity). the fog forms almost exclusively at air over a cool surface. night or near daybreak.
  3. Clear sky, little or no wind, small temperature. dew point spread, and over a land surface.

1. Which weather condition can be expected when Answer **(C)** is correct.

moist air flows from a relatively warm surface to a colder **DISCUSSION:** Advection fog forms when moist surface ? air moves over colder ground or water.

* 1. Increased visibility.
  2. Convective turbulence due to surface heating.
  3. Fog.

1. An air mass is a body of air that Answer **(C)** is correct.

**DISCUSSION:** if a body of air (or air mass) comes

* 1. Has similar cloud formations associated with it. to rest, or moves slowly over a large geographical
  2. Creates a wind shift as it moves across the Earth’s area that has fairly uniform temperatures and surface. moisture content, the body of air (or air mass)
  3. Covers an extensive area and has fairly uniform acquires the temperature/moisture properties properties of temperature and moisture. of the geographical area it covers. Therefore

it becomes fairly uniform in these properties over an extensive area.

1. The general characteristic of unstable air are Answer **(A)** is correct.

**DISCUSSION:** The stability of an air mass determines

* 1. Good visibility, showery precipitation, and cumuli- its typical weather characteristics. when one type of form-type clouds. air mass overlies another, conditions change with
  2. Good visibility, steady precipitation, and stratiform height. characteristics typical of an unstable and a type clouds. a stable air mass are shown in the figure below .
  3. Poor visibility, intermittent precipitation, and cumuliform-type clouds.

1. What are some characteristics of unstable air ? Answer **(C)** is correct.

**DISCUSSION:** The stability of an air mass determines

* 1. Nimbostratus clouds and good surface visibility. its typical weather characteristics. When one type
  2. Turbulence and poor surface visibility. of air mass overlies another conditions change
  3. Turbulence and good surface visibility. with height. Characteristic typical of an unstable and air mass are shown in the figure above.

1. Which are characteristics of an unstable cold air Answer **(B)** is correct.

mass moving over a warm surface ? **DISCUSSION:** Cool air moving over a warm surface is heated from below, generating instability of

* 1. Cumuliform clouds, turbulence, and poor visibility. of showers. Stability of an air mass determines its
  2. Cumuliform clouds, turbulence, and good visibility. typical weather characteristics. When one type of air
  3. Stratiform clouds, smooth air, and poor visibility. mass overlies another, conditions change with height. characteristic typical of an unstable air mass are cumuliform clouds, turbulence , and good visibility .

1. Which is a characteristic of stable air ? Answer **(B)** is correct.

**DISCUSSION:** The stability of an air mass determines

* 1. Fair weather cumulus clouds. its typical weather characteristics. When one type of
  2. Stratiform clouds. air mass overlies another, conditions change with height.
  3. unlimited visibility.

1. What are the characteristics of stable air ? Answer **(C)** is correct.

**DISCUSSION:** The stability of an air mass determines

* 1. Good visibility, steady precipitation, and stratus-type its typical weather characteristics. When one type clouds. of air mass overlies another, conditions change
  2. Poor visibility, intermittent precipitation, and cumulus with height. Characteristics typical of an unstable

-type clouds. and a stable air mass are shown in the figure above.

* 1. poor visibility, steady precipitation, and stratus-type clouds.

1. Steady precaution , in contrast to showers, pre- Answer **(C)** is correct.

ceding a front is an indication of **DISCUSSION:** Steady precipitation is a characteristics of stable air, which has little or no turbulence .

* 1. Stratiform clouds with moderate turbulence. Stratiform clouds are associated with stable air .
  2. Cumuliform clouds with little or no turbulence.
  3. Stratiform clouds with little or no turbulence.

1. Frontal waves normally from on Answer **(A)** is correct.

**DISCUSSION:** Frontal waves and cyclones (areas of law

* 1. Slow moving cold fronts or stationary fronts. pressure) usually from on slow-moving cold fronts or
  2. Slow moving warm fronts and strong occluded front . stationary fronts.
  3. Rapidly moving cold fronts or warm fronts.

1. Which weather phenomenon is always associated Answer **(A)** is correct.

with the passage of a frontal system ? **DISCUSSION:** Wind always changes across a front . wind discontinuity may be in direction, in speed, or

1. A wind change. in both. Temperature and humidity also may
2. An abrupt decrease in pressure. change.
3. Clouds, either ahead or behind the front.
4. If you into severe turbulence, which flight condition Answer **(B)** is correct.

should you attempt to maintain ? **DISCUSSION:** when flying in severe turbulence, maintaining positive aircraft control may be nearly impossible to do.

* 1. Constant airspeed. (Va) In attempting to maintain a constant altitude, the stresses
  2. Level flight attitude. applied to the aircraft are greatly increased.
  3. Constant altitude and constant airspeed

1. If severe turbulence is encountered during your Answer **(B)** is correct.

VFR flight, the airplane should be slowed to design **DISCUSSION:** if during flight, rough air or sever maneuvering speed because the turbulence is encountered, the airspeed should

be reduced to maneuvering speed or less to

1. Maneuverability of the airplane will increased. minimize the stress on the airplane structure.
2. Amount of excess load that can be imposed on the wing will be decreased.
3. Airplane will stall at a lower angle of attack, giving an increased margin of safety.
4. A pilot reporting turbulence that momentarily Answer **(A)** is correct.

causes slight, erratic changes in altitude and/or altitude **DISCUSSION:** Light turbulence is defined as turbulence should report it as that momentarily causes, erratic changes in altitude and

in altitude and/or altitude.

1. Light turbulence.
2. Moderate turbulence.
3. Light chop.
4. What are the requirement for the formation of a Answer **(C)** is correct.

thunderstorm ? **DISCUSSION:** For a thunderstorm to form the air must have :

A. A cumulus cloud with sufficient moisture. 1. Sufficient water vapor,

B. A cumulus cloud with sufficient moisture and an 2. An unstable lapse rate, and

inverted lapse rate. 3. An initial upward boost (lifting) to start the

C. Sufficient moisture, and unstable lapse rate, and a storm process in motion. lifting action.

1. Which weather phenomenon signals the beginning Answer **(A)** is correct.

of the mature stage of a thunderstorm ? **DISCUSSION:** Precipitation beginning to fall from the cloud base signals that a downdraft has

* 1. The start of rain at the surface. developed and a cell has entered the mature stage.
  2. Growth rate of cloud is maximum.
  3. Strong turbulence in the cloud.

1. During the life cycle of thunderstorm, which Answer **(B)** is correct.

stage is characterized predominately by downdrafts? **DISCUSSION:** A thunderstorm cell during its life

cycle progress through three stages: the cumulus,

1. Cumulus. the mature , and the dissipating. Downdrafts
2. Dissipating. characterize the dissipating stage.
3. Mature.
4. What is an indication that downdrafts have Answer **(B)** is correct.

developed and the thunderstorm cell has entered **DISCUSSION:** precipitation begging to fall from

the mature stage ? the cloud base signals that a downdraft has developed./ and a cell has entered the mature stage.

1. The anvil top has completed its development.
2. Precipitation begins to fall from the cloud base.
3. A gust front forms.
4. Where do squall lines most often develop? Answer **(C)** is correct.

**DISCUSSION**: A squall line (instability line) is a non

* 1. In an occluded front. frontal, narrow band of active thunderstorm often it
  2. In a cold air mass. develops ahead of a cold front in moist unstable air, but
  3. Ahead of a cold front. but it may develop in unstable air far removed from front.

1. If squalls are reported at your destination, what Answer **(A)** is correct.

wind conditions should are anticipate ? **DISCUSSION:** A squall is a sudden increase in speed of at least 16 knots to a sustained speed

* 1. Sudden increases in wind speed of at least 16 knots of 22 knots or more, lasting for at least one minute. rising to 22 knots or more, lasting for at last 1 minute.
  2. Peak gusts of at least 35 knots for a sustained period of 1minute or longer.
  3. Rapid variation in wind direction of at least 20° and changes in speed of at least 10 knots between peaks and lulls.

1. Which thunderstorms generally produce the most Answer **(B)** is correct.

sever conditions, such as heavy hail and destructive **DISCUSSION:** A squall line often contains severe winds ? steady-state thunderstorms and present the single

most intense weather hazard to aircraft. It usually

1. Warm front. forms rapidly, generally reaching maximum intensity
2. Squall line. during the late afternoon and the first few
3. Air mass. hours of darkness. hail competes with turbulence

as the greatest thunderstorm hazard to aircraft

1. What is indicated by the term “embedded thunder- Answer **(C)** is correct.

storms” ? **DISCUSSION:** Usually, thunderstorms are quite

visible to the pilot however, when a thunderstorm

1. Severe thunderstorms are embedded within squall line. is present but not visible to the pilot due to cloud
2. Thunderstorms are predicated to develop in stable air cover, such as a thick stratus layer, the thunder- mass. storm is said to be “embedded.”
3. Thunderstorms are obscured by massive cloud layers and cannot be seen.
4. Which weather phenomenon is always associated Answer **(A)** is correct.

with a thunderstorm ? **DISCUSSION:** A thunderstorm is a local storm produced by a cumulonimbus cloud. it is always

* 1. Lightning. accompanied by lightning and thunder, usually
  2. Heavy rain showers. with strong gusts of wind, heavy rain and some-
  3. Super cooled raindrops. times, with hail.

1. Which procedure is recommended if a pilot Answer **(C)** is correct.

should unintentionally penetrate embedded **DISCUSSION:** following are some do’s and do not

thunderstorm activity ? during thunderstorm penetration:

1. Do keep your eyes on your instruments. looking

* 1. Reserve aircraft heading or proceed toward an outside the cockpit can increase the danger of area of known VFR conditions. temporary blindness from lighting.
  2. Reduce airspeed to maneuvering speed and 2. don’t change power settings; maintain setting maintain a constant altitude. for reduced airspeed.
  3. Set power for recommended turbulence 3. Do maintain a constant attitude; left the aircraft

penetration airspeed and attempt to maintain “ride the waves.” maneuvers that try to maintain

a level flight attitude. constant altitude increase stresses on the aircraft.

4. Don’t turn back once you are in the thunderstorm A straight course through the storm most likely is the quickest way out of the hazards. In addition

turning maneuvers increase stresses on the aircraft.

1. What is the expected duration of an individual Answer **(C)** is correct.

microburst ? **DISCUSSION:** An individual microburst will seldom last longer than 15 minutes from the time it strikes

* 1. Two minutes with maximum winds lasting the ground until dissipation. However, they may approximately 1minute. be multiple microburst's in the area.
  2. One microburst may continue for as long as 2 to 4 hours.
  3. Seldom longer than 15 minutes from the time the burst strikes the ground until dissipation.

1. Maximum downdrafts in a microburst encounter Answer **(C)** is correct.

may be as strong as **DISCUSSION:** The downdrafts can be as strong as 6,000 feet per minute in a microburst encounter.

1. 8,000 feet per minute.
2. 7,000 feet per minute.
3. 6,000 feet per minute.
4. An aircraft that encounters a headwind of 45 Answer **(C)** is correct.

knots, within a microburst, may expect a total shear **DISCUSSION:** Horizontal winds near the surface across the microburst of can be as strong as 45 knots resulting in a 90-knots

shear (headwind to tailwind) across the micro-

1. 40 knots. burst. These strong horizontal winds occur within
2. 80 knots. a few hundred feet of the ground.
3. 90 knots.
4. Which conditions result in the formation of frost ? Answer **(C)** is correct.

**DISCUSSION**: In order for frost to form, the air

* 1. The temperature of the collecting surface is at or temperature must be below the dew point and below freezing and small droplets of moisture are the dew point of the surrounding air must be colder

falling. than freezing. water vapor will then sublimate

* 1. When dew forms and the temperature is below directly as ice crystals or frost. freezing .
  2. Temperature of the collecting surface is below the dew point of surrounding air and the dew point is colder than freezing.

1. In which meteorological environment is aircraft Answer **(C)** is correct.

structural icing most likely to have the highest rate of **DISCUSSION:** The condition most favorable for very accumulation ? hazardous icing is the presence of many large,

super cooled water droplets, also called freezing rain.

1. Cumulonimbus clouds.
2. High humidity and freezing temperature.
3. Freezing rain.
4. Which is an operational consideration if you fly into Answer **(B)** is correct.

rain which freezes on impact ? **DISCUSSION:** As the rain falls through air that is below freezing, its temperature begins to fall below

* 1. You have flown into an area of thunderstorms. freezing yet without freezing solid. This is freezing rain.
  2. Temperatures are above freezing at some higher altitude. The process requires that the temperature of the rain
  3. You have flown through a cold front. must be above freezing before it becomes super cooled. Therefore, when freezing rain is encountered , it indicates that warmer temperature are above.

1. Test data indicate that ice, snow or frost having Answer **(C)** is correct.

a thickness and roughness similar to medium or coarse **DISCUSSION:** Test data indicate that ice, snow, or sandpaper on the leading edge and upper surface of an frost formations having a thickness and surface airfoil. roughness similar to medium or coarse sandpaper

on the leading edge and upper surface of a wing

1. Reduce lift by as much as 50 percent and increase can reduce wing lift by as much as 30% and increase drag by such much as 50 percent. drag by 40%
2. Increase drag and reduce lift by as much as 25 percent
3. Reduce lift by as much as 30 percent and increase drag by 40 percent.
4. Why is frost considered hazardous flight operation ? Answer **(C)** is correct.

**DISCUSSION:** Frost does not change the basic

* 1. Frost changes the basic aerodynamic shape of the airfoil aerodynamic shape of the wing, but the roughness
  2. Frost decreases control effectiveness. of its surface spoils the smooth flow of air, thus
  3. Frost causes early airflow separation resulting in a causing a slowing of the airflow. This slowing of loss of lift. the air causes early air flow separation over the

affected airfoil. resulting in a loss of lift.

1. Where does wind shear occur ? Answer **(C)** is correct.

**DISCUSSION:** Wind shear may be associated

* 1. Exclusively in thunderstorms. with either a wind shift or a wind speed gradient
  2. Whenever there is an abrupt decrease in pressure at any level in the atmosphere. and/or temperature.
  3. With either a wind shift of a wind speed gradient at any level in the atmosphere.

1. What is an important characteristic of wind shear ? Answer **(C)** is correct.

**DISCUSSION:** Wind shear may be associated

* 1. Created by thunderstorms. with either a wind shift or a wind speed gradient
  2. It usually exist only in the vicinity of thunderstorms, at any level in the atmosphere. Low-level wind

but many be found near a strong temperature inversion. shear may result from a frontal passage thunderstorm

* 1. It may be associated with either a wind shift or a activity, or low-level temperature inversion . wind speed gradient at any level in the atmosphere.

1. What is an important characteristic of wind shear ? Answer **(C)** is correct.

**DISCUSSION:** Wind shear may be associated

* 1. It is an atmospheric condition that is associated with either a wind shift or a wind speed exclusively with zones of convergence. gradient at any level in atmosphere.
  2. The Coriolis phenomenon in both high- and low- level air masses is the principal generating force.
  3. It is an atmospheric condition that may be associated with a low-level temperature inversion, a jet stream, or a frontal zone.

1. Which is a characteristic of low-level wind shear Answer **(A)** is correct.

as it relates to frontal activity ? **DISCUSSION:** wind shear occurs with a cold front just after the front passes the airport and for a

* 1. With a warm front, The most critical period is before short period thereafter. if the front is moving 30 the front passes the airport knots or more, the frontal surface will usually
  2. With a cold front, the most critical period is just before be 5,000 feet above the airport about three the front passes the airport. hours after the frontal passage.
  3. Turbulence will always exist in wind-shear conditions.

1. Hazardous wind shear is commonly encountered Answer **(C)** is correct.

near the ground **DISCUSSION:** You can relatively certain of a shear zone in a low-level temperature inversion,

* 1. During periods when the wind velocity is stronger if you know that the wind at 2,000 to 4,000 feet is than 35 knots 25 knots or more. wind shear turbulence is also
  2. During periods when the wind velocity is stronger found near the ground outside than 35 knots and near mountain valleys. thunderstorm clouds .
  3. During periods of strong temperature inversion and near thunderstorms

1. Where can wind shear associated with a thunderstorm Answer **(C)** is correct.

be fount ? Choose the most complete answer **DISCUSSION:** The winds around a thunderstorm are complex Wind shear can be found on all sides

* 1. In front of the thunderstorm cell (anvil side) and on of a thunderstorm cell and in the downdraft directly the right side of the cell. under the cell The wind shift line or gust front
  2. In front of the thunderstorm cell and directly under associated with thunderstorms can precede the cell. the actual storm by 15 nautical miles or more
  3. On all sides of the thunderstorm cell and directly under the cell.

1. The wind at 5,000 feet AGL is southwesterly while Answer **(B)** is correct.

the surface wind is southerly. This difference in direction **DISCUSSION:** Friction between the wind and the is primarily due to surface slows the wind. The Coriolis force has less effect on slower winds, therefore there will be less

* 1. Stronger pressure gradient at higher altitudes. deflection with surface winds than with winds at
  2. Friction between the wind and the surface. 5,000 feet AGL
  3. Stronger Coriolis force at the surface.

1. What is the proper airspeed to use when flying Answer **(A)** is correct.

between thermals on a cross-country flight against **DISCUSSION:** When gliding into a headwind, maximum a headwind ? distance will be achieved by adding approximately one-half

the estimated headwind velocity to the best L/D speed.

1. The best lift/drag speed increased by one-half the estimated wind velocity.
2. The minimum sink speed increased by one-half the estimated wind velocity.
3. The best lift/drag speed decreased by one-half the estimated wind velocity.
4. A temperature inversion would most likely result Answer **(C)** is correct.

in which weather condition ? **DISCUSSION:** An increase in temperature with altitude is defined as an inversion. An inversion often develops near the ground

* 1. Clouds with extensive vertical development above on clear, cool nights when wind is light. The ground radiates an inversion aloft heat and cools much faster than the overlying air. Air in
  2. Good visibility in the lower levels of the atmosphere contact with the ground becomes cold while the temperature and poor visibility above an inversion aloft. a few hundred feet above changes very little. Thus,
  3. An increase in temperature as altitude is increased. the temperature increases with height. A ground-based

inversion usually means poor visibility.

1. The most frequent type of ground or surface-based Answer **(A)** is correct.

temperature inversion is that which is produced **DISCUSSION:** An inversion often develops near the ground

by on clear, cool nights when wind is light. The ground radiates

heat and cools much faster than the overlying air. Air in

1. Terrestrial radiation on a clear, relatively still night. contract with the ground becomes cold while the temperature
2. Warm air being lifted rapidly aloft in the vicinity of a few hundred feet above changes very little. mountainous terrain. Thus, the temperature increases with height.
3. The movement of colder air under warm air, or the movement of warm air over cold air.
4. What is meant by the term “dew point” ? Answer **(C)** is correct.

**DISCUSSION:** Dew point is the temperature

* 1. The temperature at which condensation and to which air must be cooled to become saturated by the evaporation are equal. water vapour already present in the air.
  2. The temperature at which dew will always form.
  3. The temperature to which air must be cooled to become saturated.

1. The amount of water vapour which air can hold Answer **(B)** is correct.

depends on the **DISCUSSION:** Temperature largely determines the maximum amount of water vapour air can hold.

1. Dew point.
2. Air temperature.
3. Stability of the air.
4. Clouds, fog, or dew will always from when Answer **(A)** is correct.

**DISCUSSION:** As water vapour condenses or sublimates on

* 1. Water vapour condenses. condensation nuclei, liquid or ice particles begin to grow.
  2. Water vapour is present. Some condition nuclei an affinity for water and can
  3. Relative humidity reaches 100 %. induce condensation or sublimation even when air is, but not completely, saturated.

1. What are the processes by which moisture is Answer **(A)** is correct.

added to unsaturated air ? **DISCUSSION:** Evaporation is the changing of liquid

water to invisible water vapour. Sublimation is the changing of

A, Evaporation and sublimation. solid water directly to the vapour phase or water vapour to ice,

B. Heating and condensation. by passing the liquid state in each process.

C. Super saturation and evaporation.

1. Of the temperature/dew point spread is small and Answer **(C)** is correct.

decreasing, and the temperature is 62°F, What type **DISCUSSION:** With a small temperature/dew point weather is most likely to develop ? spread, the air is close to saturation. This will usually result in

fog or low clouds. anticipate fog when the temperature/dew

1. Freezing precipitation. point spread is 5°F or less and decreasing.
2. Thunderstorms.
3. Fog or low clouds.
4. The boundary between two different air masses Answer **(C)** is correct.

is referred to as a **DISCUSSION:** A front is the boundary between two spread, the air is masses.

1. Frontolysis
2. Frontogenesis.
3. Front.
4. One of the most easily recognized discontinuities Answer **(A)** is correct.

across a front is **DISCUSSION:** Temperature is one of the most easily recognized discontinuities across a front.

1. A change in temperature
2. An increase in cloud coverage.
3. An increase in relative humidity.
4. One weather phenomenon which will always Answer **(A)** is correct.

occur when flying across a front is a change in the **DISCUSSION:** Wind direction always changes across a front.

* 1. Wind direction
  2. Type of precipitation.
  3. Stability of the air mass.

1. During which period is a sea breeze front most Answer **(C)** is correct.

suitable for soaring flight ? **DISCUSSION:** A sea breeze begins during early afternoon and reaches a maximum in the afternoon, subsiding around dusk.

1. Shortly after sunrise.
2. During the early forenoon.
3. During the afternoon.
4. Which weather conditions should be expected Answer **(A)** is correct.

beneath a low-level temperature inversion layer when **DISCUSSION:** A ground-based inversion leads to poor visibility the relative humidity is high ? by trapping fog, smoke, and other restrictions into low levels of

the atmosphere. The layer is stable and convection is suppressed.

1. Smooth air, poor visibility, fog, haze, or low clouds.
2. Light wind shear, poor visibility, haze , and light rain.
3. Turbulent air, poor visibility, fog, low stratus type clouds, and showery precipitation.
4. What measurement can be used to determine the Answer **(B)** is correct.

stability of the atmosphere ? **DISCUSSION:** The difference between the existing lapse rate of a given mass of air and the adiabatic rates of cooling in upward moving air determines if the air is stable or unstable.

1. Atmospheric pressure.
2. Actual lapse rate.
3. Surface temperature.
4. What would decrease the stability of an air mass ? Answer **(A)** is correct.

**DISCUSSION:** When air near the surface is warm and

* 1. Warming from below. moist, suspect instability. Surface heating, cooling aloft,
  2. Cooling from below. converging or upslope winds, or an invading mass of colder
  3. Decrease in water vapour. air may lead to instability and cumuliform clouds.

1. What is a characteristic of stable air ? Answer **(A)** is correct.

**DISCUSSION:** Since stable air resists convection, clouds in stable

* 1. Stratiform clouds. air from in horizontal, sheet-like layers of “ strata”
  2. Unlimited visibility.
  3. Cumulus clouds.

1. What feature is associated with a temperature Answer **(A)** is correct.

inversion ? **DISCUSSION:** If the temperature increases with altitude through a layer (an inversion), the layer is stable and convection is suppressed.

1. A stable layer of air.
2. An unstable layer of air.
3. Chinook winds on mountain slopes.
4. What are characteristics of a moist, unstable air Answer **(A)** is correct.

mass ? **DISCUSSION:** Characteristics of a moist, unstable air mass

include cumuliform clouds, showery precipitation, rough air

1. Cumuliform clouds and showers precipitation. (turbulence), and good visibility (except in blowing obstructions).
2. Poor visibility and smooth air.
3. Stratiform clouds and showers precipitation.
4. What are characteristics of unstable air ? Answer **(A)** is correct.

**DISCUSSION:** Characteristics of an unstable air mass

* 1. Turbulence and good surface visibility. include cumuli-form, clouds, showery precipitation, rough
  2. Turbulence and poor surface visibility. air (turbulence), and good visibility
  3. Nimbostratus clouds and good surface visibility. (except in blowing obstructions).

1. A stable air mass is most likely to have which Answer **(C)** is correct.

characteristic ? **DISCUSSION:** Characteristics of a stable air mass include stratiform clouds and fog, continuous precipitation, smooth

* 1. Showery precipitation air, and fair too poor visibility in haze and smoke.
  2. Turbulent air.
  3. Poor surface visibility.

1. Moist, Stable air flowing upslope can be expected to Answer **(A)** is correct.

**DISCUSSION:** When stable air is forced upward the air tends to train horizontal flow and any cloudiness is flat and stratified.

1. Produce stratus type clouds.
2. Cause showers and thunderstorms.
3. Develop convective turbulence.
4. If an unstable air mass is forced upward, what Answer **(C)** is correct.

type clouds can be expected ? **DISCUSSION:** When unstable air is forced upward, the disturbance grows. Any resulting cloudiness shows

* 1. Stratus clouds with little vertical development. extensive vertical development
  2. Stratus clouds with considerable associated turbulence.
  3. Clouds with considerable vertical development and associated turbulence.

1. Steady precipitation preceding a front is an Answer **(C)** is correct.

indication of **DISCUSSION:** Precipitation from stratiform clouds is usually steady and there is little or no turbulence.

1. Stratiform clouds with moderate turbulence.
2. Cumuliform clouds with little or no turbulence.
3. Stratiform clouds with little or no turbulence.
4. The conditions necessary for the formation of Answer **(B)** is correct.

cumulonimbus clouds are a lifting action and **DISCUSSION:** For a cumulonimbus cloud or thunder storm to form

the air must have :

1. Unstable air containing an excess of condensation 1. Sufficient water vapour, nuclei. 2. An unstable lapse rate and
2. Unstable, moist air. 3. An initial upward boost (lifting) to start the storm process in motion
3. Either stable or unstable air.
4. What is the approximate base of the cumulus Answer **(C)** is correct.

clouds if the surface air temperature at 1,000 feet MSL **DISCUSSION:** When lifted, unsaturated air cools at approximately is 70° and the dew point is 48°F ? 5.4°F per 1,000 feet. Therefore, the convergence of the temperature

and dew point lapse rates is 4.4°F per 1,000 feet. The base of a cloud

1. 4,000 feet MSL. (AGL) that is formed by vertical currents can be roughly calculated
2. 5,000 feet MSL. by dividing the difference between the surface temperature and the
3. 6,000 feet MSL. dew point by 4.4 and multiplying the remainder by 1,000
4. At approximately that altitude above the surface Answer **(B)** is correct.

would the pilot expect the base of cumuliform clouds When lifted, unsaturated air cools at approximately 5.4°F per 1,000 if the surface air temperature is 82°F and the dew point feet. The dew point cools at approximately 1°F per 1,000 feet. There is 38°F ? fore, the convergence of the temperature and dew point lapse rates

is 4.4°F per 1,000 feet. The base of a cloud (AGL) that is formed by

1. 9,000 feet AGL. vertical currents can be roughly calculated by dividing the difference
2. 10,000 feet AGL. between the surface temperature and the dew point by 4.4 and
3. 11,000 feet AGL. multiplying the remainder by 1,000
4. 82°F surface temperature

- 38°F 22°F

dew point

1. 44 ÷ 4.4 = 10
2. 10 x 1,000 = 10,00 feet AGL
3. The suffix “nimbus,” used in naming clouds, Answer **(B)** is correct.

means **DISCUSSION:** The prefix “nimbo-“ or suffix “-nimbus” means rain cloud.

A. A cloud with extensive vertical development.

B. A rain cloud.

C. A middle cloud containing ice pellets.

1. Clouds are divided into four families according Answer **(B)** is correct.

to their **DISCUSSION:** For identification purposes, clouds are divided into four families : high clouds, middle clouds, low

* 1. Outward shape. clouds and clouds with extensive
  2. Height range. vertical development.
  3. Composition.

1. What clouds have the greatest turbulence ? Answer **(B)** is correct.

**DISCUSSION:** Cumulonimbus are the ultimate manifestation of

* 1. Towering cumulus. instability. They are vertically-developed clouds of large dimensions
  2. Cumulonimbus. with dense boiling tops, often crowned with thick veils of dense
  3. Nimbostratus. cirrus ( the anvil). Nearly the clouds including violent turbulence.

1. An almond or lens-shaped cloud which appears Answer **(C)** is correct.

stationary, but which may contain winds of 50 knots **DISCUSSION:** Crests of standing waves may be marked by stationary, or more, is referred to as lens-shaped clouds known as standing lenticular clouds.

* 1. An inactive frontal cloud.
  2. A funnel cloud.
  3. A lenticular cloud.

1. Crest of standing mountain waves may be marked Answer **(B)** is correct.

by stationary, lens-shaped clouds known as **DISCUSSION:** Crest of standing waves may be marked by stationary, lens-shaped clouds known as standing lenticular clouds.

1. Alto cumulus clouds.
2. Standing lenticular clouds.
3. Roll clouds.
4. What cloud types would indicate convective Answer **(C)** is correct.

turbulence ? **DISCUSSION:** Towering cumulus signifies a relatively deep layer of unstable air. They show considerable vertical development and have

* 1. Cirrus clouds. billowing cauliflower tops. showers can result from these clouds .
  2. Nimbostratus clouds. Expect very strong turbulence, and perhaps some clear icing above
  3. Towering cumulus clouds. the freezing level.

1. Possible mountain wave turbulence cloud be Answer **(A)** is correct.

anticipated when winds of 40 knots or greater blow **DISCUSSION:** Always anticipate possible mountain wave turbulence

when strong winds of 40 knots or greater blow across a mountain or

1. Across a mountain ridge, and the air is stable. ridge and the air is stable.
2. Down a mountain valley, and the air is unstable.
3. Parallel to a mountain peak, and the air is stable
4. Upon encountering severe turbulence , which Answer **(C)** is correct.

flight condition should be the pilot attempt to maintain ? **DISCUSSION:** The primary concern is to avoid undue stress on the air-

frame. This can best be done by attempting to maintain a constant

1. Constant altitude and airspeed. attitude while keeping the air speed below design manoeuvring
2. Constant angle of attack. speed
3. Level flight attitude.
4. What feature is normally associated with the cumulus Answer **(B)** is correct.

stage of a thunderstorm ? **DISCUSSION:** The key feature of the cumulus stage is an updraft. Precipitation beginning to fall from the cloud base is the signal that

* 1. Roll cloud. a downdraft has developed also and a cell has entered the mature
  2. Continuous updraft. stage.
  3. Frequent lighting.

1. Which weather phenomenon signals the beginning of Answer **(B)** is correct.

the mature stage of a thunderstorm ? **DISCUSSION:** The key feature of the cumulus stage is an updraft Precipitation beginning to fall from the cloud base is the signal that

* 1. The appearance of an anvil top. a downdraft has developed also and a cell has entered the mature
  2. Precipitation beginning to fall. stage.
  3. Maximum growth rate of the clouds.

1. What conditions are necessary for the formation Answer **(A)** is correct.

of thunderstorms ? **DISCUSSION:** For a cumulonimbus cloud or thunderstorm to form, the air must have :

1. High humidity, lifting force, and unstable conditions. 1. Sufficient water vapour,
2. Hugh humidity, high temperature and cumulus clouds. 2. An unstable lapse rate, and
3. Lifting force, moist air, and extensive cloud cover. 3. An initial upward boost (lifting) to start the storm process in motion.
4. During the life cycle of a thunderstorm, which Answer **(B)** is correct.

stage is characterized predominately by downdrafts ? **DISCUSSION:** Downdrafts characterize the dissipating stage of the

thunderstorm cell and the storm dies rapidly.

1. Cumulus.
2. Dissipating.
3. Mature.
4. Thunderstorm reach their greatest intensity Answer **(A)** is correct.

during the **DISCUSSION:** All thunderstorm hazards reach their greatest intensity during the mature stage.

1. Mature stage.
2. Downdraft stage.
3. Cumulus stage.
4. Thunderstorms which generally produce the most Answer **(A)** is correct.

intense hazard to aircraft are **DISCUSSION:** A squall line is a none-frontal, narrow band of active thunderstorms. The line may be too long to easily detour and too

* 1. Squall line thunderstorms. wide and sever to penetrate. It often contains sever steady-state
  2. Steady-state thunderstorms. thunderstorms and presents the single, most intense weather hazard
  3. Warm front thunderstorms. to aircraft.

1. A non-frontal, narrow band of active thunderstorms Answer **(B)** is correct.

that often develop ahead of a cold front is known as a **DISCUSSION:** A squall line is a non-frontal, narrow band of active

thunderstorms. The line may be too long to easily detour and too

1. Prefrontal system. wide and sever to penetrate. It often contains sever steady-state
2. Squall line. thunderstorms and presents the single, most intense weather hazard
3. Dry line. to aircraft.
4. If there is thunder storm activity in the vicinity of an Answer **(B)** is correct.

airport at which you plan to land, which hazardous atmospheric **DISCUSSION:** Wind shear is an invisible hazard associated with all phenomenon might be expected on the landing approach ? thunderstorms. Shear turbulence has been encountered 20 miles

laterally from a severe storm.

1. Precipitation static.
2. Wind-shear turbulence.
3. Steady rain.
4. Which weather phenomenon is always associated Answer **(A)** is correct.

with a thunderstorm ? **DISCUSSION:** A thunderstorm is, in general, a local storm invariably produced by a cumulonimbus cloud, and is always accompanied by

* 1. Lightning. lightning and thunder.
  2. Heavy rain.
  3. Hail.

1. Which is considered to be the most hazardous Answer **(C)** is correct.

condition when soaring in the vicinity of thunderstorms ? **DISCUSSION:** During the mature stage of a thunderstorm, updrafts

and downdrafts in close proximity create strong vertical shears and a

1. Static electricity. heavy turbulent environment. A lightning strike can puncture the skin
2. Lightning. of an aircraft and damage communication and navigation equipment.
3. Wind shear and turbulence.
4. Where does wind shear occur ? Answer **(C)** is correct.

**DISCUSSION:** Wind shear may be associated with either a wind

* 1. Only at higher altitudes. direction or a wind speed at any level in the atmosphere.
  2. Only at lower altitudes.
  3. At all altitudes, in all directions.

1. When may hazardous wind shear be expected ? Answer **(B)** is correct.

**DISCUSSION:** Hazardous wind shear can occur near the ground with

* 1. When stable air crosses a mountain barrier where either thunderstorms or a strong temperature inversion. it tends to flow in layers forming lenticular clouds.
  2. In areas of low-level temperature inversion, frontal Zone , and clear air turbulence.
  3. Following frontal passage when stratocumulus clouds form indicating mechanical mixing.

1. A pilot can be expect a wind-shear in a temperature Answer **(B)** is correct.

inversion whenever the wind speed at 2,000 to 4,000 feet above **DISCUSSION:** An increase in temperature with altitude is defined as a the surface is at least. temperature inversion. A pilot can be relatively certain of a shear

zone in the inversion if the pilot knows the wind at 2,000 to 4,000 feet

1. 10 knots. is 25 knots or more.
2. 15 knots.
3. 25 knots.
4. The Presence of ice pellets at the surface is evidence that Answer **(C)** is correct.

there **DISCUSSION:** ice pellets always indicate freezing rain at higher altitude.

1. Are thunderstorms in the area.
2. Has been cold frontal passage.
3. Is a temperature inversion with freezing rain at a higher altitude.
4. One in-flight condition necessary for structural icing to Answer **(C)** is correct.

form is **DISCUSSION:** Two conditions are necessary for structural icing in flight :

* 1. Small temperature/dew point spread. 1. The aircraft must be flying through visible water such as rain or
  2. Stratiform clouds. cloud droplets, and
  3. Visible moisture. 2. The temperature at the point where the moisture strikes the aircraft must be 0°C ( 32° F) or colder.

1. In which environment is aircraft structural ice most Answer **(C)** is correct.

likely to have the highest accumulation rate ? **DISCUSSION:** A condition favourable for rapid accumulation of clear icing is freezing rain below a frontal surface.

1. Cumulus clouds with below freezing temperatures
2. Freezing drizzle.
3. Freezing rain.
4. During an VFR cross-country flight you picked up Answer **(A)** is correct.

rime icing which you estimate is 1/2" thick on the leading **DISCUSSION:** ice will accumulate unevenly on the airplane. edge of the wings. you are now below the clouds at 2000 It will add weight and drag, and decrease thrust and lift. With

feet AGL and are approaching your destination airport ice accumulations, landing approaches should be made with a under VFR. Visibility under the clouds is more than 10 miles, minimum wing flap setting and with an added margin of airspeed. winds at the destination airport are 8 knots right down the sudden and large configuration and airspeed

runway, and the surface temperature is 3 degrees Celsius. changes should be avoided. you decide to :

1. Use a faster than normal approach and landing speed.
2. Approach and land at your normal speed since the ice is not thick enough to have any noticeable effect.
3. Fly your approach slower than normal to lessen the “wind chill” effect and break up the ice.
4. What situation is most conducive to the formation of Answer **(A)** is correct.

radiation fog ? **DISCUSSION:** Conditions favourable for radiation fog are clear sky little, or no wind, and small temperature/dew

* 1. Warm, moist air over low, flatland areas on clear, clam nights. point spread (high relative humidity). Radiation fog is restricted to
  2. Moist, tropical air moving over cold, offshore water. land because water surfaces cool little from night time radiation.
  3. The movement of cold air over much warmer water.

1. In which situation is advection fog most likely to form ? Answer **(B)** is correct.

**DISCUSSION:** Advection fog forms when moist air moves over colder

1. A warm, moist air mass on the windward side of ground or water. It is most common along coastal areas. This fog mountains. frequently forms offshore as a result of cold water, then is carried
2. An air mass moving inland from the coast in winter. inland by the wind.
3. A light breeze blowing colder air out to sea.
4. What types of fog depend upon wind in order to Answer **(C)** is correct.

exist ? **DISCUSSION:** Advection fog forms when moist air moves over colder ground or water. It is most common along coastal areas but

* 1. Radiation fog and ice fog. often developments as wind speed increases up to about 15 knots.
  2. Steam fog and ground fog. Wind much stronger than 15 knots lifts the fog into a layer of
  3. Advection fog and upslope fog. low stratus or stratocumulus. Upslope fog forms as a result of moist, stable air being cooled adiabatically as it moves up sloping terrain . Once upslope wind ceases, the fog dissipates.

1. Low-level turbulence can occur and icing can become Answer **(C)** is correct.

hazardous in which type of fog ? **DISCUSSION:** Steam fog forms in the winter when cold, dry air presses from land areas over comparatively warm ocean

* 1. Rain-induced fog. waters. Low-level turbulence can occur and icing can become
  2. Upslope fog. become hazardous in a steam fog.
  3. Steam fog.

1. Which conditions result in the formation of frost ? Answer **(B)** is correct.

**DISCUSSION:** Frost forms in much the same way as dew. The differ-

* 1. The temperature of the collecting surface is at or below difference is that the dew point of surrounding air must be colder freezing when small droplets of moisture fall on the surface than freezing.
  2. The temperature of the collecting surface is at or below

the dew point of the adjacent air and the dew point is below freezing.

* 1. The temperature of the surrounding air is at or below freezing when small drops of moisture fall on the collecting surface.

1. How does frost affect the lifting surfaces of an airplane Answer **(A)** is correct.

on takeoff ? **DISCUSSION:** The roughness of the surface of frost spoils the smooth flow of air, thus causing a slowing of the airflow.

* 1. Frost may prevent the airplane from becoming This slowing of the air causes early air flow separation over airborne at normal takeoff speed. the affected airfoil resulting in a loss of lift even a small amount
  2. Frost will change the camber of the wing, increasing of frost on airfoils may prevent an aircraft from becoming lift during takeoff. airborne at normal takeoff speed.
  3. Frost may cause the airplane to become airborne with a lower angle of attack at a lower indicated airspeed.

1. How will frost on the wings of an airplane affect Answer **(A)** is correct.

takeoff performance ? **DISCUSSION:** The roughness of the surface of spoils the smooth flow of air, thus causing a

* 1. Frost will disrupt the smooth flow of air over the slowing of the airflow. This slowing of the air

wing, adversely affecting its lifting capability. causes early air flow separation over amount

* 1. Frost will change the camber of the wing, increasing of frost on airfoils may prevent an aircraft from its lifting capability. becoming airborne at normal takeoff speed.
  2. Frost will cause the airplane to become airborne

with a higher angle of attack, decreasing the stall speed.

1. Why is frost considered hazardous to flight ? Answer **(C)** is correct

**DISCUSSION:** The roughness of the surface of

* 1. Frost changes the basic aerodynamic shape of the frost spoils the smooth flow of air, thus causing airfoils, thereby decreasing lift. a slowing of the airflow. This slowing of the air
  2. Frost slows the airflow over the airfoils, thereby causes early air flow separation over the increasing control effectiveness. affected airfoil, resulting in a loss of lift. Even a
  3. Frost spoils the smooth flow of air over the wings, small amount of frost of airfoils may prevent

thereby decreasing lifting capability an aircraft from becoming airborne at normal takeoff speed.

1. Every physical process of weather is accompanied Answer **(A)** is correct.

by or is the result of **DISCUSSION:** Every physical of weather is accompanied by, or result of, a heat exchange.

1. A heat exchange.
2. The movement of air.
3. A pressure differential.
4. Moisture is added to a parcel of air by Answer **(C)** is correct.

**DISCUSSION:** Moisture is added to a parcel of air when liquid

* 1. Sublimation and condensation. water or ice are changed into water vapor .Evaporation is
  2. Evaporation and condensation. the change from liquid water to water vapor. Sublimation is
  3. Evaporation and sublimation. the change from ice directly to water vapour, without the intervening liquid stage.

1. In the northern Hemisphere, the wind is deflected Answer **(A)** is correct.

to the **DISCUSSION:** Coriolis force, caused by the Earth’s rotation, deflects air movements to the right in the northern Hemisphere and to the left

* 1. Right by Coriolis force. in the southern Hemisphere. Coriolis force is at a right angle to wind
  2. Right by surface friction. direction and is directly proportional to wind speed.
  3. Left by Coriolis force.

1. Why does the wind have a tendency to flow Answer **(A)** is correct.

parallel to the isobars above the friction level ? **DISCUSSION:** Normally, wind flows from areas of high pressure to

areas of low pressure. Wind is deflected by the Coriolis force, however.

1. Coriolis force tends to counterbalance the horizontal This force which is the result of the Earth’s rotation. Deflects wind to pressure gradient. the right in the northern hemisphere, counterbalancing the horizontal
2. Coriolis force acts perpendicular to a line connecting the pressure gradient. its effects are lessened by friction with the Earth’s highs and lows. surface at altitudes closer to the surface.
3. Friction of the air with the Earth deflects the air perpendicular to the pressure gradient.
4. With regard to wind flow patterns shown on surface analysis Answer **(C)** is correct.

charts; when the isobars are **DISCUSSION:** Pressure differences create a force, the

pressure gradient force, which drives the wind from higher pressure

1. Close together, the pressure gradient force is to lower pressure. This force is perpendicular to isobars, or pressure slight and wind velocities are weaker. contours. The closer the spacing of isobars, the stronger
2. Not close together, the pressure gradient force the pressure gradient force and is greater and wind velocities are stronger. the stronger the wind.
3. Close together, the pressure gradient force is greater and wind velocities are stronger.
4. What causes wind ? Answer **(C)** is correct.

**DISCUSSION:** Wind is caused by pressure differences

1. The Earth’s rotation. with wind flowing from high-pressure areas to low
2. Air mass modification. pressure areas. These pressure differences arise from
3. Pressure differences. the different heating of the Earth’s surface.
4. Which is true regarding a cold front occlusion ? the Answer **(B)** is correct.

air ahead of the warm front **DISCUSSION:** wind is caused by pressure differences with wind flowing from high-pressure areas to low-pressure areas.

* 1. Is colder than the air behind the overtaking These pressure differences arise from

cold front. the different heating of the Earth’s surface.

* 1. Is warmer than the air behind the overtaking cold front
  2. Has the same temperature as the air behind the overtaking cold front.

1. Which is true with respect to a high-or-low-pressure Answer **(C)** is correct.

system ? **DISCUSSION:** High-pressure air descends because it is heavier than low-pressure air. Ridge refers to an elongated area of high pressure.

A. A high-pressure area or ridge is an area of rising air.

B. A low-pressure area or trough is an area of descending air.

C. A high-pressure area or ridge is an area of descending air.

1. Which is true regarding high-or-low-pressure systems? Answer **(B)** is correct.

**DISCUSSION:** Low-pressure air rises because it weighs less than high-

A. A high-pressure area or ridge is an area of rising air. pressure air. Trough refers to an elongated area of low pressure.

B. A low pressure area or trough is an area of rising air.

C. Both high-and-low-pressure areas are characterized by descending air.

1. While flying cross-country in the Northern Hemisphere Answer **(A)** is correct.

you experience a continuous left crosswind which is associated **DISCUSSION:** Due to the counter clockwise circulation around a with a major wind system. This indicates that you low pressure area in the Northern Hemisphere, a continuous left

crosswind indicates that you are flying into such an area. Low pressure

1. Are flying toward an area to generally unfavourable weather areas are areas of rising air which are conducive to cloudiness conditions. and precipitation – generally unfavourable weather conditions.
2. Have flown from an area of unfavourable weather conditions.
3. Cannot determine weather conditions without knowing pressure changes.
4. When flying into a low-pressure area in the Northern hemi- Answer **(B)** is correct.

sphere, the wind direction and velocity will be form the **DISCUSSION:** When flying into a low-pressure area, the wind is

flowing counter clockwise and thus will be from the left.

1. left and decreasing Also, winds tend to be greater in low-pressure systems
2. left and increasing. than in high-pressure systems, so the velocity
3. Right and decreasing. will increase as you fly into the area.
4. What prevents air from flowing directly from Answer **(A)** is correct.

high-pressure areas to low-pressure areas ? **DISCUSSION:** Coriolis force, caused by the Earth’s rotation deflects air movements to the right in the Northern Hemisphere and to the

* 1. Coriolis force. let in the southern Hemisphere.
  2. Surface friction.
  3. Pressure gradient force.

163. The general circulation of air associated with Answer **(A)** is correct.

a high-pressure area in the northern Hemisphere is **DISCUSSION:** Air flows outward from a high-pressure

area, causing a descending column of air within the high.

1. Outward, downward, and clockwise. As the air moves outward, it is deflected to the right by
2. Outward, upward, and clockwise Coriolis force resulting in a clockwise
3. Inward, downward, and clockwise. rotation.
4. The wind system associated with a low-pressure area Answer **(B)** is correct.

in the northern Hemisphere is **DISCUSSION:** Air flowing into a low-pressure area is deflected to the right in the northern hemisphere, resulting in a counter clockwise

* 1. An anticyclone and is caused by descending cold air. (or cyclonic) circulation.
  2. A cyclone and is caused by Coriolis force.
  3. An anticyclone and Is caused by Coriolis force.

1. A common location of clear air turbulence is Answer **(A)** is correct.

**DISCUSSION:** The typical location of clear air turbulence is an uppr

* 1. In an upper trough on the polar side of a jet stream. trough on the cold (polar) side of the jet stream.
  2. Near a ridge aloft on the equatorial side of a high-pressure flow.
  3. South of an east/west oriented high-pressure ridge in its dissipating stage.

1. The jet stream and associated clear air turbulence Answer **(B)** is correct.

can sometimes be visually identified in **DISCUSSION:** Streamlined, windswept cirrus clouds always indicate very strong upper winds.

1. Dust or haze at flight level.
2. ling streaks of cirrus clouds.
3. A constant outside air temperature.
4. A strong wind shear can be expected. Answer **(C)** is correct.

**DISCUSSION:** When the speed of the jet stream is in excess of 110kt,

1. In the Jet stream front above a core having a speed of strong wind shears can be expected on the low-pressure side. 60 to 90 knots
2. If the 5°C isotherms are spaced between 7°to 10° of latitude.
3. On the low-pressure side of a Jet stream core where the speed at the core is stronger than 110 knots.
4. Which type of Jet stream can be expected to cause the greater Answer **(B)** is correct.

turbulence ? **DISCUSSION**: A curving jet stream indicates abrupt weather system changes, which lend themselves to more violent turbulence

A. A straight Jet stream associated with a low-pressure trough. In general, the more pronounced the difference in weather systems,

B. A curving jet stream associated with a deep low-pressure trough. the greater the potential for very strong turbulence.

C. A Jet stream occurring during the summer at the lower altitudes.

1. which feature is associated with the tropopause ? Answer (B) is correct.

**DISCUSSION:** the tropopause is the transition layer of atmosphere

* 1. Constant height above the Earth. between the troposphere and the stratosphere. Height of the tropos-
  2. Abrupt change in temperature lapse rate. here varies from about 65,000 ft. over the Equator to 2,000 ft. or lower
  3. Absolute upper limit of cloud formation. over the poles. A characteristic of the tropopause is an abrupt change in temperature decreases with height.

1. What is the standard temperature at 10,000 feet ? Answer **(A)** is correct.

**DISCUSSION:** Standard temperature is 15°C at sea level and the

* 1. -5°C standard lapse rate is 2°C per 1,000 ft. Thus, at 10,000 ft the standard
  2. -15°C temperature would be 20°C colder than at sea level. or -5°C (15°C-

C. +5°C 20°C)

1. what are the standard temperature and pressure Answer **(A)** is correct.

values for sea level ? **DISCUSSION:** standard temperature at sea level is defined as 15°C or 59°F. Standard sea-level pressure is 29.92 in. Hg or 1013.2 mb.

1. 15°C and 29.92” Hg.
2. 59°F and 1013.2” Hg.
3. 15°C and 29.93 Mb.
4. What is the standard temperature at 20,000 feet? Answer **(C)** is correct

**DISCUSSION:** Standard temperature is . 15°C at sea level and the

* 1. -15°C standard lapse rate is 2°C per 1,000 ft. Thus, at 20,000 ft. the standard
  2. -20°C temperature would be 40°C colder than at sea-level or -25°C
  3. -25°C

1. Which is true regarding actual air temperature Answer **(B)** is correct.

and dew point temperature spread? the temperature **DISCUSSION:** dew point refers to the temperature to which air must spread. be cooled to become saturated by the water vapour already present

in the air. Thus, as the relative humidity increases, the dew point

1. Decreases as the relative humidity decreases. temperature spread decreases. As relative humidity increases to 100%
2. Decreases as the relative humidity increases. the dew point approaches the temperature and the spread approaches
3. Increases as the relative humidity increases. zero.
4. Which cloud types would indicate convective Answer **(C)** is correct.

turbulence ? **DISCUSSION:** Towering cumulus clouds signify a relatively deep layer of unstable air, thus

1. Cirrus clouds. indicating very strong convective turbulence.
2. Nimbostratus clouds.
3. Towering cumulus clouds.
4. Which combination of weather-producing Answer **(B)** is correct.

variables would likely result in cumuliform-type **DISCUSSION:** Unstable , moist air accompanied by lifting usually clouds, good visibility, and showery rain ? results in showery rain, good visibility and cumuliform clouds.

orographic lifting is caused by mountain forces .

1. Stable, moist air and orographic lifting.
2. Unstable, moist air and orographic lifting.
3. Unstable , moist air and no lifting mechanism.
4. Which are characteristics of a cold air mass Answer **(B)** is correct.

moving over a warm surface ? **DISCUSSION:** When a cold mass moves over a warm surface, the warm air near the surface rises and creates an unstable condition.

* 1. Cumuliform clouds, turbulence, and poor visibility These convective currents give rise to cumuliform clouds,
  2. Cumuliform clouds, turbulence, and good visibility turbulence, and good visibility.
  3. Stratiform clouds, smooth air, and poor visibility.

1. What is the approximate base of the cumulus Answer **(C)** is correct.

clouds if the temperature at 2,000 feet MSL is 10°C **DISCUSSION:** The height of cumuliform cloud bases can be and the dew point is 1°C ? estimated using the surface temperature/dew point spread.

Unsaturated air in a convective current cools at about 3°C per

A. 3,000 feet MSL 1,000 ft, and dew point decreases about 0.5°C per 1,000 ft.

B 4,000 feet MSL Thus, temperature and dew point converge at about 2.5°C per

C. 6,000 feet MSL. 1,000 ft. Since the temperature/dew point will converge at 3,600 ft AGL (9÷ 2.5 = 3.6 or 3,600). The base of cumulus

cloud is approximately 5,600 ft. MSL (3,600 + 2,000 ).

1. What determines the structure or type of clouds which Answer **(B)** is correct.

will form as a result of air being forced to ascend ? **DISCUSSION:** The structure of cloud types that form as a result of air

being forced to ascend is determined by the stability of the air before

1. The method by which the air is lifted. lifting occurs. The difference between the existing lapse rate ( the
2. The stability of the air before lifting occurs. actual decrease in temperature with altitude ) and the adiabatic
3. The relative humidity of the air after lifting occurs. rates of cooling in upward-moving air determines the stability of the

air.

1. The presence of standing lenticular altocumulus Answer **(B)** is correct.

clouds is a good indication of **DISCUSSION:** When stable air crosses a mountain

barrier, turbulence usually results. Air flowing up the windward

1. Lenticular ice formation in calm air. side is relatively smooth Wind flow across
2. Very strong turbulence. the barrier is laminar; i.e., it tends to flow in layers
3. Heavy icing conditions.
4. Virga is best described as Answer **(A)** is correct.

**DISCUSSION:** Virga is streamers of precipitation, either water of ice

* 1. Streams of precipitation trailing beneath clouds which particles, falling from a cloud in wisps or streaks and evaporating evaporate before reaching the ground before reaching the ground.
  2. Wall clouds which dissipate before reaching the ground.
  3. Turbulent areas beneath cumulonimbus clouds.

1. Fog produced by frontal activity is a result of saturation Answer **(C)** is correct.

due to **DISCUSSION:** Fog produced by frontal activity is known

as precipitation induced fog. it arise from drops of warm rain or

1. Nocturnal cooling. drizzle falling through cool air land forms fog.
2. Adiabatic cooling.
3. Evaporation of precipitation.
4. Which in-flight hazard is most commonly associated with Answer **(C)** is correct.

warm fronts ? **DISCUSSION:** Precipitation-induced fog arises from drops of warm rain or drizzle evaporating as it falls through cool air.

* 1. Advection fog. This evaporation saturates the cool
  2. Radiation fog. air and forms fog.
  3. Precipitation-induced fog.

1. A situation most conducive to the formation of advection Answer **(B)** is correct.

fog is **DISCUSSION:** Advection fog forms when moist air

moves over colder ground or water. This type of fog is,

A. A light breeze moving colder air over a water surface. common when comparatively warm moist oceanic air moves

B. An air mass moving inland from the coastline during the water inland from the coastline during winter.

C. A warm, moist air mass setting over a cool surface under no-wind conditions.

1. Advection fog has drifted over a coastal airport during the day. Answer **(C)** is correct.

what may tend to dissipate or lift this fog into low stratus clouds ? **DISCUSSION:** Advection fog deepens as

wind speed increases up 15 kt. will lift the fog

1. Night time cooling. into a layer of low stratus or stratocumulus.
2. Surface radiation
3. Wind 15 knots or stronger.
4. What lifts advection fog into low stratus clouds ? Answer **(C)** is correct.

**DISCUSSION:** Advection fog deepens as wind speed increases up to

* 1. Night time cooling. 15 kt. wind much stronger than 15 kt. lifts the fog into a layer of low
  2. Dryness of the underlying land mass. stratus or stratocumulus.
  3. Surface winds of approximately 15 knots or stronger.

1. Which conditions are favourable for the formation of Answer **(A)** is correct.

a surface based temperature inversion ? **DISCUSSION:** A temperature inversion occurs when warm

air exists over cooler air. When ground heat radiates out on clear

1. Clear, cool nights with clam or light wind. nights, the cool ground surface cools still air at the surface
2. Area of unstable air rapidly transferring heat from the surface to a temperature below the air above it.
3. Broad areas of cumulus clouds with smooth, level bases at the same altitude.
4. In what ways do advection fog, radiation fog and steam fog Answer **(A)** is correct.

differ in their formation or location ? **DISCUSSION:** Radiation fog is restricted to land

because water surfaces cool little from night time radiation.

1. Radiation fog is restricted to land areas; Advection fog forms when moist air moves over colder advection fog is most common along coastal ground or water. It is most common along coastal areas.

areas; steam fog forms over a water surface. Steam fog occurs when cold air moves over

1. Advection fog deepens as wind speed increases up to 20 knots; relatively warm water or wet ground. steam fog requires clam or very light wind; radiation fog forms

when the ground or water cools the air by radiation.

1. Steam fog forms from moist air moving over a colder surface; advection fog requires cold air over a warmer surface; radiation

fog is produced by radiation cooling of the ground.

1. With respect to advection fog, which statement is true ? Answer **(C)** is correct.

**DISCUSSION:** Advection fog is usually more extensive and much

* 1. It is slow to develop and dissipates quite rapidly. more persistent than radiation fog. advection fog can move in
  2. It forms almost exclusively at night or near daybreak. rapidly regardless of the time of day or night.
  3. It can appear suddenly during day or night, and it is more persistent than radiation fog.

1. What are characteristics of stable air ? Answer **(B)** is correct.

**DISCUSSION:** Stable air is still or moving horizontally but without

* 1. Good visibility, Steady precipitation; stratus clouds. vertical movement. As a result, the pollutants in the air are not swept
  2. Poor visibility; steady precipitation; stratus clouds. away and visibility is poor .Also stable air forms layer-like clouds since
  3. Poor visibility; intermittent precipitation; cumulus clouds. the air is moving in layers.

1. Which would decrease the stability of an air mass ? Answer **(A)** is correct.

**DISCUSSION:** When air is warmed from below, it tends to rise

* 1. Warming from below. resulting in instability ;i.e., vertical movement occurs.
  2. Cooling from below.
  3. Decrease in water vapour.

1. What is a characteristic of stable air ? Answer **(A)** is correct.

**DISCUSSION:** Stable air is still or moving horizontally but without

* 1. Stratiform clouds. vertical movement. As a result, the pollutants in the air are not
  2. Fair weather cumulus clouds. swept away and visibility is poor. Also stable air forms layer-like
  3. Temperature decreases rapidly with altitude. clouds since the air is moving in layers

1. From which measurement of the atmosphere can stability Answer **(B)** is correct.

be determined ? **DISCUSSION:** The stability of the atmosphere

is determined by vertical movements of air. Warm

1. Atmospheric pressure. air rises when the air above is cooler. The lapse rate,
2. The ambient lapse rate. which is decrease of temperature with altitude,
3. The dry adiabatic lapse rate. is therefore a measure of stability.
4. The difference found by subtracting the temperature of a parcel Answer **(A)** is correct.

of air theoretically lifted from the surface to 500 millibars and the **DISCUSSION:** The lifted index is computed as if a parcel existing temperature at 500 millibars is called the of air near surface were lifted to 500 mb (18,000 ft MSL)

As the air is lifted, it cools by expansion.

1. Lifted index. The temperature the parcel would have at 500 is then
2. Negative index. subtracted from the environmental 500 mb, temperature.
3. Positive index.
4. The conditions necessary for the formation of stratiform clouds Answer **(B)** is correct.

are a lifting action and **DISCUSSION:** Stable , moist air and adiabatic cooling, e.g., upslope flow or lifting over colder air,

* 1. Unstable, dry air. are need to form stratiform clouds.
  2. Stable moist air.
  3. Unstable, moist air.

1. What visible signs indicate extreme turbulence in thunderstorms ? Answer **(C)** is correct.

**DISCUSSION:** Cumulonimbus clouds are thunderstorms by

* 1. Base of the clouds near the surface, heavy rain, and hail. definition. Their intensity can be gauged by the presence of roll
  2. Low ceiling and visibility, hail, and precipitation static clouds on the lower leading edge of the storm, which mark the
  3. Cumulonimbus clouds, very frequent lightning and roll clouds eddies in the shear. Roll clouds are prevalent with clod frontal or

squall line thunderstorms and signify an extremely turbulent zone.

1. What feature is normally associated with the cumulus stage of Answer **(B)** is correct

thunderstorm ? **DISCUSSION:** The cumulus stage of a

thunderstorm has continuous updrafts that build the cloud up.

1. Roll cloud. The water droplets are carried up until they become too heavy.
2. Continuous updraft. Once they begin falling and creating downdrafts,
3. Beginning of rain at the surface. the storm changes from the cumulus to the mature stage.
4. The conditions necessary for the formation of cumulonimbus Answer **(C)** is correct.

clouds are a lifting action and **DISCUSSION:** Unstable moist air and a lifting action i.e., convective activity, are needed to form cumulonimbus clouds.

1. Unstable, dry air.
2. Stable, moist air.
3. Unstable, moist air
4. The most severe weather conditions, such as destructive winds, Answer **(B)** is correct.

heavy hail, and tornadoes, are generally associated with **DISCUSSION:** A squall line is a non-frontal, narrow

band of thunder-storms that often develops ahead of a

1. Slow-moving warm fronts which slope above the tropopause. cold front. it often contains severe steady-state
2. Squall lines. thunderstorms and presents the single most
3. Fast-moving occluded fronts. intense weather
4. Of the following, which is accurate regarding turbulence Answer **(C)** is correct.

associated with thunderstorms ? **DISCUSSION:** Hazardous turbulence is present in and around all thunderstorms. Outside the cloud, shear turbulence has been

* 1. Outside the clouds, shear turbulence can be encountered encounter several thousand feet above and 20 NM 50 miles laterally from a severe storm. laterally from a severe storm. The roll cloud
  2. Shear turbulence is encountered only inside cumulonimbus signifies an extremely turbulent zone. clouds or within a 50mile radius.
  3. Outside the cloud, shear turbulence can be encountered 20 miles laterally from a severe storm.

1. Which statement is true concerning squall lines ? Answer **(C)** is correct.

**DISCUSSION:** A squall line is a non-frontal narrow band of active

* 1. They form slowly, but move rapidly thunderstorms. It often contains severe steady-state thunderstorms
  2. They are associated with frontal systems only. and presents the single most intense weather hazard to aircraft.
  3. They offer the most intense weather hazards to aircraft.

1. Which statement is true regarding squall lines ? Answer **(C)** is correct.

**DISCUSSION:** A squall line is a non-frontal, narrow band of active

* 1. They are always associated with cold fronts thunderstorms that frequently develops ahead of a cold front. it can,
  2. They are slow in forming, but rapid in movement however, occur in any area of moist, unstable air. it often contains
  3. They are non-frontal and often contain severe, steady-state severe steady-state thunderstorms and presents the single most thunderstorms. intense weather hazard to aircraft.

1. Which is true regarding the use of airborne weather- Answer **(A)** is correct.

avoidance radar for the recognition of certain weather **DISCUSSION:** Airborne weather avoidance radar is designed conditions ? to identify areas of precipitation, especially heavy precipitation

which may signify an active thunderstorm. Instrument

1. The radarscope provides no assurance of weather conditions are restricted visibility due to clouds avoiding instrument weather conditions. or fog which are not indicated on radar screens.
2. The avoidance of hail assured when flying between and just clear of the most intense echoes.
3. The clear area between intense echoes indicates that visual sighting of storms can be maintained when flying between the echoes.
4. Which weather phenomenon signals the beginning Answer **(A)** is correct.

of the mature stage of a thunderstorm ? **DISCUSSION:** Thunderstorms have three stage in their life cycle: cumulus, mature, and dissipating. The

* 1. The start of rain. beginning of rain at Earth’s surface indicates the mature stage,
  2. The appearance of an anvil top. which is characterized by numerous updrafts and downdrafts
  3. Growth rate of cloud is maximum.

1. During life cycle of a thunderstorm, which stage Answer **(C)** is correct.

is characterized predominately by downdrafts ? **DISCUSSION:** Thunderstorms have three stage in their life cycle: cumulus, mature, and dissipating. The beginning

* 1. Mature of rain at Earth’s surface indicates the mature stage, which
  2. Developing. is characterized by numerous updrafts and downdrafts
  3. Dissipating.

1. What minimum distance should exist between Answer **(C)** is correct.

intense radar echoes before any attempt is made to **DISCUSSION:** Wind shear turbulence has been encountered fly between these thunder storms ? as far as 20 NM laterally from a severe thunderstorm.

Thus, a minimum distance of 40 NM should exist between intense radar echoes before any attempt is made to fly

1. 20 miles between them.
2. 30 miles

C.40 miles

1. Which situation would most likely result in freezing Answer **(C)** is correct..

precipitation ? rain falling from a which has temperature of **DISCUSSION:** A condition favourable for rapid

accumulation of clear icing is freezing rain. rain forms at

1. 32°F or less into air having a temperature. temperature warmer than freezing. then falls through air at
2. 0°C or less into air having a temperature of 0°C or more. temperature below freezing and becomes Super cooled.
3. More than 32°F into air having a temperature of 32°F or less.
4. If airborne radar is indicating an extremely intense Answer **(A)** is correct.

thunderstorm echo, this thunderstorm should be avoided by **DISCUSSION:** wind shear turbulence has been encountered a distance at least as far as 20 NM laterally from a severe thunderstorm.

* 1. 20 miles
  2. 10 miles
  3. 5miles

1. Which statement is true concerning the hazards of hail ? Answer **(C)** is correct.

**DISCUSSION:** Hail competes with turbulence as the greatest

* 1. Hail damage in horizontal flight is minimal due to the vertical thunderstorm hazard to aircraft. Hail has been observed in clear movement of hail in the clouds. air several miles from the parent thunderstorm. you should
  2. Rain at the surface is a reliable indication of no hail aloft. beneath the anvil of a large cumulonimbus cloud.
  3. Hailstones may be encountered in clear air several miles from from thunderstorm.

1. Hail is most likely to be associated with Answer **(B)** is correct.

**DISCUSSION:** Hail competes with turbulence as the greatest

* 1. Cumulus clouds. thunderstorm hazard to aircraft. hail has been observed in clear
  2. Cumulonimbus clouds. air in several miles from the parent thunderstorm. you should
  3. Stratocumulus clouds. beneath the anvil of a large cumulonimbus cloud.

1. Ice pellets encountered during flight normally are Answer **(B)** is correct.

evidence that **DISCUSSION:** Ice pellets from as a result of rain freezing at a higher altitude. This indicates that there

A. A warm front has passed. is a layer of warm air above in which it is raining and

B. A warm front is about to pass. the rain freezes as it falls through to colder air.

1. There are thunderstorms in the area.
2. Ice pellets encountered during flight are normally Answer **(C)** is correct.

evidence that **DISCUSSION:** Rain falling through subfreezing

cold air may become super cooled , freezing on impact

1. A cold front has passed. as freezing rain; or it may freeze during its descent.
2. There are thunderstorms in the area falling as ice pellets . ide pellets always indicate
3. Freezing rain exist at higher altitude. freezing rain at higher altitude.
4. What is indicated if ice pellets are encountered Answer **(A)** is correct.

at 8,000 feet ? **DISCUSSION:** Ice pellets from as a result

of rain freezing at a higher altitude. There is a layer

1. Freezing rain at higher altitude. of warm air above in which it is raining and the
2. You are approaching an area of rain freezes as it falls through the colder air. thunderstorms.
3. You will encounter hail if you encounter your flight.
4. A pilot reporting turbulence that momentarily Answer **(B)** is correct.

causes slight, erratic changes in altitude and/or **DISCUSSION:** Light turbulence momentarily causes

attitude should report as slight, erratic change in altitude and/or attitude.

1. Light chop
2. Light turbulence
3. Moderate turbulence.
4. When turbulence causes changes in altitude and/or Answer **(C)** is correct.

attitude, but aircraft control remains positive that **DISCUSSION:** Moderate turbulence is similar to reported

as light should be turbulence but of greater intensity

1. Light
2. Severe.
3. Moderate.
4. Turbulence that is encountered above 15,000 Answer **(B)** is correct.

feet AGL no associated with cumuliform cloudiness, **DISCUSSION:** CAT (clear air turbulence) is turbulence including thunderstorms, should be reported as encountered in air where no clouds are present.

* 1. Severe turbulence.
  2. Clear air turbulence.
  3. Convective turbulence.

1. The minimum vertical wind shear value critical Answer **(B)** is correct.

for probable moderate of greater turbulence is **DISCUSSION:** Moderate or greater turbulence should be expected where vertical wind shears

* 1. 4 knots per 1,000 feet exceed 6 kt. per 1,000 ft.
  2. 6 knots per 1,000 feet
  3. 8 knots per 1,000 feet.

1. One of the most dangerous features of mountain Answer **(A)** is correct.

waves is the turbulence area is and **DISCUSSION:** when stable air flows across a mountain rage, large waves occur downwind from the mountains .

* 1. Below rotor clouds. Underneath each wave crest is a rotary circulation
  2. Above rotor clouds. called a rotor turbulence is most frequent and most
  3. Below lenticular clouds. severe in and below the rotor clouds.

1. To conditions most favourable to wave formation Answer **(A)** is correct.

over mountainous areas are a layer of **DISCUSSION:** A mountain wave requires a layer of stable air at mountain top altitude and a

* 1. Stable air at mountaintop altitude and a wind of at wind of at least 20 kt. blowing across the ridge. least 20 knots blowing across the ridge.
  2. Unstable air at mountaintop altitude and a wind of at least 20 knots blowing across the ridge.
  3. Moist unstable air at mountaintop altitude and

a wind of less than 5 knots blowing across the ridge.

1. When flying low over hilly with a tailwind. Answer **(B)** is correct.

mountain ranges, the greatest potential danger from **DISCUSSION:** When wind flows turbulent air currents will usually be encountered on the over ridges or mountain ranges it flows up

the windward side and down the leeward side.

1. Leeward side when flying with a tailwind.
2. Leeward side when flying into the wind.
3. Windward side when flying into the wind.
4. Convective currents are most active on warm Answer **(A)** is correct.

summer afternoons when winds are **DISCUSSION:** Convective currents are localized vertical air movement both ascending and descending.

* 1. Light. They are most active on warm summer afternoons
  2. Moderate. when wind are light.
  3. Strong

1. During departure under conditions of suspected Answer **(A)** is correct.

low-level wind shear, a sudden decrease in headwind **DISCUSSION:** In such low-airspeed operations wind will cause. Shears causing a sudden decrease in headwind are critical.

A sudden decrease in headwind will decrease airspeed

A. A loss in airspeed equal to the decrease in wind velocity equal to the decrease in the wind velocity.

B. A gain in airspeed equal to the decrease in wind velocity

C. No change in airspeed, but groundspeed will decrease.

1. During an approach the most important and most easily Answer **(C)** is correct.

recognized means of being alerted to possible wind shear is **DISCUSSION:** If substantial power and vertical monitoring the speed adjusts are required to remain on the

proper glide path during an approach, wind

1. Amount of trim required to relieve control pressure. shear factor exist.
2. Heading changes necessary to remain on the runway centreline.
3. Power and vertical velocity required to remain on the proper glide path.
4. What is an important characteristic of wind shear. Answer **(C)** is correct.

**DISCUSSION:** Wind shear occurs because of changes in

* 1. It is present at only lower levels and exist in a horizontal wind direction and wind velocity,

direction horizontal and vertical. it may be present at

* 1. It is present at any level and exist in only a vertical direction any flight level.
  2. It can be present at any level and can exit in both a horizontal and vertical direction.

1. Low-level wind shear may occur when Answer (B) is correct.

**DISCUSSION:** A low-level temperature inversion

* 1. Surface winds are light and variable forms on a clear night with clam or light surface winds.
  2. There is a low-level temperature inversion with strong winds When the wind just a above the inversion is relatively strong, above the inversion. a wind shear zone develops between
  3. Surface winds are above 15 knots and there is no change in wind the clam and the stronger winds above. direction and wind speed with height

1. hazardous wind shear is commonly encountered Answer **(C)** is correct.

**DISCUSSION :** Hazardous wind shear is found near

* 1. Near warm or stationary frontal activity. thunderstorms and also near strong temperature inversions.
  2. When the wind velocity is stronger than 35 knots.
  3. In areas of temperature inversion and near thunderstorms.

1. If a temperature inversion is encountered Answer **(A)** is correct.

immediately after take-off or during an approach **DISCUSSION:** a wind shear develops in a zone

to a landing a potential hazard exist due to between cold , clam air covered by warm air with a strong wind.

1. Wind shear
2. Strong surface winds.
3. Strong convective currents.
4. winds at 3,000 feet AGL . . . . . . . . 30 kts Answer **(A)** is correct.

surface winds . . . . . . . . . . . . . .clam while on approach **DISCUSSION:** When landing in calm wind under approach for landing under clear skies with convective clear skies within a few hours after sunrise, you turbulence a few hours after sunrise one should. should be prepared for a temperature

inversion near the ground.

1. Increase approach airspeed slightly above normal to avoid stalling.
2. Keep the approach airspeed at or slightly below normal to compensate for floating.
3. Not alter the approach airspeed, these conditions are nearly ideal.
4. The low level wind shear alert system ( LLWAS ) Answer **(B)** is correct.

provides wind data and software process to **DISCUSSION:** The LLWAS provides wind data and

detect the presence of a software process to detect the presence of hazardous wind shear and microbursts in the vicinity of the airport .wind sensors

1. Rotating column of air extending from a mounted on poles as high as 150 ft. are located 2,000 to 3,500 ft cumulonimbus cloud. from the runway centreline wind shear is defined as a change
2. Change in wind direction and/or speed within a very in wind speed and/or direction in a short distance and short distance above the airport. and can exist in either, or both horizontal or
3. Downward motion of the air associated with vertical direction. continuous winds blowing with an easterly

component due to the rotation of the Earth.

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# CHAPTER 5

## INTERPRETING WEATHER DATA

* + **Printed Reports and Forecasts**
  + **Graphic Weather Products**
  + **Source of Weather Information.**

1. ICAO defines ceiling as the height above the ground or Answer **(C)** is correct.

water of the: **DISCUSSION:** ICAO defines ceiling as the height above the ground or water of the base of the lowest layer

* 1. lowest layer of clouds that is reported as scattered, broken, of cloud below 6000 meters (20,000 feet) covering
  2. lowest reported obscuring phenomena and the highest layer more than half the sky. of clouds reported as broken or overcast.
  3. base of the lowest layer of cloud below 6000 meters (2000 feet) covering more than half the sky.

1. (Refer to figure 30)What are the reported winds at Schiphol, Answer **(B)** is correct.

Amesterdam (EHAM)? **DISCUSSION:** The wind group at EHAM is coded as 02017G28KT. The first three digits represent the direction

* 1. Wind is from 200 true at 7 knots, gusts to 28 knots. from which the wind is blowing (020), in reference to true
  2. Wind is from 020 true at 17 knots, gusts to 28 knots. north. The next two digits show the speed in knots
  3. Wind is from 020 magnetic at 17 knots, gusts to 28 knots. (17). If the wing is gusty, it is reported with a G after
  4. Wind is from 200 true at 17 knots, gusts from 020 the speed and followed by the highest gust (28). at 7 knots.

1. (Refer to figure 30) What is the height of the base of the Answer **(A)** is correct.

Lowest ceiling at London, Heathrow (EGLL)? **DISCUSSION:** Ceiling is defined as the height

above the ground or water of the base of the lowest layer

1. 800 feet. of cloud below 6000 meters (2000 feet) covering more
2. 1400 feet. than half the sky. Broken clouds cover 5/8 to 7/8 of
3. 4000 feet. the sky and are designated by BKN in the METAR.
4. 400 feet. To determine the cloud bases, add two zeros

to the number given in the report. In this example, a broken layer begins at 800feet AGL.

1. (Refer to figure 30) What is the wind direction and Answer **(C)** is correct.

velocity at Mehrabad International (OIII)? **DISCUSSION:** The wind at OIII is coded as 26010KT. The first three digits represent the direction from

* 1. Wind is from 260 magnetic at 10 knots. which the wind is blowing (260), in reference to true
  2. Wind is from 010 magnetic at 26 knots. north. The next two digits show the speed in knots
  3. Wind is from 260 true at 10 knots. (10).
  4. Wind is from 010 true at 26 knots.

1. (Refer to figure 30) What are the current conditions depicted Answer **(C)** is correct.

for Detroit Metropolitan Airport (KDTW)? **DISCUSSION:** Visibility 3 statute miles, light snow, mist, scattered clouds at 2500 feet AGL, overcast skies at

* 1. Visibility 3 statute miles, snow, broken clouds, scattered 4500 feet AGL. clouds at 250 feet AGL, overcast skies at 450 feet AGL.
  2. Visibility 3 statute miles, snow, mist, scattered clouds at 2500 feet AGL, overcast skies at 4500 feet AGL.
  3. Visibility 3 statute miles, light snow, mist, scattered clouds at 2500 feet AGL, overcast skies at 4500 feet AGL.
  4. Visibility 3 statute miles, light snow, mist, scattered clouds at 2500 feet MSL, overcast skies at 4500 feet MSL.

1. (Refer to figure 30) What is the actual temperature and dew Answer **(B)** is correct.

point at Detroit Metropolitan Airport (KDTW)? **DISCUSSION:** Since the first digit after T is 1, it indicates that the temperature is negative; the dew

* 1. The actual temperature is -7 ºC and the dew point point is also negative since the fifth digit is 1.

is -12 ºC. Therefore, the actual temperature is -6.7 ºC and the

* 1. The actual temperature is -6.7 ºC and the dew point dew-points is -11.7 ºC. is -11.7 ºC.
  2. The actual temperature is 10.7 ºC and the dew point is 11.2 ºC.
  3. The actual temperature is 6.7 ºC and the dew point is 11.7 ºC.

1. (Refer to figure 30) In the METAR for LEBL, Answer **(C)** is correct.

what does the code **9999 FEW035** indicate? **DISCUSSION:** If the prevailing visibility is 10 kilometres or more, it is coded as 9999.

* 1. Visibility is 10 kilometers or more, few clouds FEW is used when cloud coverage is greater than zero at 350 feet. to 2/8 of the sky. To find the cloud bases, you must
  2. Visibility is more than 9 kilometers, few clouds add 2 zeros to the number given in the report (few at 3500 feet. 3500).
  3. Visibility is 10 kilometers or more, few clouds at 3500 feet.
  4. Visibility is 9 kilometers or more, few clouds at 3500 feet

1. (Refer to figure 30) What are the wind conditions at Answer **(A)** is correct.

London Heathrow (EGLL)? **DISCUSSION:** 21015G26KT indicates: The first three digits represent the direction from which the wind is blowing

* 1. Wind is from 210º true at 15 knots with gusts to 26 knots, (210 º), in reference to true north. The next two digits and the wind direction is varying from 180 º true show the speed in knots (15). If the wind is gusty, it is

to 250º true. reported with a G after the speed and followed by the

* 1. Wind is from 210 º magnetic at 15 knots with gusts to highest gust (26).

26 knots, and the wind direction is varying from 180º 180V250 indicates: indicates that wind is varying magnetic to 250º magnetic. from 180º true to 250º true.

* 1. Wind is from 150 º true at 21 knots with gusts to 26 knots, and the wind direction is varying from 250º true to 180º true.
  2. Wind from 015 magnetic at 21 knots with gusts to 26 knots, and the wind direction is varying from 180 º to 250º.

1. (Refer to figure 30) What is the reported runway visual Answer **(D)** is correct.

range (RVR) along runway 25 at Fiumicino (LIRF)? **DISCUSSION:** The RVR along runway 25 is coded as

R25/0900V1200U. RVR is designated with R

1. RVR along runway 25 is 900 meters and vertical followed by the runway number, a slant, and visual visibility is 1200 meters. range in meters. IF the RVR is varying, the lowest and
2. RVR along runway 25 is varying between 900 highest visual range values will be separated by a V. and 1200 meters. In addition, the letters U, D, and N are sometimes used
3. RVR along runway 25 is 900 meters and is expected to denote respectively increasing (Up), decreasing to increase to approximately more 1200 (Down) and unchanged (No change) visual range

meters in one hour. values since last report.

1. RVR along runway 25 is varying between 900 and 1200 meters and is increasing.
2. (Refer to figure 30) What is the reported intensity of Answer **(B)** is correct.

the snow at Mehrabad airport (OIII)? **DISCUSSION:** The intensity of precipitation is

indicated immediately before the descriptor and the weather

1. Light. phenomena code. Intensity levels are indicated
2. Moderate. as light (-),moderate (no sign), and Heavy (+).
3. Heavy. In this example, the intensity of the snow is

reported as moderate because there is no sign before the precipitation code (+ or – sign).

1. (Refer to figure 30) Which of the following airports have Answer **(D)** is correct.

VFR weather? **EDDM – LEBL – ESSA - OIFM DISCUSSION:** Both EDDM and LEBL are reporting

Meteorological conditions that meet the minimum

1. EDDM, LEBL, and ESSA. requirements for VFR flight (1000 ft. ceiling and or
2. OIFM, EDDM, and ESSA. 3 SM visibility).
3. EDDM, and OIFM.
4. EDDM, and LEBL.
5. (Refer to figure 30)In the METAR for Mehrabad Answer **(D)** is correct.

airport (OIII), decode the following: **DISCUSSION:** The intensity of precipitation is indicated immediately before the descriptor and

**-SN FEW035CB SCT040 OVC090** the weather phenomena code. In this example, the intensity of the snow is reported as light (-).

1. Light snow, few clouds at 3500 feet AGL, scattered clouds A cloud type may be included in the report if towering at 4000 feet AGL, Overcast skies at 9000 feet AGL. cumulus clouds (TCU) or cumulonimbus (CB) are
2. Light snow, few clouds at 3500 feet MSL, scattered present.

clouds at 4000 feet MSL, Overcast skies at 9000 FEW is used when cloud coverage is greater than zero

feet MSL. to 2/8 of the sky. Broken clouds, which cover between

1. Moderate snow, few clouds at 3500 feet AGL made up of 5/8 to 7/8 of the sky, are designated by BKN. Overcast cumulonimbus clouds, scattered clouds at 4000 feet AGL, skies (8/8 covered) are designated as OVC. To find the Overcast skies at 9000 feet AGL. cloud bases, you must add 2 zeros to the number given
2. Light snow, few clouds at 3500 feet AGL made up of in the report (few clouds at 1500 ft. AGL, scattered cumulonimbus clouds, scattered clouds at 4000 feet clouds at 4000 ft. AGL, and overcast skies at 9000 feet AGL, Overcast skies at 9000 feet AGL. AGL).
3. (Refer to figure 30) In the METAR for EDDM, Answer **(C)** is correct.

what does the code **CAVOK** indicate? **DISCUSSION:** The visibility and sky condition group of the METAR are replaced by CAVOK (**C**eiling **A**nd **V**isibility **OK**)

* 1. Visibility is 10 statute miles or more, with no cloud below if the following conditions exist:

5000 feet, no cumulonimbus clouds at any level, and There are no clouds below 5000 feet above aerodrome there is no significant weather. level or minimum sector altitude (whichever is higher)

* 1. Visibility is 5 kilometers or more, with no cloud below and no cumulonimbus, visibility is at least 10 2500 feet, no cumulonimbus clouds at any level, and and no cumulonimbus, visibility is at least 10 there is no significant weather. cumulonimbus, visibility is at least 10 such as
  2. Visibility is10 kilometers or more, with no cloud below precipitation, thunderstorms, shallow fog or low 5000 feet, no cumulonimbus clouds at any level, and drifting snow.

there is no significant weather.

* 1. Visibility 5 statute miles or more, with no cloud below 5000 feet, cumulonimbus clouds at any level,

and there is no significant weather.

1. (Refer to figure 30) In the METAR for Arlanda airport Answer **(C)** is correct.

(ESSA), decode the following: **DISCUSSION:** If the prevailing visibility is 10 kilometers or more, it

is coded as 9999.

**9999 SN FEW005 BKN014 M06/M08** FEW is used when cloud coverage is greater than zero to 2/8 of the sky. Broken clouds, which cover between

1. Visibility is 9 kilometers or more, Snow, few clouds at 5/8 to 7/8 of the sky, are designated by BKN. To find 500 feet AGL, Broken clouds at 1400 feet AGL, the cloud bases, you must add 2 zeros to the number

temperature -6 ºC, dew point -8 ºC. given in the report (few clouds at 1500 ft. AGL,

1. Visibility is 10 kilometers or more, snow, few clouds Broken clouds at 1400 ft. AGL).

at 500 feet MSL, Broken clouds at 1400 feet MSL, Temperatures below 0 ºC are prefixed with an M. temperature -6 ºC, dew point -8 ºC. Hence, in this example, the temperature is -6 ºC and

1. Visibility is 10 kilometers or more, snow, few clouds dew point is -8 ºC. at 500 feet AGL, Broken clouds at 1400 feet AGL,

temperature -6 ºC, dew point -8 ºC.

1. Visibility is 9 kilometers or more, snow, few clouds at

50 feet AGL, broken clouds at 140 feet AGL, temperature

-6 ºC, dew point -8 ºC.

1. In a METAR, what does the code VCTS -SHRA indicate? Answer **(D)** is correct.

**DISCUSSION:** Weather obscuration's or other weather phenomena

* 1. Thunderstorm in vicinity, moderate rain showers occurring between approximately 8 km and 16 km of
  2. Various clouds in connection with thunderstorm, light the airport reference point are indicated by VC rain showers. preceding the code. TS is a descriptor code which
  3. Severe thunderstorm, light snow showers. means thunderstorm.
  4. Thunderstorm in vicinity, light rain showers. Intensity of precipitation is shown immediately before the descriptor and the weather phenomena code. In this example, the intensity of the rain (coded as RA) is reported as light (-). SH is a descriptor code that means showers.

Therefore, the code VCTS –SHRA indicates: Thunderstorm in vicinity, light rain showers.

1. (Refer to figure 30) What is the reported runway visual range Answer **(A)** is correct.

(RVR) along runway 16R at Fiumicino (LIRF)? **DISCUSSION:** The RVR along runway 16R is coded as R16R/P1200U. RVR is designated with an R,

* 1. More than 1200 meters and increasing. followed by the runway number, a slant, and visual
  2. More than 1200 meters and not changing. range in meters. If the RVR is above the highest value
  3. 1200 meters and increasing. that can be determined by the system, it must be reported using the abbreviation “P”.

When the variation of the RVR values shows an upward tendency, it should be indicated by a U.

1. (Refer to figure 31) When was the TAF for EGLL issued? Answer **(A)** is correct.

**DISCUSSION:** The first two digits represent the day of the month,

* 1. On the 16th day of the month, at 1150Z. and the next four represent the issuance time (hour and
  2. At 16:11:02Z. minute) in Zulu.
  3. On the 2nd day of the month, at 1611Z.

1. (Refer to figure 31) What is the valid period for Answer **(B)** is correct.

the EGLL TAF? **DISCUSSION:** The valid period for this TAF is 1612/171 The first two digits before the slant represent the

* 1. Valid from 1612Z to 1718Z. on the 16th of the month. beginning date of this forecast (16th in this example),
  2. Valid from 1200Z on the 16th day of the month until and the last two digits immediately prior to the slant 1800Z on the 17th. represent the beginning hour of the valid time in zulu
  3. Valid from 1200Z to 2100Z on the 16th day of (1200Z).

the month. The first two digits immediately after the slant

represent the ending date of the forecast (17th), and the last two digits represent the ending hour in zulu (1800Z)

1. (Refer to figure 31) Between 1200Z (on the 16th) and Answer **(C)** is correct.

2100Z (on the 16th) the wind at EGGL is forecast to be? **DISCUSSION:** The forecast wind for EGGL from 1200Z until 2100Z

is coded as 22017G28KT.

1. Wind from 220º true at 14 knots. The first three digits represent the wind direction
2. Wind is from 220º magnetic at 17 knots with gusts to 28 knots. (220º) in reference to true north. The next two digits
3. Wind is from 220º true at 17 knots with gusts to 28 knots. show the speed in knots (17). If the wind is gusty, it is
4. Wind is from 170º magnetic at 22 knots with gusts to 28 knots. reported with a G after the speed and followed by the

highest gust (28).

1. (Refer to figure 31) What weather conditions are forecast to exist Answer **(C)** is correct.

from 1800Z until 2100Z at EGLL? **DISCUSSION:** The forecast for EGLL from 1800Z until 2100Z is coded as BECMG 1618/1621 8000 –RA SCT007

* 1. Refer to figure winds and temperature aloft forcast Becoming between BKN012.

1800Z and 2100 Z, visibility 8000 meters, light rain, scattered clouds It indicates a gradual change in weather conditions is At 70 feet AGL, broken clouds at 120 feet AGL. expected to occur sometimes between 1800Z and

* 1. Becoming between 1800Z and 2100Z, visibility 8000 meters, rain, 2100Z.

scattered clouds at 700 feet AGL, broken clouds at 1200 feet AGL. Becoming from 1800Z to 2100Z, visibility 8000

* 1. Becoming between 1800Z and 2100Z, visibility 8000 meters, meters, light rain, scattered clouds at 700 feet AGL, light rain, scattered clouds at 700 feet AGL, broken clouds broken clouds at 1200 feet AGL

at 1200 feet AGL.

1. (Refer to figure 31) What weather conditions are forecast to Answer **(A)** is correct.

exist from 0700Z until 1900Z at EHAM? **DISCUSSION:** The forecast for EHAM between 0700Z and 1900Z is coded as PROB30 TEMPO 1707/1719 4000

* 1. A 30% Probability, temporary conditions between 0700Z and RADZ BKN004.

1900Z, visibility is 4000 meters, rain, Drizzle, broken clouds A probability group (PROB) is used when the

at 400 feet AGL. probability of occurrence is between 30% and 49% (in

* 1. A 30% Probability, temporary conditions between 0700Z and this example the probability is 30%).

1900Z, visibility is 4000 feet, freezing rain, broken clouds TEMPO indicates a temporary forecast when wind, at 400 feet AGL. visibility, weather, or sky conditions are expected to

* 1. A 30% probability, becoming between 0700Z and 1900Z, visibility last less than 60 minutes.

4000 meters, rain, drizzle, broken clouds at 400 feet MSL. Therefore, the temporary group predicts that between

0700Z and 1900Z, visibility is expected to be 4000 meters in rain and drizzle, and broken clouds at 400 feet AGL.

1. (Refer to figure 31) In the TAF for EHAM, what does the code Answer **(C)** is correct.

MIFG indicate? **DISCUSSION:** MI is a descriptor code that means shallow. FG is an obscuration to visibility which means fog. Therefore,

* 1. Mist and Fog. MIFG indicates shallow fog.
  2. Patches of fog.
  3. Shallow fog.
  4. Partial fog.

1. (Refer to figure 31) What is the forecast wind for EHAM Answer **(B)** is correct.

between 1800Z and 2100Z on the 18th of the month? **DISCUSSION:** The forecast wind for EHAM between 1800Z and

2100Z is coded as **VRB03KT**.

1. Variable in speed from 030º. If the direction from which the wind is blowing is
2. Variable in direction at 3 knots. variable, the letters VRB are used. In the example, the
3. Variable in direction at 4 knots. forecast wind is variable in direction at 3 knots
4. From 190 º true at 7 knots. between 1800Z and 2100Z.
5. A squall (SQ) is defined as: Answer **(C)** is correct.

**DISCUSSION:** A squall is defined as a sudden increase in the wind

* 1. a sudden increase in the wind speed of at least 14 knots to speed of at least 16 knots to a sustained speed of 22 a sustained speed of 32 knots or more for knots or more for at least one minute.

at least 10 minute.

* 1. a drastic change in wind speed and/or direction that may occur at any altitude and in all directions.
  2. a sudden increase in the wind speed of at least 16 knots to a sustained speed of 22 knots or more for

at least 1 minute.

1. (Refer to figure 31) In the TAF for VIAR, what does Answer **(C)** is correct.

the following statement indicate? **DISCUSSION:** Wind, visibility, weather, or sky conditions that are expected to last less than 60 minutes are described in

**TEMPO 1808/1815 2000 TSRA FEW030CB** the temporary (coded as TEMPO) group, followed by the beginning and end time. In this example, the

1. Temporary conditions between 0800Z and 1500Z, visibility temporary group predicts that between 800Z and 2000 meters, light rain and turbulence, few clouds at 1500Z, the visibility is 2000 meters, moderate rain

3000 feet, ceiling below VFR minimums. associated with thunderstorm, few clouds at 3000 feet,

1. Temporary conditions between 0800Z and 1500Z, visibility made up of cumulonimbus.

2000 meters, moderate rain associated with thunderstorm, TSRA: The intensity of rain is moderate because there few clouds at 300 feet, made up of cumulonimbus. is no qualifier (+ or -) prior to this group. Therefore,

1. Temporary conditions between 0800Z and 1500Z, visibility this code (TSRA) means moderate rain associated 2000 meters, moderate rain associated with thunderstorm, with thunderstorm.

few clouds at 3000 feet, made up of cumulonimbus.

1. Temporary between 18:08Z and 18:15Z, visibility 2000 meters, moderate rain associated with thunderstorm, few clouds at 3000 feet, made up of cumulonimbus.
2. (Refer to figure 31) The only cloud type forecast in TAF is: Answer **(B)** is correct.

**DISCUSSION:** Only cumulonimbus (CB) clouds are forecast in the

* 1. Altocumulus. TAF.
  2. Cumulonimbus.
  3. Stratocumulus.
  4. Nimbostratus.

1. (Refer to figure 31) What weather conditions are forecast Answer **(A)** is correct.

to exist from 1900Z until 2000Z at VIAR? **DISCUSSION:** The forecast for VIAR between 1900Z and 2000Z is coded as BECMG 1719/1720 1500 BR

* 1. Becoming between 1900Z and 2000Z, visibility If a more gradual change in weather, taking about two 1500 meters, mist. hours, is expected, the code BECMG (becoming) is
  2. Becoming between 1900Z and 2000Z, visibility used. This code is followed by the beginning and 1500 meters, broken clouds. ending times of change period.
  3. Becoming between 1900Z and 2000Z, visibility BECMG 1719/1720 1500 BR: this indicates that a 1500 feet, blowing rain. gradual change in condition is expected to occur

between 1900Z and 2000Z. Sometimes during this period, the visibility will be 1500 meters in mist**.**

1. (Refer to figure 31) In the TAF for EHAM, between 0100Z Answer **(C)** is correct.

and 0400Z the height of the base of the lowest ceiling is **DISCUSSION:** The forecast between 0100Z and 01400Z is: expected to be: **BECMG 1701/1704 19007KT SCT007 BKN012**

**BKN 01**

1. 400 feet AGL. Ceiling is defined as the height above the ground or water
2. 700 feet AGL. of the base of the lowest layer of cloud below 6000 meters
3. 1200 feet AGL. (2000 feet) covering more than half the sky. Broken
4. 1800 feet AGL. clouds cover 5/8 to 7/8 of the sky and are designated by BKN in the METAR. To determine the cloud bases, add two zeros to the number given in the report. In this example, the base of the first broken layer begins at 1200 feet AGL.
5. (Refer to figure 31) In the TAF for EHAM, what does Answer **(B)** is correct.

the code **20012KT CAVOK** indicate? **DISCUSSION:** The forecast wind is depicted by a five digit group.

The first three digits represent the wind direction

1. Wind is from 200 º true at 12 knots, visibility is 5 kilometers (200 º) in reference to true north, and the last two or more, with no cloud below 10000 feet, no cumulonimbus digits show the wind speed (12 knots).

clouds at any level, and there is no significant weather. The visibility and sky condition group are replaced by

1. Wind is from 200 º true at 12 knots, visibility is 10 kilometers CAVOK if the following conditions exist:

or more, with no cloud below 5000 feet, no cumulonimbus There are no clouds below 5000 feet above aerodrome clouds at any level, and there is no significant weather. level or minimum sector altitude (whichever is higher)

1. Wind is from 200 º magnetic at 12 knots, visibility is 10 and no cumulonimbus, visibility is at least 10

statute miles or more, with no cloud below 5000 feet, no kilometers, no current or forecast significant weather cumulonimbus clouds at any level, and there is low drifting snow.

no significant weather.

1. Wind is from 200 º true at 12 knots, visibility is 10 statute miles or more, with no cloud below 5000 feet, no cumulonimbus clouds at any level, and there is

no significant weather.

1. In a winds and Temperatures aloft forecast, winds are Answer **(B)** is correct.

given in ………. and speed is shown in ………. **DISCUSSION:** In winds aloft forecast, winds are given in true

direction and speed is in knots.

1. True direction and kilometers per hour.
2. True direction and knots.
3. Magnetic direction and miles per hour
4. Magnetic direction and knots.
5. (Refer to figure 32) What wind is forecast for Answer **(B)** is correct.

SAN at 12000 feet? **DISCUSSION:** The wind forecast for SAN at 12000 feet is coded as 3317. The first two digits (33) represent the true

* 1. 330º magnetic at 17 knot direction (in tens of degrees) from which the wind is s
  2. 330º true at 17 knots. blowing from. The next two digits (17) show the
  3. 330º true at 17 miles per hour. speed in knots.
  4. 033º true at 17 knots.

1. (Refer to figure 32) What wind is forecast for Answer **(A)** is correct.

MIA at 30000 feet? **DISCUSSION:** To decode a forecast of winds between 100 and 199 knots, subtract 50 from the two-digit wind direction

* 1. 250º true at 112 knots. code (75) and multiply it by 10. Then, add 100 to the
  2. 075º at 12 knots. two-digit wind speed code (12). Therefore, the
  3. 250 magnetic at 112 knots. forecast wind for MIA at 30000 ft. is 250 º true at 112
  4. 075 magnetic at 12 knots. knots.

1. (Refer to figure 32) Determine the wind and temperature Answer **(D)** is correct.

aloft forecast for BOS at 9000 feet. **DISCUSSION:** The wind and temperature forecast for BOS at 9000

### feet is coded as 2624-16. The first two digits (26)

1. Wind is from 26 º true at 24 knots and the temperature represent the true direction (in tens of degrees) from

### is -16 ºC. which the wind is blowing from. The next two digits

1. Wind is from 260 º magnetic at 24 knots and the temperature (24) show the speed in knots. The last two digits (-16) is -16 ºC. represent the temperature in degrees Celsius.
2. Wind is from 260 º true at 24 miles per hour and the temperature is -16 ºF.
3. Wind is from 260 º true at 24 knots and the temperature

is -16 ºC.

1. (Refer to figure 32) Determine the wind and temperature Answer **(C)** is correct.

aloft forecast for MIA at 34000 feet. **DISCUSSION:** To decode a forecast of winds between 100 and 199 knots, subtract 50 from the two-digit wind direction

### **752341** code (75) and multiply it by 10. Then, add 100 to the

two-digit wind speed code (23). Therefore, the

1. Wind is from 75 º true at 123 knots and the temperature forecast wind for MIA at 34000 ft. is 250 º true at 123 is -41 ºC. knots.
2. Wind is from 75 true at 23 knots and the temperature The last two digits (41) indicate the temperature in is -41 ºC. degrees Celsius. Since all the temperatures above
3. Wind is from 250 true at 123 knots and the temperature 24000 ft. are negative, the forecast temperature is is -41 ºC. -41 ºC.
4. Wind id from 250 magnetic at 123 knots and the temperature is -41 ºC.
5. When the term light and variable is used in reference to Answer **(C)** is correct.

a winds aloft forecast, the coded group and **DISCUSSION:** A code of 9900 indicates light and variable winds (less

wind speed is? than 5 knots).

1. 9900 and less than 7 knots.
2. 0000 and less than 3 knots.
3. 9900 and less than 5 knots.
4. 0000 and less than 7 knots.
5. (Refer to figure 32) You plan to fly over ONT at 12000 on Answer **(A)** is correct.

a true heading of 340 º and a true speed of 135 knots. **DISCUSSION:** The wind and temperature forecast for ONT at 9000 What groundspeed do you expect? feet is coded as 3416-01. This forecast is decoded as

What will be the outside air temperature? wind from 340 º true at 16 knots and a temperature of

-1 ºC. Since the angle between wind direction (from

1. Groundspeed of 119 knots and an outside air temperature 340 º true) and the true heading (340 º) is 180 º, you of -1 ºC. will have 16 knots of headwind. Therefore, you
2. Groundspeed of 129 knots and an outside air temperature should expect to have a ground speed of 119 knots of -1 ºC. (135-16).
3. Groundspeed of 151 knots and an outside air temperature of -1 ºC.
4. Groundspeed of 141 knots and an outside air temperature of -1 ºC.
5. (Refer to figure 32) You plan to fly over SFO at 6000 on at Answer **(C)** is correct.

true heading of 220 º and a true speed of 110 knots. **DISCUSSION:** The wind and temperature forecast for ONT at 9000 What groundspeed do you expect? feet is coded as 3416-01. This means the wind is from

What will be the outside air temperature? 040 º true at 20 knots and the temperature is 11 ºC. Since the angular difference between wind direction

1. Groundspeed of 90 knots and an outside air temperature (040 º true) and the true heading (220 º) is zero, you of 6 ºC. will have 20 knots of tailwind. Therefore, you should
2. Groundspeed of 129 knots and an outside air temperature expect to have a groundspeed of 130 knots (110+20). of -1 ºC.
3. Groundspeed of 130 knots and an outside air temperature of 11 ºC.
4. Groundspeed of 90 knots and an outside air temperature of 11 ºC.
5. (Refer to figure 32) You plan to fly over SEA at 7500 feet. Answer **(A)** is correct.

Determine the forecast wind. **DISCUSSION:** Since wind and temperature are not forecast for 7500 feet, you must interpolate between 6000 feet and 9000

* 1. 315º true at 15 knots. feet. Your planned flight altitude is halfway between
  2. 320º true at 17 knots. 6000 and 9000 feet.
  3. 310º magnetic at 16 knots. The forecast wind at 6000 feet is: 330º at 09 knots.
  4. 310º true at 14 knots. The forecast wind at 9000 feet is: 300º at 21 knots. Therefore, a good estimate of the wind at 7500 feet Therefore, a good estimate of the wind at 7500 feet over SEA is 315º true at 15 knots.

1. (Refer to figure 32) You plan to fly over ONT at 10500 feet. Answer **(D)** is correct.

Determine the forecast wind. **DISCUSSION:** Since wind and temperature are not forecast for 10500 feet, you must interpolate between 9000 feet and

* 1. 015º true at 14 knots. 12000 feet. Your planned flight altitude is midway
  2. 360º true at 10 knots. between 9000 and 12000 feet.
  3. 340º true at 16 knots. The forecast wind at 9000 feet is: 010º at 08 knots.
  4. 355º true at 12 knots. The forecast wind at 12000 feet is: 340º at 16 knots. Therefore, a good estimate of the wind at 7500 feet over SEA is 355º true at 12 knots.

1. AIRMETs are advisories of significant weather phenomena Answer **(C)** is correct.

but of lower intensities than SIGMETs and are intended **DISCUSSION:** AIRMETS are advisories of significant weather for dissemination to: phenomena that describe conditions at intensities

lower than those which require the issuance of

1. Only VFR pilots. SIGMETS. They are intended for dissemination to all
2. Only IFR pilot. pilots.
3. All pilots.
4. What information is contained in an AIRMET? Answer **(C)** is correct.

**DISCUSSION:** Refer to Annex 3, Appendix 6, 2.1.4

1. Severe icing, severe turbulence, and embedded thunderstorms
2. Severe mountain wave, sandstorms, duststorms, and volcanic ash.
3. Sustained winds of 30 knots or more at the surface, mountain obscuration, widespread areas of broken

or overcast cloud with height of base less than 1000 feet.

1. What is the validity period of an AIRMET? Answer **(B)** is correct.

**DISCUSSION:** The period of validity of an AIRMET can’t be more

* 1. Not more than 2 hours. than 4 hours.
  2. Not more than 4 hours.
  3. Not more than 6 hours.
  4. Not more than 8 hours.

1. AIRMETs contain weather conditions which are Answer **(A)** is correct.

potentially hazardous to: **DISCUSSION:** AIRMETs contain weather conditions which are potentially hazardous to small aircraft.

1. Small aircraft.
2. Large aircraft.
3. All aircraft.
4. SIGMETs are issued for hazardous weather which Answer **(C)** is correct.

is considered significant to: **DISCUSSION:** SIGMETs warn of hazardous weather conditions which concern all aircraft.

1. Large aircraft only.
2. Small aircraft only.
3. All aircraft.
4. What is the validity period of a SIGMET other than Answer (C) is correct.

those for volcanic ash clouds and tropical cyclones? **DISCUSSION:** The validity period of a SIGMET shall be not more

than 4 hours. In the special case of SIGMET

1. Not more than 2 hours. messages for volcanic ash cloud and tropical cyclones,
2. Not more than 3 hours. the period of validity shall be extended up to 6 hours.
3. Not more than 4 hours.
4. Not more than 6 hours.
5. What information is contained in a SIGMET? Answer **(A)** is correct.

**DISCUSSION:** Refer to Annex 3, appendix 6, and 1.1.4.

1. Embedded thunderstorms, severe turbulence, severe icing, duststorms, sandstorms, and volcanic ash.
2. Sustained winds of 30 knots or more at the surface, and mountain obscuration.
3. Broken or overcast clouds with height of base less than 1000 feet AGL, and visibility less than 5000 meters affecting widespread areas.
4. Moderate icing, and moderate turbulence, and moderate mountain wave.
5. In a SIGMET, what does “EMBD TSGR” stand for? Answer **(C)** is correct.

**DISCUSSION:** Refer to Annex 3, appendix 6, and 1.1.4.

1. Embedded thunderstorm with snow pellets.
2. Embedded thunderstorm with heavy rain.
3. Embedded thunderstorm with hail.
4. Embedded squall with hail.
5. An area of thunderstorms should be considered isolated if : Answer **(B)** is correct.

**DISCUSSION:** An area of thunderstorm should be considered isolated

* 1. If it is embedded within cloud layers and can’t be if it consists of individual features which affect an area readily recognized. with a maximum spatial coverage less than 50% of the
  2. If it consists of individual features that affect an area with area concerned. a maximum spatial coverage less than 50% of

the area concerned

* 1. If it consists of well-separated features which affect an area with a maximum spatial coverage between 50% and 75% of the area concerned.
  2. If it is obscured by haze or smoke.

1. (Refer to figure 33) The area enclosed in the Answer **(B)** is correct.

scalloped line over southeastern Caspian sea **DISCUSSION:** Refer to Annex 3, SHEET OF NOTATION USED IN

is forecast to have: FLIGHT DOCUMENTATION, and use the following sections:

1. Severe turbulence between 12000 ft. and 20000ft. 1. Symbols for significant weather.

and severe icing between 12000 ft. and 20000 ft. 3. Abbreviations used to describe clouds (3.3 Heights).

1. Moderate turbulence between 12000 ft. and 20000 ft. 4. Depicting of lines and systems on specific charts. and moderate icing between 12000 ft. and 20000. ft.
2. Moderate turbulence between 12000 ft. and 20000 ft. and isolated cumulonimbus with tops at 20000 ft.
3. (Refer to figure 33) The area enclosed in the scalloped line Answer **(A)** is correct.

over northern, central, and southern Turkey indicates: **DISCUSSION:** Refer to Annex 3, SHEET OF NOTATION USED IN

FLIGHT DOCUMENTATION, and use the following

1. Isolated embedded cumulonimbus with tops at 32000 ft. 4. Depicting of lines and systems on specific charts. and bases below 10000 ft.
2. Isolated embedded stratocumulus with bases at 32000 ft. and tops above 45000 ft.
3. Isolated embedded cumulonimbus with bases at 32000 ft. and topes above 45000 ft.
4. (Refer to figure 33) What is the height and speed of Answer **(B)** is correct.

the jet stream over southern Iran flowing from **DISCUSSION:** Refer to Annex 3, SHEET OF NOTATION USED IN west to east? FLIGHT DOCUMENTATION, and use the following

section

1. 39000 ft. MSL at 260 knots. 4. Depicting of lines and systems on specific charts
2. 39000 ft. MSL at 130 knots. (4.1 and 4.3).
3. 39000 feet AGL at 150 knots.
4. 39000 feet AGL at 130 knots.
5. (Refer to figure 33) What does the following symbol Answer **(D)** is correct.

over northeastern Iran indicate? **DISCUSSION:** Refer to Annex 3, SHEET OF NOTATION USED IN FLIGHT DOCUMENTATION, and use the following

section:

1. Moderate icing at 35000 ft. 4. Depicting of lines and systems on specific charts.
2. Clear air turbulence at 35000 ft.
3. Tropopasue maximum height of 35000 ft.
4. Tropopasue height of 35000 ft.

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# CHAPTER 6

## BASIC NAVIGATION

* + **Aeronautical Charts**
  + **Flight computers**
  + **Pilotage and Dead Reckoning**
  + **Sources of Flight Information**

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# CHAPTER 7

## RADIO NAVIGATION SYSTEMS

* + - **VHF Omnidirectional Range**
    - **Automatic Direction Finder**
    - **Advanced Navigation**

1. Pilots should notify controllers on initial contact that Answer **(C)** is correct.

They have received that ATIS broadcast by **DISCUSSION:** Pilots should notify controllers on initial contact that they have received the ATIS

* 1. Stating “Have Numbers.” broadcast by repeating the alphabetical code
  2. Stating “Have Weather.” word appended to the broadcast.
  3. Repeating the alphabetical code word appended to the to the broadcast.

1. During a LORAN approach the receiver must detect a Answer **(B)** is correct.

Lost signal, a signal blink within : **DISCUSSION:** LORAN navigation for non-precision approaches requires accurate and reliable

* 1. 5 seconds of the occurrence and warm the pilot of the information. During an approach, the occurrence even. of a signal blink or a loss of signal must detected
  2. 10 seconds of the occurrence and warm the pilot of the within 10 seconds, and the pilot must be notified. event.
  3. 15 seconds of the occurrence and warm the pilot of the event.

1. Where does the DME indicator have the greatest error Answer **(A)** is correct.

Between the ground distance and displayed distance **DISCUSSION:** The mileage readout on the DME To the VORTAC ? is the direct distance from the airplane to the

VORTAC and is commonly referred to as slant-

1. High altitudes close to the VORTAC. Range distance. The difference between a measured
2. Low altitudes close to the VORTAC.. distance on the surface and the DME slant-
3. Low altitudes far from the VORTAC. Range is known as slant-range error and is greatest at high altitudes close to the VORTAC.
4. What DME indication should a pilot observe when Answer **(B)** is correct.

directly over a VORTAC site at 12,000 feet ? **DISCUSSION:** When directly over a VORTAC site, the DME will display altitude in nautical miles

* 1. 0 DME miles. (NM) above the site. One NM equals approximately
  2. 2 DME miles. 6,000 ft at 12,000 ft. directly above the VORTAC,
  3. 2.3 DME miles. the DME will indicate 2 DME.

1. What would be the identification when a VORTAC Answer **(C)** is correct.

is undergoing routine maintenance and is considered **DISCUSSION:** The only positive method of identifying unreliable ? a VOR is by its Morse code identification or

by the recorded automatic voice identification

1. A test signal, “TESTING”, is sent every 30 seconds. which is always indicated by the use of the word
2. Identifier is preceded by “M” and an intermitted “OFF” “V-O-R” following the range’s name. During periods flag would appear. of maintenance, the facility may radiate a T-E-S-T code,
3. The identifier would be removed. or the identification code would be removed.
4. Which indication may be received when a VOR is Answer **(A)** is correct.

undergoing maintenance and is considered unreliable ? **DISCUSSION:** The only positive method of identifying

a VOR is by its Morse code identification or by the recorded automatic voice identification which is always

1. Coded identification T-E-S-T. indicated by the use of the word “V-O-R” following
2. Identifier is preceded by “M” and intermittent “OFF” flag the range’s name. During periods of maintenance might appear. the facility may radiate a T-E-S-T code, or the
3. An automatic voice recording stating the VOR is out-of- identification code would be removed. service for maintenance.
4. (Refer to Figure 34) Which RMI illustration indicates the Answer **(B)** is correct.

aircraft to be flying outbound on the magnetic bearing **DISCUSSION:** A radio magnetic indicator (RMI) consist of 235° FROM the station ? ( wind 050°at 20 knots.) of a rotating compass card which rotates as the airplane

turns. The magnetic heading of the airplane is always

1. 2 directly under the index at the top of the instrument.
2. 3 The bearing pointer displays magnetic bearings to the
3. 4 selected station. The tail of the indicator tells you which

radial you are on or the magnetic bearing from the station. Thus, a magnetic bearing of 235°from the station is indicated when the tail of the needle as in RMI 3 is on 235°. The 20-kt wind from 050° is a direct tailwind which does not require wind correction.

1. (Refer to figure 34) What is the magnetic bearing TO Answer **(B)** is correct.

the station as indicated by illustration 4 ? **DISCUSSION:** The magnetic heading of the airplane is always directly under the index at the top of the instrument.

* 1. 285° The bearing pointer displays the magnetic bearing to the
  2. 055° selected station. In RMI 4, the needle is pointing to 055°,
  3. 235° which is the magnetic bearing to the station.

1. (Refer to Figure 34) Which RMI illustration indicates the Answer **(A)** is correct.

indicates the aircraft is southwest of the station and **DISCUSSION:** If the airplane is to the southwest of the proceeding TO the station ? station and moving toward it, the heading and the needle

should both be indicating northeast, which is shown in

1. 1 RMI 1. It indicates a magnetic bearing to the station
2. 2 of 055°. The heading is also 055°, which means the airplane
3. 3 is flying to the station.
4. (Refer to figure 34) Which RMI illustration indicates the Answer **(B)** is correct.

aircraft is located on the 55° radials of the station and heading **DISCUSSION:** The magnetic heading of the airplane is away from the station ? always directly under the index at the top of the instrument.

The bearing pointer display magnetic bearings to the

1. 1 selected station. The tail of the indicator tells you which
2. 2 radial you are on or the magnetic bearing from the station.
3. 3 Thus, a magnetic bearing of 055°from the station is indicated

when the tail of the needle is on 055°, as in 2. The heading is also 055°, which means you are flying northeast ,which is away from the station ,and you are on the 055*°*radial.

1. (Refer to figure 35) What is the lateral displacement Answer **(A)** is correct.

of the aircraft in nautical miles from the radial **DISCUSSION:** On VORs, the displacement from course

selected on the No. 1 NAV ? is approximately 200 ft. per dot per NM. At 30 NM from the station. one dot deflection indicates approximately

1. 5.0 NM. 1 NM displacement of the airplane from the course
2. 7.5 NM. centerline . At 60 NM it would be 2 NM for every dot
3. 10.0 NM. of displacement. Since here, displacement is 2 1/2 dots, the airplane would be 5 NM from the centerline.
4. (Refer to figure 35 ) On which radial is the aircraft Answer **(C)** is correct.

as indicated by the NO. 1 NAV? **DISCUSSION:** The course selector in figure 35 is set on 350°with a FROM reading, indicating that, if the course

* 1. R-175 . deflection bar were centered, the airplane would be on
  2. R-165. R-350 Since a total deflection is approximately 10°to 12°
  3. R-345 one-half, so it is about 5° to 6°. Here, deflection is less than one-half, so it is about 5°. The course deflection bar indicates that this airplane is to the left of R-350, which would be

R-345.

1. (Refer to figure 35) What is the lateral displacement Answer **(C)** is correct.

in degrees from the desired radial on the No.2 NAV ? **DISCUSSION:** Since on a standard 5-dot VOR indicator, a

full deflection on 5 dots is about 10°, 2 dots means a 4°

1. 1°. deflection.
2. 2°.
3. 4°.
4. (Refer to figure 35) Which OBS selection on the Answer **(B)** is correct.

NO.1 NAV would center the CDI and change the **DISCUSSION:** The course selector in figure 35 set to 350° ambiguity indication to a TO? with a FROM indication, which means the airplane would

be on R-350, if the course deviation bar were centered.

1. 175 However, the deviation bar indicates that the airplane is
2. 165 5°(2°per dot) to the left of R-350, or R-345. Thus, to center
3. 345 the CDI and change the ambiguity indicator TO, the OBS

should be set on the reciprocal of 345°, which is 165° ( 345° - 180°)

1. (Refer to figure 35) which OBS selection on the Answer **(A)** is correct.

NO. 2 NAV would center the CDI ? **DISCUSSION:** The course selector in figure 35 is set to 170° (it is not an HIS; it is a VOR) and the TO-FROM indicator

* 1. 174 indicates FROM, which means the airplane would be on
  2. 166 R-170 if the course deviation bar were centered. Since the
  3. 335 bar indicates a left deflection (2° per dot), the airplane is to

the right of the radial, or R-174.

1. (Refer to figure 35) Which OBS selection Answer **(C)** is correct.

on the NO.2 NAV would center the CDI and change **DISCUSSION:** The course selector in Figure 35 is set to 170° the ambiguity indication to a TO ? (it is not an HIS; it is a VOR) and the TO-FROM indicator

indicates FROM, which means the airplane would be

1. 166 means the airplane would be on R-170 if the course
2. 346 deviation bar were centered. Since the bar indicates
3. 354 a left deflection (2°per dot), the airplane is to the right

of the radial, or on the 174° radial. To obtain a TO indication, one would have to change the OBS selection by 180° from 174° to 354°.

1. (Refer to figure 36) To which aircraft position does Answer **(A)** is correct.

HIS presentation “A” correspond ? **DISCUSSION:** HIS “A” has a VOR

course selection of 090°, with a TO indication, meaning

1. 1 the airplane is to the left of the 360/180 radials. It has
2. 8 a right deflection, which means it is north of the 270/090
3. 11 radials. The airplane heading is 205°, which means airplane

1 is described.

1. (Refer to figure 36) To which aircraft position does HIS Answer **(C)** is correct

presentation “B” correspond ? **DISCUSSION:** HIS “B” has a VOR

course selection of 270° with a FROM indication, meaning

1. 9 that the airplane is to the left of the 360/180 radials.
2. 13 Since it has a right deflection, the airplane is south
3. 19 of R-270. Given a heading of 135°, airplane 19 is described.
4. (Refer to figure 36) To which aircraft position does HIS Answer **(C)** is correct.

presentation “C” correspond ? **DISCUSSION:** HIS “C” has a VOR

course selection of 360° with a TO indication, meaning

1. 6 the airplane is south of the 270/090 radials. Since the
2. 7 course deflection bar is to the left, the airplane 12 is
3. 12 to the east of the 180° radial. Given a 310° heading,

airplane 12 is described.

1. (Refer to figure 36) To which aircraft position does HIS Answer **(C)** is correct.

presentation “D” correspond ? **DISCUSSION:** HIS “D” has a VOR

course selection (OBS) of 180° . It's FROM indication

1. 4 means the airplane is south of R-270/090. Since the
2. 15 course deflection bar is to the left, the airplane is
3. 17 west of R-180. Given the heading of 180°, the position

describes airplane 17.

1. (Refer to figure 36) To which aircraft position does HIS Answer **(B)** is correct.

presentation “E” correspond ? **DISCUSSION:** HIS “E” has a VOR

course selection of 360°. It's FROM indication means

1. 5 the airplane is north of R-270/090. Given the course
2. 6 Given the course deflection bar to the left, the airplane
3. 15 is to the east of the 360° radial. Given the 360° heading

the position describes airplane 6.

1. (Refer to figure 36) To which aircraft position does HIS Answer **(C)** is correct.

presentation “F” correspond ? **DISCUSSION:** HIS “F” has VOR

course selection of 180° with a FROM indication*,*

1. 10 meaning that the airplane is south of the 270/090 radials.
2. 14 Since the course deflection bar is centered, the airplane is
3. 16 on R-180. Given a heading of 045° ( at the top of HIS),

airplane 16 is described.

1. Which is true about homing when using ADF during Answer **(A)** is correct.

crosswind conditions? Homing **DISCUSSION:** Homing to a station accomplished by keeping the needle centered

* 1. To a radio station results in a curved path that leads on the top index of your inbound course and fly to the station. a curved path to the station.
  2. Is a practical navigation method for flying both to and from a radio station.
  3. To a radio station requires that the ADF have an automatically or manually rotatable azimuth.

1. Which is true regarding tracking on a desired bearing Answer **(B)** is correct.

when using ADF during crosswind conditions ? **DISCUSSION:** When tracking outbound from an NDB station, the nose of the aircraft will be crabbed into

* 1. To track outbound, heading corrections should be the wind. As a result of this crab and flying away from made away from the ADF pointer. the station, the ADF needle will be deflected towards
  2. When on the desired track outbound with the proper the windward side ( the side the wind is coming from) drift correction established, the ADF pointer will be

deflected to the windward side of the tail position.

* 1. When on the desired track inbound with the proper drift correction established, the ADF pointer will be deflected to the windward side of the nose position.

1. The magnetic heading is 315°and the ADF shows a Answer **(C)** is correct.

relative bearing of 140°. The magnetic bearing FROM **DISCUSSION:** To compute the magnetic bearing the radio beacon would be to an NDB, you use the formula below MH is given

as 315°and RB is given 140°

1. 095°
2. 175° MH + RB = MB(TO)
3. 275° 315°+ 140°= MB(TO) 455°- 360°= 095°

you adjust by 180°to get MB (FROM) 95°+ 180°= 275°

1. The magnetic heading is 350◦ and the relative bearing Answer **(B)** is correct.

to a radio beacon is 240◦. what would be the magnetic **DISCUSSION:** To compute the magnetic bearing to bearing TO that radio beacon ? an NDB, you use the formula below. The MH is given

as 350° and the RB is given as 240°.

1. 050°
2. 230° MH + RB = MB(TO)
3. 295° 350°+ 240°= MB(TO)

MB(TO) = 590°– 360°= 23

1. The ADF is tuned to a radio beacon. If the magnetic Answer **(B)** is correct

heading is 040°and the relative bearing is 290, the **DISCUSSION:** To compute the magnetic bearing to magnetic bearing TO that radio beacon would be an NDB, you use the formula below. The MH is given

as 040°and the RB is given as 290°.

1. 150°
2. 285° MH + RB = MB(TO)
3. 330° 040°+ 290°= 330°
4. If the relative bearing to a non-directional radio beacon Answer **(A)** is correct.

is 045°and the magnetic heading is 355°, the magnetic **DISCUSSION:** To compute the magnetic bearing to bearing TO that radio beacon would be an NDB, you use the formula below. The MH is given

as 355°and the RB is given as 045°.

1. 040°
2. 065° MH + RB = MB(TO)
3. 220° 355°+ 045°= MB(TO)

MB(TO) = 400°– 360°= 040°

1. An aircraft is maintaining a magnetic heading of 265°and Answer **(B)** is correct.

the ADF shows a relative bearing of 065°. This indicates **DISCUSSION*:*** To compute the magnetic bearing to that the aircraft is crossing the an NDB, you use the formula below. The MH is given

as 265°and the RB is given as 065°.

1. 065° magnetic bearing FROM the radio-beacon.
2. 150° magnetic bearing FROM the radio-beacon. MH + RB = MB(TO)
3. 330° magnetic bearing FROM the radio-beacon. 265°+ 065°= 330°

you adjust by 180°to get MB (FROM) 330°– 180°= 150°

1. (Refer to Figure 37) To intercept a magnetic bearing of Answer **(B)** is correct.

240°FROM at a 030°angle (while outbound), the airplane **DISCUSSION:** Draw a diagram as illustrate . should be turned Read the illustration from right to left. You are on

a 35° MH. Your RB is 310°. That identifies where

1. left 065° the NDB is. Finally you want to draw the 240°MB
2. left 125° at a 30°angle, you need a left turn from 35°to
3. right 270° 270°which is 125°

MH + RB = MB

035°+ 310°= MB(TO) = 345°

1. (Refer to Figure 37) If the airplane continues to fly on Answer **(B)** is correct.

the heading as shown, what magnetic bearing FROM **DISCUSSION:** You are currently on the 165° MB(FROM) the station would be intercepted at a 35°angle outbound ? With a 35°MH, you will cross the 70° MB(FROM)

at a 35° intersection angle (70°- 35°= 35°). Note that

1. 035° the 70°MB(FROM) is in front of us when you are northeast
2. 070° bound currently crossing the 165° MB(FROM)
3. 215
4. (Refer to Figure 38 ) If the airplane continues to fly Answer **(C)** is correct.

on the magnetic heading as illustrated, what magnetic **DISCUSSION:** Draw a diagram as illustrate. bearing FROM the station would be intercepted at a 35° Being by determining your present MB.

angle ?

1. 090°
2. 270° MH + RB = MB(TO)
3. 305° ADD 180°for MB(FROM)

340°+ 110°+ 180°= MB(FROM) = 630°– 360°= 270°

you are now on the 270° MB(FROM). When you cross the 305°MB(FROM) of the NDB, you will have a 35° interception angle (340° - 305° = 35°

1. (Refer to Figure 38) If the airplane continues to fly Answer **(C)** is correct.

on the magnetic heading as illustrated, what magnetic **DISCUSSION:** Refer to figure 38, bearing FROM the station would be intercepted at a 30◦ Being by determining your present MB.

angle ?

MH + RB = MB (TO)

1. 090° add 180°for MB (FROM)
2. 270 340°+ 110°+ 180= MB (FROM) = 360° – 360°= 270°
3. 310° when you cross the 310°MB(FROM) of the NDB, you

will have a 30° interception angle (340°-310°= 30°)

1. When checking the course sensitivity of a VOR receiver, Answer **(B)** is correct.

how many degrees should be OBS be rotated to move **DISCUSSION:** Course sensitivity may be checked on a the CDI from the centre to the last dot on either side ? VOR by noting the number of degrees of change in the

course selected as you rotate the OBS to move the CDI

1. 5° to 10° from centre to the last dot on either side. This should
2. 10°to 12° be between 10° and 12°.
3. 18°to 20°
4. When using a VOT to mage a VOR receiver check, the Answer **(C)** is correct.

CDI should be centred and the OBS should indicate **DISCUSSION:** To use a VOT, tune in the published VOT that the aircraft is on the frequency on your VOR receiver. With the course deviation

indicator (CDI) centred, the Omni-bearing selector

1. 090°radial. (OBS) should read 0°with the TO-FORM indicator
2. 180°radial. showing FROM or the OBS should read 180°with the
3. 360°radial. TO-FORM indicator showing TO. This indicates you are on the 360°radial.
4. How should the pilot make a VOR receiver check Answer **(B)** is correct.

when the aircraft is located on the designated **DISCUSSION**: On ground checkpoints, you must have

checkpoint on the airport surface ? the aircraft on the location of the checkpoint and have the designated radial set on the OBS. The CDI must

1. Set the OBS on 180°plus or minus 4◦; the CDI centre within ±4°of the designated radial. should centre with a FROM indication.
2. Set the OBS on the designated radial. The CDI must centre within plus or minus 4°of that radial with a FROM indication,
3. With the aircraft headed directly toward the VOR and the OBS set to 000°, the CDI should centre with a TO indication.
4. An aircraft 60 miles from a VOR station has a CDI Answer **(B)** is correct.

indication of one-fifth deflection, this represents a **DISCUSSION:** Assuming a receiver with normal course course centreline deviation of approximately. sensitivity and full-scale deflection at 5 dots, aircraft

displacement from course is approximately 200 ft.

1. 6 miles. per dot per NM. Since one-fifth deflection equals 1dot,
2. 2 miles. the aircraft is 12,000 ft. or 2 NM off course
3. 1 miles. (200 ft./NM x 60 NM = 12,000 ft.)
4. When the CDI needle is centred during an airborne Answer **(B)** is correct.

VOR check, the Omni-bearing selector and the TO/FROM **DISCUSSION:** For an airborne VOR receiver check, the indicator should read maximum permissible bearing error of a VOR is ±6°.

* 1. Within 4°of the selected radial.
  2. Within 6°of the selected radial.
  3. 0° TO , only if you are due south of the VOR.

1. Which situation would result in reverse sensing of a Answer **(C)** is correct.

VOR receiver ? **DISCUSSION:** By flying heading that is a reciprocal of the course set in the OBS, you will have two situations :

* 1. Flying a heading that is reciprocal to the bearing you will be flying to the station with a FROM indication selected on the OBS. or you will fly from the station with a TO indication.
  2. Setting the OBS to a bearing that is 90° from the bearing either will result in reverse sensing. on which the aircraft is located.
  3. Failing to change the OBS from the selected inbound course to the outbound course after passing the station.

1. To track outbound on the 180 radial of a VOR station, the Answer **(C)** is correct.

recommended procedure is to set the OBS to **DISCUSSION:** The recommended procedure is to set 180°on the OBS (your outbound course) . This will give

* 1. 360°and make heading corrections toward the CDI needle. you a FROM indication while flying away from the station.
  2. 180°and make heading corrections away from the CDI needle. This is normal sensing and you correct towards the needle.
  3. 180°and make heading corrections toward the CDI needle.

1. To track inbound on the 215 radial of a VOR station, the Answer **(C)** is correct.

recommended procedure is to set the OBS to **DISCUSSION:** Since radials emanate outward from the VOR, tracking inbound on R-215 means you are flying

* 1. 215°and make heading corrections toward the CDI needle. the reciprocal course of 035°. Thus you should set 035°
  2. 215°and make heading corrections away from the CDI needle. on the OBS, and make heading corrections toward the
  3. 035°and make heading corrections toward the CDI needle. needle*.*

1. What would be the identification when a VORTAC is Answer **(C)** is correct.

undergoing routine maintenance and is considered **DISCUSSION:** During periods of routine or emergency unreliable ? maintenance, coded identification (or code and voice

, where applicable) is removed from certain ICAO NAV-

1. A test signal, “TESTING,” is sent every 30 seconds. AIDs. During periods of maintenance, VHF ranges may
2. Identifier is preceded by “M” and an intermittent radiate a T-E-S-T code. “OFF” flag would appear.
3. The identifier would be removed.
4. Which indication may be received when a VOR is Answer **(A)** is correct.

undergoing maintenance and is considered unreliable ? **DISCUSSION:** During periods of routine or *emergency*

maintenance, coded identification (or code and voice

1. Coded identification T-E-S-T where applicable) is removed from certain ICAO NAV-
2. Identifier is preceded by “M” and an intermittent “OFF” AIDs. During periods of maintenance, VHF ranges may flag might appear. radiate a T-E-S-T code.
3. An automatic voice recording stating the VOR is out-of-service for maintenance.
4. During a VOT check of the VOR equipment, the course deviation Answer **(B)** is correct.

indicator centers on 356° with the TO/FROM reading FROM. This **DISCUSSION:** With the course deviation indicator (CDI) VOR equipment may centered, the Omni-bearing selector should read 0°

(±4°) with the TO/FROM indicator showing FROM

1. Be used if 4° is entered on a correction card and subtracted from or 180° (±4°) with the TO/FROM indicator showing TO. all VOR courses.
2. Be used during VFR flights, since the error is within limits.
3. Not be used during VFR flights, since the TO/FROM should read TO.
4. If an airborne checkpoint is used to check the VOR system for VFR Answer **(A)** is correct.

operations, the maximum bearing error permissible is **DISCUSSION:** If neither a VOT nor a designated ground

checkpoint is available, a pilot may use a designated air-

1. Plus or minus 6°. borne checkpoint for the VOR check. The Maximum
2. Plus 6°or minus 4°. permissible bearing error is ± 6°
3. Plus or minus 4°.
4. Which entry shall be recorded by the person performing a VOR Answer **(C)** is correct.

operational check ? **DISCUSSION:** Each person making the VOR operational check required by regulations shall the date, place,

bearing error and sign the aircraft log or other record .

1. Frequency, radial and facility used, and bearing error.
2. Flight hours and number of days since last check, and bearing error.
3. Date, place, bearing error, and signature.
4. What DME indications should a pilot observe when directly Answer **(B)** is correct.

over a VORTAC site at 12,000 feet ? **DISCUSSION:** Distance information displayed on DME equipment is slant range from the station in nautical

* 1. 0 DME miles. miles. 12,000 feet directly over a VORTAC is almost
  2. 2 DME miles. exactly 2NM.
  3. 2.3 DME miles.

1. Where Does the DME indicator have the greatest error Answer **(A)** is correct.

between the ground distance and displayed distance to **DISCUSSION:** Distance information displayed on DME the VORTAC ? *eq*uipment is slant range from the station in nautical

miles. The greatest difference between displayed

1. High altitudes close to the VORTAC. distance and ground distance will occur at high altitude
2. Low altitudes close to the VORTAC. close to the VORTAC
3. Low altitudes far from the VORTAC.
4. (Refer to Figure 36) To which aircraft position does HIS Answer **(C)** is correct.

presentation “D” correspond ? **DISCUSSION:** HIS indicator “D” has a course selection of of 180°, and the TO/FROM indicator is pointing to the

* 1. 4. tail of the course arrow. So the aircraft is flying away
  2. 15. FROM the station, and is south of R-270 and R-090.
  3. 17 The CDI bar is deflected left, which means the aircraft

is west of R-180. The aircraft heading is 180°, which describes position 17.

1. ( Refer to Figure 36) To which aircraft position does HIS Answer **(B)** is correct.

presentation “E” correspond ? **DISCUSSION:** HIS indicator “E” has a course selection of 360°, and the TO/FROM indicator is pointing to

* 1. 5. of the course arrow. So the aircraft is flying away FROM
  2. 6. the station, and is north of R-270 and R-090. The CDI bar
  3. 15. is deflected left, which means the aircraft is east of

R-180. The aircraft heading is 360°, which describes

position 6.

1. (Refer to Figure 36) To which aircraft position does HIS Answer **(A)** is correct.

presentation “A” correspond ? **DISCUSSION:** HIS indicator “A” has a course selection of 090°, and the TO/FROM indicator is pointing to the

* 1. 1. head of the course arrow. So the aircraft is flying
  2. 8. TO the station, and is west of R-180 and R-000
  3. 11. The CDI bar is deflected right, which means the aircraft

heading is 205°, which describes position 1.

1. (Refer to Figure 36) To which aircraft position does HIS Answer **(C)** is correct.

presentation “B” correspond ? **DISCUSSION:** HIS indicator “B” has a course selection of 270°, and the TO/FROM indicator pointing to the

* 1. 9. tail of the course arrow. So the aircraft is flying away
  2. 13. FROM the station, and is west of R-180 and R-000
  3. 19. The CDI bar is deflected right, which means the aircraft

is south of R-270. The aircraft heading is 135°, which describes position 19.

1. (Refer to Figure 36) To which aircraft position does HIS Answer **(C)** is correct.

presentation “C” correspond ? **DISCUSSION:** HIS Indicator “C” has a course selection of 360°, and the TO/FROM indicator is pointing to head of

* 1. 6 the course arrow. So the aircraft is flying TO the station
  2. 7 and is which means the aircraft is east of R-180.The aircraft
  3. 12. aircraft heading is 310°, which describes position 12.

1. (Refer to Figure 40) What is the approximate position of the Answer **(B)** is correct.

aircraft if the VOR receivers indicate the 320° radial of **DISCUSSION:** 1. Pilot the 320° radial (magnetic course savannah VORTAC (Area 3) and the 184° radial of Allendale FROM) of the Savannah VORTAC.

VOR (Area 1) ? 2. Plot the 184° radial of the Allendale VOR.

3. Note the intersection of the two plotted radials over

* 1. Town of Guyton. the town of Springfield.
  2. Town of Springfield.
  3. 3 miles east of Marlow.

1. (Refer to Figure 41) What is the approximate position of the Answer **(B)** is correct.

aircraft if the VOR receivers indicate that 245 radial of Sulphur **DISCUSSION:** 1. Pilot the 320° radial (magnetic course Springs VORD-DME (area5) and the 140° radial of Bonham FROM) of the Sulphur Springs VOR-DME.

VORTAC (area3) ? 2. Plot the 140°radial ( magnetic course FROM) of the Bonham VORTAC.

1. Meadowview Airport. 3. Note the intersection of the two plotted radials over
2. Glenmar Airport. the Glenmar Airport (PVT).
3. Majors Airport.
4. (Refer to Figure 42, area 5) The VOR is tuned to the Dallas/Fort Worth Answer **(A)** is correct.

VORTAC. The Omni-bearing selector (OBS) is set on 253°, with **DISCUSSION:** The course selected is 253° and the TO/ TO indication, and a right course deviation indicator (CDI) FROM indicator has a TO flag, which means the air- deflection. What is the aircraft’s position from the VORTAC ? craft is south of the course but north of the VOR. The

CDI needle is deflected to the right, which means the

1. East-northeast aircraft is left ( or east ) of the course. Therefore,
2. North-northeast. the aircraft must be to the east northeast of the
3. . West-southwest. station to satisfy the VOR indications.
4. (Refer to Figure 43-1) The VOR receiver has the indications shown Answer **(C)** is correct.

What is the aircraft’s position relative to the station ? **DISCUSSION:** The course selected is 030° and the TO/

FROM indicator is showing TO, which means the

1. North aircraft is south of the course. The CDI needle is
2. East. deflected to the left, which means the aircraft
3. South. is right of the course.
4. (Refer to Figure 43-3 ) The VOR receiver has the indications shown. Answer **(B)** is correct.

What is the aircraft’s position relative to the station ? **DISCUSSION:** Observe from illustration 3 of

Figure 43, that there is no TO/FROM indication

1. East. and the CDI is deflected left with an OBS set on
2. Southeast. 030°. The aircraft is somewhere along the perpendicular
3. West. line (120/300°). The CDI left means the

030° radial is to the left, or west, of the aircraft position. Answer B is the only one placing the aircraft on the 120° radial, or southeast of the station.`

1. (Refer to Figure 43-8) The VOR receiver has the indication has Answer **(A)** is correct.

the indications shown. What radial is the aircraft crossing ? **DISCUSSION:** The CDI is centered with the OBS set to

210° with a TO indication . Therefore, the aircraft is

1. 030° located on the 030° radial
2. 210°
3. 300°
4. (Refer to Figure 40) On what course should the VOR receiver Answer **(B)** is correct.

(OBS) be set to navigates direct from Hampton Varnville **DISCUSSION:** 1. Plot the course direct from Hampton Airport (area1) to Savannah VORTAC (area3) ? Varnville Airport to the Savannah VORTAC.

2. Note radial (magnetic course from Savannah )

* 1. 003° on which the plotted course lies (003°)
  2. 183° Determine the course To the VORTAC by finding
  3. 200 the reciprocal :

TO = FROM + 180° TO = 003°+ 180°

TO = 183°

1. (Refer to Figure 41) On what course should the VOR receiver Answer **(A)** is correct.

(OBS) be set in order to navigate direct from Majors Airport **DISCUSSION:** Use the following steps :

(area1) to Quitman VORTAC (area2) ? 1. Plot the course direct from Majors Airport to Quitman VORTAC.

1. 101°. 2. Note the radial ( magnetic course FROM ) of Quitman
2. 108°. ` VORTAC on which the plotted course lies (281°)
3. 281° 3. Determine the course TO the VORTAC by finding the

reciprocal :

TO = FROM + 180° TO = 281°+ 180°

TO = 461°-360°= 101°

1. (Refer to Figure 44) The VOR is tuned to Elizabeth City VOR, and Answer **(A)** is correct.

the aircraft is positioned over Shawboro. Which VOR indication **DISCUSSION:** 1. Locate the Shawboro Airport and the is correct ? Elizabeth City VOR in FAA Figure . Draw the radial

( magnetic course FROM ) of the Elizabeth City VOR

1. 2. on which Shawboro lies (030°)
2. 5.
3. 9. 2. When over Shawboro on the 030 radial, the CDI

should be centered with a 030 FROm indication

or a 210 TO indication ( the reciprocal). Dials 2 and 8 satisfy these conditions. Only dial 2 is listed as an answer choice.

1. (Refer To Figure 41 and 43) The VOR is tuned to Bonham Answer **(B)** is correct.

VORTAC (area3), and the aircraft is positioned over the town of **DISCUSSION:** 1. Locate and draw the magnetic course OF Sulphur Springs (area5). Which VOR indication is correct ? from Bonham VORTAC to Sulphur Springs (120°)

* 1. 1. 2. Notice that the OBS selections of all the dials in
  2. 7. Figure are 030°or 210°, both of which are
  3. 8. at 90° with respect to the 120°radial. Therefore,

When over Sulphur Springs, the flag should indicate neither TO nor FROM and the course needle should have a full deflection either side.

1. (Refer to Figure 45 AND 43) The VOR is tuned to Jamestown Answer **(B)** is correct.

VOR, and the aircraft is positioned over Cooperstown airport. **DISCUSSION:** Use the following steps :

which VOR indication is correct ? 1. Locate the Cooperstown Airport and the Jamestown VOR in Figure Draw the radial (magnetic course

1. 1 FROM) of the Jamestown VOR on which Cooperstown
2. 6 Airport lies.
3. 4 2. When over Cooperstown Airport on the 30 radial,

The CDI should have a 030 FROM indication or a 210

TO indication (The reciprocal). Dial 6 satisfies these conditions.

1. (Refer to Figure 46) What course should be selected on the Answer **(B)** is correct.

Omni-bearing selector (OBS) to make a direct flight from Mercer **DISCUSSION:** Use following steps :

county Regional Airport (area3) to the Minot VORTAC (area1) with 1. plot a direct course from Mercer Airport to the Minot TO indication ? Airport VORTAC.

1. 001° 2. Note the radial (magnetic course FROM Minot VORTAC )
2. 359° on which the plotted course lies (179°)
3. 179° 3. Determine the course TO Minot VORTAC by finding the

reciprocal:

TO = FROM + 180° TO = 179°+ 180°

TO = 359°

1. (Refer to Figure 44) What is your approximate position on low Answer **(B)** is correct.

altitude airway Victor 1, southwest of Norfolk (area1), if the **DISCUSSION:** Use the following steps :

VOR receiver indicates you are on the 340° radial of Elizabeth City 1. Plot the 340° radial from the Elizabeth City VOR to VOR (area3) ? the point of intersection with V1. **Caution**: the numerals

”330” just inside the Elizabeth City compass rose ( just

1. 15 nautical miles from Norfolk VORTAC. to the left of the course line ), refer to an obstruction
2. 18 nautical miles from Norfolk VORTAC. high , not a VOR radial.
3. 23 nautical miles from Norfolk VORTAC. 2. Measure the distance from Norfolk to the plotted intersection using the sectional scale of a plotter. the distance is 18 NM.
4. When the course deviation indicator (CDI) needle is centered Answer **(C)** is correct.

during an receiver check using a VOR test signal (VOT), the **DISCUSSION:** To use the VOT service, tune in the VOT Omni-bearing selector (OBS) and the TO/FROM indicator should frequency on the VOR receiver. With the CDI centered, read the OBS should read 0° with the TO/FROM indication

showing “FROM” or the OBS should read 180° with the

1. 180° FROM, only if the pilot is due north of the VOT. TO/FROM indication showing “TO”.
2. 0° TO or 180° FROM, regardless of the pilot’s position from the VOT.
3. 0° FROM or 180° TO, regardless of the pilot’s position from the VOT.
4. (Refer to Figure 47-1) Determine the magnetic bearing TO Answer **(C)** is correct.

the station **DISCUSSION:** The head of the needle indicates the

magnetic bearing TO the station, which is 210°

1. 030°
2. 180°
3. 210°
4. (Refer to Figure 47-2) What magnetic bearing TO the station Answer **(C)** is correct.

**DISCUSSION:** The nose of the needle indicates the

* 1. 010° magnetic bearing TO the station which is 190°.
  2. 145°
  3. 190°

1. (Refer to Figure 47-2) Determine the approximate heading to Answer **(C)** is correct.

intercept the 180 bearing TO the station. **DISCUSSION:** To determine the intercept angle, turn to the inbound bearing and note degrees the needle is from the nose. Double this figure to get the intercept angle of

* 1. 040° 20°
  2. 160° 180°+ 20° = 200
  3. 220° The only possible answer is 220° since the other true

headings would not intercept the180° bearing to the station.

1. (Refer to Figure 47-3) What is the magnetic bearing from the station? Answer **(B)** is correct.

**DISCUSSION:** The tail of the needle indicates the magnetic

* 1. 025° bearing FROM the station which is 115°
  2. 115°
  3. 295°

1. (Refer to Figure 47) which ADF indication represents the aircraft Answer **(C)** is correct.

tracking TO the station with a right crosswind ? **DISCUSSION:** Figure 47depicts ADF indications combined with aircraft heading information. In this case,

* 1. 1 the magnetic bearing To can be read under the nose of the
  2. 2 needle and the bearing FROM can be read directly under
  3. 4 the tail of the needle. Use the following steps :
     1. Note which dials,#3 and #4, of Figure 47, show an aircraft proceeding toward the station.
     2. A right crosswind ( wind FROM the right) requires that the aircraft heading be to the right of the course to

compensate for drift to the left. With the nose of the aircraft to the right of the course, the station appears to be left on the nose, as shown on dial #4.

1. (Refer to Figure 47-1) What outbound bearing is the aircraft Answer **(A)** is correct.

crossing ? **DISCUSSION:** The tail of the needle indicates the magnetic bearing FROM the station, which 030°

1. 030°
2. 150°
3. 180°
4. (Refer to Figure 48-1)The relative bearing TO the station is Answer **(C)** is correct.

**DISCUSSION:** On a fixed-scale (fixed-card) ADF, the nose

* 1. 045° of the aircraft is marked as 0°. The ADF indication is
  2. 180° relative to aircraft heading, thus relative bearing may
  3. 315 be read directly under the head of the needle, which is

315°.

1. (Refer to Figure 48-2) The relative bearing TO the station is Answer **(A)** is correct.

**DISCUSSION:** On a fixed-scale (fixed-card) ADF, the nose

* 1. 090° of the aircraft is marked as 0°. The ADF indication is re-
  2. 180° relative to aircraft heading, thus relative bearing may
  3. 270° be read directly under the head of the needle, which is

090°.

1. (Refer to Figure 48-2) The relative bearing TO the station Answer **(B)** is correct.

**DISCUSSION:** On a fixed-scale (fixed-card) ADF, the nose

* 1. 090° of the aircraft is marked as 0°. The ADF indication is
  2. 180° relative to aircraft heading, thus relative bearing may
  3. 270° be read directly under the head of the needle, which is

180°.

1. How many satellites make up the Global positioning System Answer **(C)** is correct.

(GPS)? **DISCUSSION:** The GPS constellation of 24 satellites is

designed so that a minimum of five are always observable

1. 25. by a user anywhere on earth.
2. 22.
3. 24.
4. What is the minimum number of global positioning system (GPS) Answer **(B)** is correct.

satellites that are observable by a user anywhere on earth ? **DISCUSSION:** The GPS constellation of 24 satellites is

designed so that a minimum of five are always

1. 6. observable by a user anywhere on earth.
2. 5.
3. 4.
4. How many global Positioning system (GPS) satellites are required Answer **(C)** is correct.

to yield a three dimensional position ( latitude, longitude, and **DISCUSSION:** The GPS receiver uses data from a minimum altitude ) and time solution ? of four satellites to yield a three-dimensional position

(latitude, longitude and altitude) and time solution.

A. 5

B. 6

C. 6

1. (Refer to Figure 47-1 ) What is the relative bearing TO Answer **(C)** is correct.

the station ? **DISCUSSION:** Figure 47-1 depicts ADF indications combined with aircraft heading information, In this

* 1. 030° case, the magnetic bearing TO can be read under the
  2. 210° nose of the needle and the bearing FROM can be read
  3. 240° directly under the tail of the needle. Use the following

steps:

* + 1. The aircraft magnetic heading is 330°
    2. The magnetic bearing TO the station is 210°
    3. Calculate the relative bearing (RB): MB = MH + RB

RB = 210° – 330°+ 360°

RB = 240°

1. (Refer to Figure 47-2) what is the relative bearing TO Answer **(B)** is correct

The station ? **DISCUSSION:** Figure 47-2 depicts ADF indications combined with aircraft heading information, In this

* 1. 190° case, the magnetic bearing TO can be read under the
  2. 235° nose of the needle and the bearing FROM can be read
  3. 315° directly under the tail of the needle . Use the following

steps:

* + 1. The aircraft magnetic heading is 315°.
    2. The magnetic bearing TO the station is 190°.
    3. Calculate the relative bearing (RB): MB = MH + RB

RB = 190°– 315°+360°

RB = 235°

1. (Refer to Figure 47-4) what is the relative bearing TO Answer **(C)** is correct.

The station ? **DISCUSSION:** Figure 47-4depicts ADF indications combined with aircraft heading information, In this

* 1. 020° case, the magnetic bearing TO can be read under the
  2. 060° nose of the needle and the bearing FROM can be read
  3. 340° directly under the tail of the needle. Use the following

steps:

* + 1. The aircraft magnetic heading is 220
    2. The magnetic bearing TO the station is 200°
    3. Calculate the relative bearing (RB): MB = MH + RB

RB = 200°– 220° + 360°

RB = 340°

1. (Refer to Figure 48-4) On a magnetic heading of 320, Answer **(B)** is correct.

The magnetic bearing TO the station is **DISCUSSION:** Use the following steps :

1. On a fixed-scale ADF, the aircraft heading is marked
   1. 005° as 0°. The ADF indication is relative to the aircraft.
   2. 185° heading, thus relative bearing (RB) may be read directly
   3. 225° under the head of the needle (255°).
2. Calculate the magnetic bearing to the station at a magnetic heading of 320°.

MB = RB + MH

MB = 225°+ 320°= 545 - 360°

MB = 185°

1. (Refer to Figure 48-5) On a magnetic heading of 320, Answer **(A)** is correct.

The magnetic bearing TO the station is **DISCUSSION:** Use the following steps :

1. On a fixed-scale ADF, the aircraft heading is marked
   1. 035° as 0°. The ADF indication is relative to the aircraft.
   2. 180° heading, thus relative bearing (RB) may be read directly
   3. 215° under the head of the needle (000°).
2. Calculate the magnetic bearing to the station at a magnetic heading of 035°.

MB = RB + MH MB = 0° + 035

MB = 035°

1. (Refer to Figure 48-6) On a magnetic heading of 120◦, Answer **(B)** is correct.

The magnetic bearing TO the station is **DISCUSSION:** Use the following steps :

* 1. On a fixed-scale ADF, the aircraft heading is marked

1. 045° as 0° . The ADF indication is relative to the aircraft*.*
2. 165° heading, thus relative bearing (RB) may be read directly
3. 270° under the head of the needle (045°) .
   1. Calculate the magnetic bearing to the station at a magnetic heading of 120°.

MB = RB + MH MB = 045° + 120°

MB = 165°

1. (Refer to Figure 48-6) If the magnetic bearing TO the Answer **(C)** is correct.

station is 240◦, the magnetic heading is **DISCUSSION:** Use the following steps :

1. On a fixed-scale ADF, the aircraft heading is marked
   1. 045° as 0°. The ADF indication is relative to the aircraft.
   2. 105 heading, thus relative bearing (RB) may be read directly
   3. 195° under the head of the needle (045°).
2. note that the magnetic bearing TO the station is 240°. Calculate the magnetic heading using : MB = RB + MH

240°= 045°+ MH

MH = 240°- 045°= 195°

1. (Refer to Figure 48-7) If the magnetic bearing TO the Answer **(B)** is correct.

station is 030◦, the magnetic heading is **DISCUSSION:** Use the following steps :

1. On a fixed-scale ADF, the aircraft heading is marked
   1. 060° as 0°. The ADF indication is relative to the aircraft.
   2. 120° heading, thus relative bearing (RB) may be read directly
   3. 270° under the head of the needle (270°).
2. note that the magnetic bearing TO the station is

030. Calculate the magnetic heading using : MB = RB + MH

030= 270 + MH

MH = 030°- 270°+ 360°

MH = 120°

1. (Refer to Figure 48-8) If the magnetic bearing TO the Answer **(C)** is correct.

station is 135, the magnetic heading is **DISCUSSION:** Use the following steps :

1. On a fixed-scale ADF, the aircraft heading is marked
   1. 135° as 0°. The ADF indication is relative to the aircraft.
   2. 270° heading, thus relative bearing (RB) may be read directly
   3. 360° under the head of the needle (135°).
2. note that the magnetic bearing TO the station is 135°. Calculate the magnetic heading using : MB = RB + MH

135= 135°+ MH MH = 0°or 360°

1. The major components of a VOR indicator are the Answer **(D)** is correct

**DISCUSSION:** The VOR indicator has three different

* 1. HSI, CDI, and course selector. components which give you related navigation information .
  2. HIS, CDI, and TO-FROM indicator. the components are the course deviation indicator (CDI),
  3. CDI, DME, and TO-FROM indicator. the TO-FROM indicator , and the course selector .
  4. CDI, TO-FROM indicator, and course selector.

1. …………….. The heading of the airplane has a direct Answer **(B)** is correct

Relationship to the radial selected on the VOR **DISCUSSION:** It is important to remember that the radial

Indicator. travel outward from the VOR station . The heading of the airplane has not a direct relationship to the radial selected

1. True on the VOR indicator .
2. False
3. If the CDI is deflected four dots to the right and your Answer **(D)** is correct

course Indicator and heading indicator are in general **DISCUSSION:** When you are off course , the CDI points agreement, Your desired course is toward the desired course . The scale underneath the needle

shows how far you are off course , with each dot on the

1. 2° to the right. scale representing course deviation off two degree.
2. 4° to the left.
3. 4° to the right.
4. 8° to the right.
5. When correcting toward the CDI in a reverse sensing Answer **(C)** is correct

Situation, you will **DISCUSSION:** If you mistakenly set your course selector to the reciprocal of the desired course, your CDI will be

* 1. Parallel the radial. deflected away from the course you want to follow .
  2. Fly closer to the radial. this situation is known as reverse sensing .
  3. Fly further away from the radial.
  4. Stay the same distance from the radial.

1. When you are conducting a VOR check with a VOT Answer **(D)** is correct

And the CDI centers, the course selector and TO- **DISCUSSION:** A VOT check using a course of 180° should FROM indicator should read center the CDI and give you a TO indication. Using 0°

should center the CDI and give you a FRO indication.

1. 0° TO.
2. 180° FROM.
3. 0° TO or 180° FROM , depending on your position from The VOT.
4. 0° FROM or 180° TO, regardless of your position from the VOT.
5. A VORTAC facility provides you with Answer **(D)** is correct

**DISCUSSION:** The VORTAC facility provides you with

* 1. Course guidance only. course guidance and distance information.
  2. Distance information only.
  3. Nautical mile distance information only.
  4. Course guidance and distance information.

1. The most accurate DME groundspeed readings occur when Answer **(C)** is correct

Traveling **DISCUSSION:** The ground speed reading is accurate only when you are travelling directly to or from the station.

* 1. Directly to the station only. Flight in any other direction will give you an unreliable
  2. Directly from the station only. reading.
  3. Directly to or from the station.
  4. At a 90° angle to the station.

1. DME measures Answer **(D)** is correct

**DISCUSSION:** DME measures slant range distance , not

* 1. Magnetic course. horizontal distance . slant range distance is the results of
  2. Vertical distance. two components , the horizontal distance and vertical
  3. Horizontal distance. distance.
  4. Slant range distance.

1. When you are tuning a VOR/DME or VORTAC facility Answer **(A)** is correct

The absence of the single-coded identification every **DISCUSSION:** The absence of the single-coded identification 30 second indicates. signal every 30 seconds means the DME is not operational.

* 1. The DME is not operational.
  2. The VOR is not operational.
  3. The system is working correctly.
  4. Your receiver is not operational.

1. ADF equipment is capable of receiving signals from Answer **(D)** is correct

**DISCUSSION:** ADF equipment allows you to navigate using

* 1. Any FM radio station. NDBs and commercial broadcast stations .
  2. Only AM radio station.
  3. Specially equipped VOR or VORTAC station.
  4. NDBs and commercial broadcast stations.

1. ……………….. The ADF receiver will give an OFF indication Answer **(B)** is correct

if the station signal is unreliable. **DISCUSSION:** Always use the test function to verify that the bearing pointer is responding to a reliable signal . The ADF

* 1. True receiver will not give an OFF indication if the station signal
  2. False is unreliable.

1. VORTAC-based RNAV systems allow you more lateral freedom Answer **(D)** is correct

because **DISCUSSION:** Area navigation ( RNAV ) allows you more lateral freedom in navigation , because it does not require

* 1. The data base identifies surrounding airports you to track directly to or from navigation facilities.
  2. The signals radiate from satellites in space.
  3. You do not have to tune and identify the station.
  4. You do not have to track directly to or from navigations facilities.

|  |  |  |
| --- | --- | --- |
| 100. | The main component for VORTAC-based RNAV is the | Answer **(C)** is correct |
|  |  | **DISCUSSION:** VOTRAC- based RNAV uses a course-line |
| A. | TACAN receiver. | Computer (CLC) which permits you to create "”phantom |
| B.  C. | LORAN receiver. Course line computer. | Station " for use in navigation. |
| D. | Flight management computer. |  |

1. When you are using a VORTAC-based RNAV system Answer **(D)** is correct

The needle deflections on the VOR indicator show **DISCUSSION:** Another desirable RNAV feature is that you course deviation in terms of navigate using the VOR indicator . With RNAV , the needle

deflections still indicate course displacement , but the

1. Degrees. deviation scale is in nautical miles and not dot degrees.
2. Radials.
3. Statute miles.
4. Nautical miles.
5. ………………. The sky waves formed by the low frequency Answer **(A)** is correct

LORAN transmitters are not considered as reliable for **DISCUSSION:** Sky waves are formed by LORAN signals navigation as the ground waves. but are not considered as reliable for navigation

as ground waves .

1. True.
2. False.
3. A LORAN chain is composed of stations designated as Answer **(D)** is correct

**DISCUSSION:** In a typical LORAN chain , one transmitter

* 1. AM and FM. is the master and two or more other are called secondary's.
  2. High and low.
  3. Main and auxiliaries.
  4. Master and Secondary's.

1. The global positioning system (GPS) provides horizontal Answer **(B)** is correct

accuracy for civil user of approximately **DISCUSSION:** System accuracy for civil users is approximately 328 feet (100 meters) horizontally.

1. 100 feet.
2. 328 feet.
3. 300 meters.
4. 328 meters.
5. …………….. One disadvantage of the GPS is that it is adversely Answer **(B)** is correct

affected by electrical disturbances such as thunderstorms **DISCUSSION:** One advantage of the GPS is that it is free and precipitation static. from any affected by electrical disturbances such as

thunderstorms and precipitation static.

1. True.
2. False.
3. The radio magnetic indicator, or RMI, is usually composed Answer **(B)** is correct

of a single-bar needle, double-bar needle. **DISCUSSION:** The radio magnetic indicator combines the heading indicator with two bearing pointers.

1. And a fixed compass card.
2. And a slaved compass card.
3. Ambiguity indicator , and a fixed compass card.
4. A TO-FORM indicator , and a slaved compass card.
5. The RMI is oriented toward. Answer **(B)** is correct

**DISCUSSION:** The RMI is oriented toward magnetic north.

* 1. True north. The number under the tail of each needle indicates the
  2. Magnetic north. magnetic bearing from the appropriate station.
  3. Relative north.
  4. The nose of the aircraft.

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# CHAPTER 8

## AVIATION PHTSIOLOGY

* + - **Vision in Flight**
    - **Spatial Disorientation**
    - **Respiration and Altitude**
    - **Alcohol, Drugs, and Performance**

1. In Bright light, the best vision is obtained by looking Answer **(A)** is correct.

**DISCUSSION:** The best vision in day light is obtained by looking

* 1. Directly at the object. directly at the object.
  2. Off center of the object.
  3. With quick scanning motions.
  4. With your peripheral vision.

1. To see an object most clearly at night, you should look. Answer **(B)** is correct.
   1. directly at the object. **DISCUSSION:** To see an object clearly at night, you must expose
   2. 5◦ to 10 ◦ away from the object. the rods to the image. This is accomplished by looking 5° to 10°
   3. 45◦ away from the object. off center of the object you want to see.
   4. In quick scanning movements.
2. What part of the retina is most active during periods of Answer **(C)** is correct.

darkness ? **DISCUSSION:** The rods are our dim light and night receptors and are concentrated outside the fovea area.

1. The entire retina.
2. Fovea.
3. Roads.
4. Cones.
5. If you look directly at an object at night, you will see it ? Answer **(B)** is correct.

**DISCUSSION:** Since the cones do not see well in the dark, you

* 1. Less clearly because there are no as many cones as rods. may not be able to see an object if you look directly at it. The
  2. Less clearly because the fovea is a night blind-spot. concentration of cones in the fovea can make a nigh blind-spot
  3. More clearly because it is focused in the fovea. At the center of your vision.
  4. More clearly because rods see better in the dark.

1. Before a night fight, you should avoid bright lights for at Answer **(B)** is correct.

least minutes. **DISCUSSION:** Bright lights should be avoided for at least 30 minutes before a night flight.

1. 15
2. 30
3. 45
4. 60
5. The cockpit light color that best preserves your dark Answer **(C)** is correct.

adaptation is light . **DISCUSSION:** Red cockpit lighting enhances dark adaptation, while regular white light, such as that from a flash light, impairs

* 1. Green. your night adaptation.
  2. Yellow.
  3. Red.
  4. Blue.

1. , Aeronautical charts are easier to read under red Answer **(B)** is correct.

cockpit lighting. **DISCUSSION:** Red light severely distorts some colors, especially those found on aeronautical charts.

1. True
2. False
3. During a night flight, you see a steady red light and a flashing Answer **(A)** is correct.

red light ahead, the other aircraft is **DISCUSSION:** When you see a steady red light and a flashing red light ahead, the other aircraft is crossing from right to left.

1. Crossing from right to left.
2. Crossing from left to right.
3. Approaching head on.
4. Headed away from you.
5. During a night flight, you see a steady white light, a steady Answer **(C)** is correct.

green light, and a flashing red light. the other aircraft is **DISCUSSION:** When you see a steady white light, a steady

green light, and a flashing red light, the other aircraft is

1. Approaching head on. Flying away from you and will cross from left to right.
2. Approaching, but will pass from right to left.
3. Flying away from you and will cross from left to right.
4. Flying away from you and will cross from right to left.
5. The three primary senses used in maintaining balance Answer **(D)** is correct.

are the , , and . **DISCUSSION:** your awareness of your body's position is a

result of input from three main senses : visual, vestibular,

1. Visual. and kinesthetic.
2. Vestibular.
3. Kinesthetic.
4. All
5. The sense that we rely on most for orientation is Answer **(C)** is correct.

sense. **DISCUSSION:** you need to rely heavily on your visual sense to interpret flight environment.

1. Vestibular.
2. Kinesthetic.
3. Visual.
4. Saccule.
5. The two sensory organs in the inner ear responsible for Answer **(D)** is correct.

vestibular sense are the and the . **DISCUSSION:** The semicircular canals and the vestibule

referred to as the static organ), located in your inner (sometimes

1. Utricle. ear, are primarily responsible for your vestibular sense.
2. Saccule.
3. Vestibule.
4. Semicircular canals, vestibule (static organ)
5. The utricle and the saccule organs Answer **(B)** is correct.

differentiate between G-loads and gravity. **DISCUSSION:** The utricle and saccule organs within the vestibule are responsible for the perception of linear acceleration, which is

* 1. True. movement forward and back, side to side, and up and down.
  2. False. one of the major problems with this sensory organ is its inability to tell the difference between gravity caused by the earth and

G-loads caused by centrifugal force.

1. Spatial disorientation may be defined as Answer **(C)** is correct.

**DISCUSSION:** Spatial disorientation is an incorrect mental image

1. A physiological illness of the inner ear. of your position, attitude, or movement in relation to what is
2. An incorrect mental image of where you are on the map. actually happening to your airplane.
3. An incorrect mental image of you r position, altitude or movement in space.
4. An incorrect mental image caused exclusively by fatigue and anxiety.
5. Spatial disorientation will most likely occur if a pilot Answer **(B)** is correct.

**DISCUSSION:** spatial disorientation is an incorrect mental image

* 1. Ignores the kinesthetic sense. of your position, attitude, or movement in relation to what is
  2. Uses body signals to interpret flight altitude. actually happening to your airplane.
  3. Ignores the sensations of muscles and inner ear.
  4. Cross checks the instrument panel with eye movement.

1. Spatial disorientation most commonly occurs during Answer **(B)** is correct.

**DISCUSSION:** spatial disorientation is most common at night

* 1. Daylight hour. and during times of restricted visibility.
  2. Periods of low visibility
  3. Flight at high altitude and is related to hypoxia.
  4. Rapid acceleration or deceleration , regardless of the weather conditions.

1. If you become spatially disoriented, you should Answer **(B)** is correct.

**DISCUSSION:** relay on the instruments and believing what

* 1. Reduce power and slow the aircraft. they tell you, regardless of how it feels, are the keys to
  2. Concentrate on the flight instruments. maintaining spatial orientation.
  3. Concentrate on visual cues outside the aircraft.
  4. Control the airplane by relying on your kinesthetic sense.

1. During acceleration, if you experience the overwhelming Answer **(B)** is correct.

sensation that you are in a nose-high attitude, even though **DISCUSSION:** a rapid acceleration or deceleration can you are in straight-and-level-flight, you are experiencing the cause a somatogravic illusion. An acceleration can produce

the illusion that you are in a nose-high attitude, even though

1. Coriolis illusion. You are still in straight -and-level flight.
2. Somatogravic illusion.
3. Inversion sensation.
4. False horizon illusion.
5. Vertigo caused by sunlight shining through a rotating Answer **(D)** is correct.

propeller is called . **DISCUSSION:** Flicker vertigo can happen when the sun is behind

is behind you, reflecting off the propeller.

1. Inversion Illusion.
2. Leans.
3. Coriolis illusion.
4. Flicker vertigo.
5. Inhaled oxygen is carried to the cells of your body by Answer **(A)** is correct.

attaching to in your bloodstream. **DISCUSSION:** Inhaled oxygen is diffused through the lungs into

the bloodstream, where it attaches to hemoglobin.

1. Hemoglobin.
2. Lungs
3. Vessels.
4. A condition where there is a lack of oxygen in Answer **(B)** is correct.

your body because there is not enough oxygen **DISCUSSION:** Hypoxia is a state of oxygen deficiency in the air is referred to as in the body.

* 1. Anemic hypoxia.
  2. Hypoxic hypoxia.
  3. Hyperventilation.
  4. Carbon monoxide poisoning.

1. One of the early symptoms of hypoxia is Answer **(B)** is correct.

**DISCUSSION:** Impaired judgment is an early symptom of

* 1. Unconsciousness. hypoxia. It can occur at lower altitudes as well as at higher
  2. Impaired judgment. altitudes. Do not wait for the symptoms; anticipate them
  3. A feeling of euphoria. and use supplemental oxygen.
  4. Blue-colored fingernails.

1. The part of the body that is unusually the first Answer **(D)** is correct.

affected by oxygen deprivation is the . **DISCUSSION:** The part of the body that is first affected by

oxygen deprivation is the retina of the eye.

1. Pupil.
2. Cones
3. Rods.
4. Retina.
5. The time you have to make a rational and Answer **(A)** is correct.

lifesaving decision following a lack of oxygen **DISCUSSION:** The time of useful consciousness is the

at a given altitude is known as the time of maximum time you have to make a rational, life-saving decision

. And carry it out following a lack of oxygen at given altitude.

1. Useful consciousness.
2. useful unconsciousness.
3. Euphoria.
4. Impaired judgment.
5. , Carbon monoxide poisoning produces a Answer **(A)** is correct.

state of anemic hypoxia in the body. **DISCUSSION:** Carbon monoxide poising produces a state of anemic hypoxia in the body.

1. True
2. False.
3. Breathing large amounts of carbon monoxide can Answer **(B)** is correct.

result in **DISCUSSION:** Carbon monoxide robs the body of oxygen by attaching to the hemoglobin and reducing the oxygen

1. A warm sensation. carrying capacity of the blood. Large accumulations of
2. Loss of muscle power. CO result in a loss of muscular power.
3. An increased sense of well-being.
4. Tightness across the forehead and neck.
5. Susceptibility to carbon monoxide poisoning increases Answer **(B)** is correct.

as **DISCUSSION:** Susceptibility to carbon monoxide poisoning

increases as altitude increases.

1. Altitude decreases.
2. Altitude increases.
3. Temperature increases.
4. Air pressure increases.
5. In order to avoid hypoxia, you should Answer **(D)** is correct.

**DISCUSSION:** To avoid the effects of hypoxia, do not fly

* 1. Breathe slowly and deeply. for prolonged periods above 10,000 feet MSL, during the day
  2. Avoid hyperventilating by breathing into a paper bag. or 5,000 feet MSL at night without breathing supplemental
  3. Rely on knowing your own personal symptoms to oxygen. serve as a warning.
  4. Not fly above 10,000 feet MSL for extended periods of time without using supplemental.

1. When flying at night, you may experience symptoms of Answer **(A)** is correct.

hypoxia as low as **DISCUSSION:** To avoid the effects of hypoxia, do not fly for prolonged periods above 10,000 feet MSL, during the day

* 1. 5,000 feet MSL. or 5,000 feet MSL at night without breathing supplemental
  2. 10,000 feet MSL. oxygen.
  3. 12,000 feet MSL.
  4. 14,000 feet MSL.

1. whenever you are replenishing an aircraft’s oxygen Answer **(C)** is correct.

system, always use oxygen. **DISCUSSION:** Use only aviator's breathing oxygen to fill

aircraft oxygen cylinders.

1. Environmental.
2. Medical breathing.
3. Aviator's breathing.
4. Rapid and deep breathing , even when you are using Answer **(D)** is correct.

supplemental oxygen, can cause a condition known as **DISCUSSION:** rapid or extra deep breathing can cause

hyperventilation. It can occur even while breathing

1. The “bends.” supplemental oxygen.
2. Anemic hypoxia.
3. Hypoxic hypoxia.
4. Hyperventilation.
5. Which condition would most likely result in Answer **(B)** is correct.

hyperventilation ? **DISCUSSION:** Some of the symptoms of hyperventilation include:

* 1. Excessive consumption of alcohol. 1. Dizziness.
  2. Emotional tension, anxiety, or fear. 2. Tingling of the fingers and toes.
  3. An extreme case of relation or sense of well-being. 3. Muscle spasms.
  4. A very slow rate of breathing with insufficient 4. Coolness. oxygen intake. 5. Drowsiness.

1. Weakness or numbness.
2. Rapid heart rate.
3. Apprehension and mental confusion.
4. Finally, loss of consciousness.
5. To overcome the symptoms of hyperventilation, you can Answer **(D)** is correct.

**DISCUSSION:** The treatment for hyperventilation involves

* 1. Breathe more oxygen. restoring the proper carbon dioxide level in the body.
  2. Monitor your flight instruments. Breathing normally is both the beast prevention and the best
  3. Use over-the-counter medications. cure for hyperventilation. In addition to slowing the breathing
  4. Slow your breathing rate, breathe into a bag, or talk out loud. rate, you also can breathe into a paper bag or talk aloud to

to overcame hyperventilation.

1. , As you descend, the pressure in your ear canal Answer **(B)** is correct.

and throat becomes lower than the pressure in your middle **DISCUSSION:** As you descend, the pressure in your ear canal ear. and throat becomes lower than the pressure in your middle ear.

* 1. True
  2. False

1. The method of relieving pressure on the eardrum by holding Answer **(C)** is correct.

your nose and mouth closed and forcing air into the middle **DISCUSSION:** Air can also be forced into the middle ear by ear is referred to as the technique. holding your nose and mouth shut and attempting to blow air

gently into your nostrils.

1. Yawning.
2. Swallowing.
3. Valsalva.
4. Chewing.
5. After a dive requiring a decompression stop, scuba divers Answer **(C)** is correct.

should wait at least hour before flying. **DISCUSSION:** After a dive requiring a decompression stop.

Scuba divers should wait at least 24 hour before flying.

1. 12.
2. 48.
3. 24.
4. 8.
5. The main effect of depressant drugs is to Answer **(C)** is correct.

**DISCUSSION:** Depressants slow your motor responses and

* 1. Erode self-confidence. mental processes.
  2. Stimulate bodily functions.
  3. Slow down bodily functions
  4. Cause carbon monoxide poisoning at lower altitude.

1. The most widely and commonly used depressant drug is Answer **(A)** is correct.

. **DISCUSSION:** Ethyl alcohol is the most widely used and

abused drag. although some alcohol is used for medicinal purposes,

1. Alcohol. The majority of it is consumed as a beverage.
2. Caffeine.
3. Nicotine.
4. The amount of oxygen absorbed into your bloodstream is Answer **(B)** is correct.

reduced by . **DISCUSSION:** Alcohol reduces the amount of oxygen absorbed into your blood stream.

1. Caffeine.
2. Alcohol.
3. Non-alcohol beverage.
4. Asprine.
5. With reference to alcohol consumption and flying, ICAOs Answer **(D)** is correct.

require that **DISCUSSION:** ICAO regulations require that your blood alcohol level be below .4% and that at least eight hours

* 1. 12 hours pass between drinking and flying. pass between bottle and throttle.
  2. 12 hours pass between drinking and flying , and your blood alcohol level be .04% or less.
  3. either 8 hours pass between drinking and flying, or your blood alcohol be less than .04%.
  4. 8 hour pass between drinking and flying, and your blood alcohol level be less than .04%.

1. When you consume alcohol, your “physiological altitude” Answer **(A)** is correct.

. **DISCUSSION:** When you drink, your physiological altitude is much higher than your actual altitude.

1. Increases.
2. Decreases.
3. Motion sickness medications should not be used when you Answer **(B)** is correct.

are pilot in an aircraft, because they often contain **DISCUSSION:** these type of drugs often contain sedatives that

can cause drowsiness and decreased alertness.

1. Alcohol.
2. Sedatives.
3. Stimulants.
4. Anticholinergics.
5. Antihistamines and decongestants are sometimes dangerous Answer **(D)** is correct.

to use while flying because they cause . **DISCUSSION:** These drugs often cause drowsiness and slowed

motor response and can be very hazardous to use when flying.

1. Restlessness.
2. Anxiety.
3. Panic.
4. Drowsiness.
5. Two commonly used stimulant drugs that are not prohibited Answer **(B)** is correct.

by ICAOs are and . **DISCUSSION:** Although caffeine and nicotine use are not

prohibited by the regulation, you should use they in

1. Alcohol , Drags. moderation to avoid the side effects.
2. Nicotine, Caffeine.
3. Amphetamines, Caffeine.
4. Drags. Nicotine.
5. Due to the increased level of carbon monoxide in their blood- Answer **(A)** is correct.

streams, smokers are much more susceptible to the effects of **DISCUSSION:** Smoker increases the level of carbon monoxide

. In your bloodstream and increases the chance of hypoxia.

1. Hypoxia.
2. Paranoia.
3. Hyperventilation.
4. Halluninations.
5. The physiological altitude of a smoker is raised from sea Answer **(B)** is correct.

level to about **DISCUSSION:** If you are a regular smoker, you carry a carbon monoxide level of about 5% in your blood stream. This raises

* 1. 5,000 feet. your physiological altitude from sea level to about 7,000 feet.
  2. 7,000 feet.
  3. 10,000 feet.
  4. 12,000 feet.

1. What general statement is applicable for flying after you Answer **(D)** is correct.

have had dental treatment ? **DISCUSSION:** Most local anesthetics wear of shortly after treatment, but the dental procedure itself and the subsequent

* 1. Flying within 48 hour of a minor dental procedure is not pain may preclude flight operations. recommended.
  2. You should not fly after undergoing dental treatment without authorization from an aviation medical examiner.
  3. Because of the depressant effect of local anesthetics, you should not fly within 24 hours of a dental treatment.
  4. Most local anesthetics wear of shortly after treatment, but the dental procedure itself and the subsequent pain may preclude flight operations.

1. A person may not act as a crewmember of a civil Answer **(A)** is correct.

aircraft if alcoholic beverages have been consumed **DISCUSSION:** No person may act or attempt to act by that person within the preceding. as a crewmember of a civil aircraft within 8 hours

after the consumption of any alcoholic beverage.

1. 8 hours.
2. 12 hours.
3. 24 hours.
4. In the dark , a stationary light will appear to move Answer **(C)** is correct.

when stared at for a period of time. This illusion **DISCUSSION:** In the dark, a stationary light will is known as appear to move about when started at for many

seconds. then illusion is known as auto-kinesis.

1. Somatogravic illusion.
2. Ground lighting illusion.
3. Auto-kinesis.
4. What is the effect of alcohol consumption on Answer **(A)** is correct.

functions of the body ? **DISCUSSION:** The adverse effect of alcohol is greatly multiplied when a person is exposed

* 1. Alcohol has an adverse effect , especially as altitude to altitude. Two drinks on the ground are

increases. equivalent to three or four at altitude.

* 1. Small amount of alcohol in the human system increases judgment and decision-making abilities.
  2. Alcohol has little effect if followed by equal quantities of black coffee.

1. When making an approach to a narrower-than usual Answer **(B)** is correct.

runway , without VASI assistance , the pilot should **DISCUSSION:** An approach to a narrower-than be aware that the approach . usual runway can create the illusion that the air-

craft is higher than it actually is.

1. Altitude may be higher than it appears.
2. Altitude may be lower than it appears.
3. May result in leveling off too high and landing hard.
4. When making a landing over darkened of featureless Answer **(A)** is correct.

terrain such as water or snow, a pilot should be aware **DISCUSSION:** An absence of ground features, of the possibility illusion. The approach may appear when landing over water , darkened areas and to be too terrain made featureless by snow, can create

the illusion that the aircraft is at a higher

1. High. altitude than it actually is.
2. Low.
3. Shallow.
4. The illusion of being in a nose up altitude which may Answer **(C)** is correct.

occur during rapid acceleration take off is known as **DISCUSSION:** A rapid acceleration during takeoff

can create the illusion of being in a nose-up

1. Inversion illusion. altitude. This is known as a Somatogravic illusion
2. Auto-kinesis.
3. Somatogravic illusion.
4. What is the most effective way to use the eyes during Answer **(B)** is correct.

night flight ? **DISCUSSION:** One should scan slowly at night to permit off-center viewing of dim objects.

1. Look only at far away ,dim lights.
2. Scan slowly to permit off center viewing.
3. Concentrate directly on each object for a few second.
4. Which observed target aircraft would be of most Answer **( C)** is correct.

concern with respect to collision avoidance ? **DISCUSSION:** Any aircraft that appears to have no relative motion and stay in one scan quadrant is

* 1. One which appears to be ahead and moving from left likely to be on a collision course. If a target shows to right at high speed. no lateral or vertical motion, but increases in size,
  2. One which appears to be ahead and moving from right take evasive action. to left at slow speed.
  3. One which appears to be ahead with no lateral or vertical movement and is increasing in size.

1. Scanning procedures for effective collision avoidance Answer **(A)** is correct.

should constitute. **DISCUSSION:** Studies show that the time a pilot spends on visual tasks inside the cabin should re-

1. Looking outside for 15 seconds, then inside for 5 seconds, present no more than 1/4 to 1/3 of the scan time then repeat. outside, or no more that 4 to 5 seconds on the
2. 1 minute inside scanning , then 1 minute outside scanning, instrument panel for every 16 seconds outside. then , repeat.
3. Looking outside every 30 second except in radar contact when outside scanning is unnecessary.
4. When using the Earth’s horizon as a reference point to Answer **(C)** is correct.

determine the relative position of other aircraft, most **DISCUSSION:** Any aircraft that appears to have concern would be for aircraft. no relative motion and stays in one scan quadrant likely to be on a collision course. If a target shows

* 1. Above the horizon and increasing in size. no lateral or vertical motion, but increases in size
  2. On the horizon with little relative movement. take evasive action.
  3. On the horizon and increasing in size.

1. A pilot is more subject to spatial disorientation when Answer **(C)** is correct.

**DISCUSSION:** When seated on an unstable moving

* 1. Ignoring or overcoming the sensation of muscles and platform at altitude, with your vision cut off from inner ear. the earth, horizon or other fixed reference, you are
  2. Eyes are moved often in the process of cross checking susceptible to misinterpreting certain body sensations the flight instruments. caused by angular accelerations.
  3. Body sensations are used to interpret flight altitudes.

1. Which procedure recommended to prevent or overcome Answer **(C)** is correct.

spatial disorientation ? **DISCUSSION:** The best method to prevent or over- come spatial disorientation is rely entirely on the

* 1. Reduce head and eye movement to the greatest possible indications of the flight instruments. extent.
  2. Rely on the kinesthetic sense.
  3. Rely entirely on the indications of the flight instruments.

1. While making prolonged constant rate turns under IFR Answer **(B)** is correct.

conditions, an abrupt head movement can create the **DISCUSSION:** An abrupt head movement illusion of rotation on an entirely different axis. making a prolonged constant rate turn,

This is known as can produce a strong sensation of rotation movement in an entirely different axis.

1. Autoi-kinesis. the phenomenon is known as Coriolis
2. Coriolis illusion. illusion.
3. The leans.
4. Haze can give the illusion that the aircraft is Answer **(B)** is correct.

**DISCUSSION:** Atmospheric haze can create an

* 1. Closer to the runway than it actually is. illusion of being at a greater distance from the
  2. Farther from the runway than it actually is. runway than you actually are.
  3. The same distance from the runway as when there is no restriction to visibility.

1. Sudden penetration of fog can create the illusion of Answer **(A)** is correct.

**DISCUSSION:** Penetration of fog can create an

* 1. Pitching up. illusion of pitching up.
  2. Pitching down
  3. Leveling off.

1. What illusion , if any, can rain on the windscreen Answer **(C)** is correct.

create ? **DISCUSSION:** Rain on the windscreen can create

an illusion of being at a higher altitude than you

1. Does not cause illusion . are.
2. Lower than actual.
3. Higher than actual.
4. what is the symptom of carbon monoxide poisoning ? Answer **(C)** is correct.

**DISCUSSION:** Carbon monoxide poisoning

* 1. Rapid, shallow breathing. produces the same symptoms as hypoxia,
  2. Pain and cramping of the hands and feet. which included dizziness.
  3. Dizziness.

1. Which would most likely result in hyperventilation ? Answer **(A)** is correct.

**DISCUSSION:** You are most likely to hyperventilation

1. A stressful situation causing anxiety. when under stress or a high altitude.
2. The excessive consumption of alcohol
3. An extremely slow rate of breathing and insufficient Oxygen
4. What causes hypoxia ? Answer **(C)** is correct.

**DISCUSSION:** Low partial pressure of oxygen

* 1. Excessive carbon dioxide in the atmosphere. causes hypoxia.
  2. An increase in nitrogen content of the air at high altitudes.
  3. A decrease of oxygen partial pressure.

1. Which is a common symptom of hyperventilation ? Answer **(A)** is correct.

**DISCUSSION:** Symptoms of hyperventilation

* 1. Tingling of the hands, leg, and feet. include dizziness tingling of the extremities,
  2. Increased vision keenness. sensation of body heat, rapid heart rate,
  3. Decreased breathing rate. blurring of vision, muscle spasm and , finally unconsciousness.

1. Loss of cabin pressure may result in hypoxia be- Answer **(C)** is correct.

cause as cabin altitude increases **DISCUSSION:** Low partial pressure of oxygen causes hypoxia.

1. The percentage of nitrogen in the air is increased.
2. The percentage of oxygen in the air is decreased.
3. Oxygen partial pressure is decreased.
4. Hypoxia is the result of which of these conditions ? Answer **(A)** is correct.

**DISCUSSION:** Hypoxia is a result of too little

* 1. Insufficient oxygen reaching the brain . oxygen reaching the brain.
  2. Excessive carbon dioxide in the bloodstream.
  3. Limited oxygen reaching the heart muscles.

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# CHAPTER 9

## FLIGHT PLANNING AND DECISION MAKING

* **Planning and Organizing Flights**
* **Factors Affecting Decision Making**

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# CHAPTER 10

**REGULATIONS**

* + **Annex II**
  + **Annex III**
  + **Annex VI**
  + **Annex X**
  + **Annex XI**
  + **AIP**
    1. Aerodrome traffic includes all the traffic: Answer **(D)** is correct.

**DISCUUSION:** Refer to Annex 2; Chapter 1-Definitions.

1. On the movement area.
2. On the maneuvering area of an aerodrome.
3. Flying in the vicinity of an aerodrome.
4. Both B and C are correct.
   * 1. Air traffic advisory service is provided within advisory Answer **(A)** is correct

airspace to ensure separation between: **DISCUSSION:** Refer to Annex 2; Chapter 1-Definitions.

* + - 1. Aircraft which are operating on IFR flight plans.
      2. Aircraft which are operating on special VFR and VFR flight plans.
      3. Aircraft which are operating on VFR and IFR flight plans.
    1. ……… is provided to notify appropriate organizations Answer **(B)** is correct.

regarding aircraft in need of search and rescue air. **DSCUSSION:** Refer to Annex 2; Chapter 1-Definitions.

* + - 1. Advisory service.
      2. Alerting service.
      3. Area control service.
      4. Surveillance service.
    1. A controlled airspace extending upwards from a Answer **(B)** is correct.

specified limit above the earth is called a: **DISCUSSION:** Refer to Annex 2; Chapter 1-Definitions.

* + - 1. Control zone.
      2. Control area.
      3. Control center.
      4. Terminal control area.
    1. A controlled airspace extending upwards from the surface Answer **(C)** is correct.

of the earth to a specified upper limit is called a: **DISCUSSION:** Refer to Annex 2; Chapter 1-Definitions.

* + - 1. Terminal control area.
      2. Control area
      3. Control zone.
      4. Control center.
    1. The estimated time required from take-off to arrive over Answer **(A)** is correct.

the destination aerodrome is called: **DISCUSSION:** Refer to Annex 2; Chapter 1-Definitions.

* + - 1. The total estimated elapsed time.
      2. The estimated flight time.
      3. The estimated off-block time.
      4. The estimated en-route time.
    1. ……… is responsible for the operation of the aircraft in Answer **(B)** is correct.

accordance with the rules of the air. **DISCUSSION:** Refer to Annex 2; Chapter 2 -2.3.1

* + - 1. The air traffic control unit.
      2. The pilot-in-command.
      3. The operation manager.
      4. The person manipulating the controls
    1. Who has the final authority as to the disposition of Answer **(D)** is correct.

the aircraft while in command. **DISCUSSION:** Refer to Annex 2; Chapter 2 -2.4

* + - 1. The chief pilot.
      2. The flight operations department.
      3. The air traffic controller.
      4. The pilot-in-command.
    1. What separation shall be maintained from the flight Answer **(C)** is correct.

leader by each aircraft in a formation flight? **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.1.8

* + - 1. A distance not exceeding 500 meters laterally and longitudinally and 30 meters vertically.
      2. A distance not exceeding 1000 meters laterally and longitudinally and 100 meters vertically.
      3. A distance not exceeding 0.5 NM laterally and longitudinally and 100 feet vertically.
      4. A distance of 1 km laterally and longitudinally and 30 feet vertically.
    1. When two aircraft are approaching head-on or nearly so and Answer **(B)** is correct.

category are converging at approximately the same level? **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.2.2.2

* + - 1. Both aircraft must alter their headings to the right.
      2. The faster aircraft shall give way.
      3. The aircraft that has the other on is right shall give way.
      4. The aircraft that has the other on its left shall give way.
    1. Which aircraft has the right-of-way over the aircraft Answer **(B)** is correct.

listed below? **DISCUSSION:** Refer to Annex 2; Chapter 3 3.2.2.3

* + - 1. airplane.
      2. Balloon.
      3. Glider.
      4. Airship.
    1. Which converging aircraft has the right-of-way over the Answer **(A)** is correct.

other aircraft listed below? **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.2.2.3

* + - 1. Aircraft towing another aircraft.
      2. Airship.
      3. Rotorcraft.
      4. Airplane.
    1. An airplane and a glider are converging. The glider has the Answer **(B)** is correct.

airplane on its right. Which aircraft has the right of way? **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.2.2.3

* + - 1. Both should alter their headings to the right.
      2. The glider.
      3. The airplane.
    1. Which of the following statements, concerning the right-of-way is Answer **(B)** is correct.

correct when two or more heavier-than-air aircraft are approaching **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.2.2.5.2 an aerodrome for the purpose of landing?

* + - 1. Aircraft at the lower level shall give way to the aircraft at the higher level.
      2. Aircraft at the higher level shall give way to the aircraft at the lower level.
      3. An aircraft on final approach shall give way to on aircraft on downwind leg.
    1. Which lights must be displayed by all aircraft in flight between Answer **(A)** is correct.

sunset and sunrise **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.2.3.1

* + - 1. Navigation lights and anti-collision lights.
      2. Anti-collision lights and landing lights
      3. Navigation lights and landing lights.
    1. Unless otherwise prescribed by the appropriate ATS authority, Answer **(C)** is correct.

a flight plan for a flight to be provided with air traffic control service **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.3.1.4 or air traffic advisory service shall be submitted:

* + - 1. At least 15 minutes before departure.
      2. At least 30 minutes before departure.
      3. At least 60 minutes before departure.
      4. At least 90 minutes before departure.
    1. You shall notify the appropriate air traffic services unit Answer **(D)** is correct.

if the average true airspeed at cruising level between **DISCUSSION:** Refer to Annex 2; Chapter 3 – 3.6.2.2.b reporting points varies or is expected to be varies by:

* + - 1. Plus or minus 10 %.
      2. Plus or minus 15 %.
      3. 5 knots.
      4. Plus or minus 5%.
    1. When operating under visual flight rules in class D airspace Answer **(C)** is correct.

at altitudes above 10000 feet AMSL, you must maintain **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.9 – table 3-1 a vertical distance of at least from clouds.

1. 1500 feet.
2. 300 feet.
3. 1000 feet.
4. 1000 meters.
   * 1. When flying under visual flight rules in class C airspace Answer **(B)** is correct.

at altitudes below 10000 feet AMSL and above 3000 feet AMSL, **DISCUSSION:** Refer to Annex 2 – chapter 3 – 3.9 – table 3-1 or 1000 feet above terrain, whichever is the higher,

you must maintain a horizontal distance of at least from clouds.

1. 5 kilometers.
2. 1500 meters.
3. 1000 feet.
4. 2000 feet.
   * 1. To fly under VFR in class D airspace at or below 3000 Answer **(A)** is correct.

feet AMSL, or 1000 feet above terrain, whichever is the **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.9 – table 3-1 higher, the flight visibility must be at least:

* + - 1. 5 kilometers.
      2. 5 nautical miles.
      3. 8000 meters.
      4. 1500 meters.
    1. To fly under VFR in class G airspace at and below 3000 Answer **(D)** is correct.

feet AMSL or 1000 feet above terrain, whichever is **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.9 – table 3-1 the higher, you must:

* + - 1. Maintain a horizontal distance of at least 1500 meters from clouds.
      2. Maintain a vertical distance of at least 1500 meters from the clouds.
      3. Maintain a horizontal distance of at least 1500 feet from clouds.
      4. Remain clear of clouds and insight of the surface.
    1. To fly under VFR in class C airspace at and above Answer **(B)** is correct.

10000 feet AMSL, the flight visibility must be at least: **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.9 – table 3-1

* + - 1. 5000 meters.
      2. 8000 meters.
      3. 1500 meters.
      4. 3000 meters.
    1. What is the required minimum distance from clouds Answer **(D)** is correct.

for VFR flights in class G airspace at and **DISCUSSION:** Refer to Annex 2; Chapter 3 -3.9- table 3-1. above 10000 feet MSL?

* + - 1. 1500 meters horizontally, and 300 feet vertically

from clouds.

* + - 1. 1500 feet vertically, and 1000 feet horizontally from clouds.
      2. Remain clear of clouds and insight of the surface.
      3. 1500 meters horizontally, and 1000 feet vertically from the clouds.
    1. Except when a clearance is obtained from an air traffic control unit Answer **(C)** is correct.

no VFR flight may take-off or land at an aerodrome **DISCUSSION:** Refer to Annex 2 – chapter 4 – 4.2 within a control zone, or enter the aerodrome

traffic zone or traffic pattern when:

1. The ceiling is less than 1000 ft, and the ground visibility is less than 3 km.
2. The ceiling is less than 1500 ft, and the ground visibility is less than 5 statute miles.
3. The ceiling is less than 1500 ft, and the ground visibility is less than 5 km.
4. The ceiling is less than 450 ft, and the ground visibility is less than 5 km.
   * 1. Unless authorized by the appropriate ATS authority, Answer **(A)** is correct.

VFR flights shall not be operated: **DISCUSSION:** Refer to Annex 2 – chapter 4 – 4.4

* + - 1. Above FL 200, at transonic and supersonic speeds.
      2. Above FL 200, at subsonic and transonic speeds.
      3. Above FL 180, at transonic and supersonic speeds.
      4. Above FL 290, at transonic and supersonic speeds.
    1. You may not fly over any congested area of a city, town, Answer **(A)** is correct.

or settlement at a height from which it would be impossible **DISCUSSION:** Refer to Annex 2; Chapter 3 – 3.1.2 to land without undue hazard to persons or property

on the surface in the event of an emergency arising ,except:

1. When necessary for take-off or landing.
2. When trying to remain clear of clouds and in sight of surface.
3. When you receive a logbook endorsement from your instructor.
   * 1. Except when taking off or landing, or except by permission Answer **(D)** is correct.

from the appropriate authority, an aircraft may not fly over the **DISCUSSION:** Refer to Annex 2 – chapter 4 – 4.6 a congested areas of cities, towns, or settlements or over an

open-air assembly of persons at a height less than ……. above the highest obstacle.

1. 300 feet.
2. 1500 feet.
3. 500 feet.
4. 1000 feet.
   * 1. When an A/C has been intercepted ,what action(s) Answer **(D)** is correct.

shall take place by intercepted immediately? **DISCUSSION:** Refer to Annex 2 – appendix 2 – 2.

1. Follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals.
2. Attempt to establish radio-communication with the intercepting aircraft by making a general call on 121.5 MHz.
3. Squawk 7700.
4. All of the above.
   * 1. What does it mean when the intercepting aircraft Answer **(B)** is correct.

rocks its wings **DISCUSSION:** Refer to Annex 2 – Appendix 1 – 2.1 and, after acknowledgement, initiates a slow level turn,

normally to the left on the desired heading?

1. You may proceed.
2. You have been intercepted. Follow me.
3. You must leave the prohibited area.
4. You should land at this aerodrome.
   * 1. If an intercepted A/C instructed to intercepting A/C Answer **(A)** is correct.

to follow me what signal shall be used by intercepted **DISCUSSION:** Refer to Annex 2 – Appendix 1 – 2.1 A/C that I understood and will comply ?

* + - 1. Rocking aircraft wings, flashing navigation lights at irregular intervals, and follow the intercepting aircraft.
      2. Lowering the landing gear (if fitted), and show steady landing lights.
      3. Switch the anti-collision lights on and off at regular intervals for 15 seconds.
      4. Switch all available lights on and off at regular intervals in such a manner as to be distinct from flashing lights.
    1. The intercepting aircraft performs an abrupt break-away Answer **(C)** is correct.

maneuver from the intercepted aircraft consisting **DISCUSSION:** Refer to Annex 2 – Appendix 1 – 2.1 of a climbing turn of 90 degrees or more.

What does this mean?

1. You have been intercepted. Follow me.
2. Land at this aerodrome.
3. You may proceed.
4. Understood, follow me.
   * 1. what shall be the intercepted aircraft signal that the Answer **(D)** is correct.

designated aerodrome is inadequate? **DISCUSSION:** Refer to Annex 2 – Appendix 1 – 2.2

* + - 1. Switching on and off of all available lights but in a such manner as to be distinct from flashing lights.
      2. Irregular flashing of all available lights.
      3. Rocking the aircraft’s wings, and flashing the navigation lights at irregular intervals while passing over runway in use.
      4. Raising landing gear, and flashing landing lights while passing over runway in use.
    1. How should the pilot of the intercepted aircraft Answer **(C)** is correct.

signal that he or she cannot comply? **DISCUSSION:** Refer to Annex 2 – Appendix 1 – 2.2

1. Raising landing gear, and flashing landing lights.
2. Rocking the aircraft’s wing, and flashing navigation lights at irregular intervals.
3. Switching all available lights on and off at regular intervals.
4. Irregular flashing of all available lights
   * 1. Flight under SVFR is only permitted within: Answer **(B)** is correct.

**DISCUSSION:** Refer to Annex 2 – Chapter 1 – Definitions.

1. A Terminal Control Area.
2. A Control Zone.
3. An Aerodrome Traffic Zone.
4. An ATS route.
   * 1. A Control Area (CTA) normally established at the confluence Answer **(C)** is correct.

of ATS routes in the vicinity of one or more **DISCUSSION:** Refer to Annex 2 – Chapter 1 – Definitions. major aerodromes is known as:

* + - 1. An Aerodrome traffic zone.
      2. A Control Zone.
      3. A Terminal Control Area.
      4. An airway.
    1. When QNH is set on the altimeter, the vertical position Answer **(A)** is correct.

of the aircraft is expressed in terms of: **DISCUSSION:** Refer to Annex 2 – Chapter 1 – Definitions.

* + - 1. Altitude.
      2. Height.
      3. Flight level.
      4. Elevation.
    1. The vertical position of the aircraft during climb Answer **(B)** is correct.

is expressed in terms of ………. until reaching **DISCUSSION:** Refer to Annex 2 – Chapter 1 – Definitions. the transition altitude.

* + - 1. Height.
      2. Altitude.
      3. Flight level.
      4. Elevation.
    1. When climbing through the transition altitude, Answer **(C)** is correct.

the reference for **DISCUSSION:** Refer to Annex 2

the vertical position of the aircraft should be changed from ………… to …………

1. Flight levels – altitudes.
2. Altitudes – height.
3. Altitudes – flight levels.
4. Transition layer – altitudes.
   * 1. During the approach to land, you initiate your descent Answer **(B)** is correct.

below transition level with the altimeter subscale set to: **DISCUSSION:** Refer to Annex 2

1. 1013.2 hPa.
2. The QNH.
3. The QFE.
4. 29.82 in. Hg.
   * 1. The vertical positioning of aircraft during approach shall Answer **(C)** is correct.

be controlled by reference to ………… until reaching **DISCUSSION:** Refer to Annex 2 the transition level below which vertical positioning is

controlled by reference to …………. .

1. Flight levels – height.
2. Altitudes – flight levels.
3. Flight levels – altitudes.
4. Flight level – 1013.2 hPa.
   * 1. To which type of operations, the advisory service Answer **(B)** is correct.

shall be provided? **DISCUSSION:** Refer to annex 11.

* + - 1. VFR
      2. IFR
      3. Controlled flights
      4. SVFR
    1. Within which airspace, the advisory service Answer **(D)** is correct.

may be provided? **DISCUSSION:** Refer to annex 2

* + - 1. Controlled airspace
      2. Uncontrolled airspace
      3. FIR
      4. Advisory airspace
    1. Who is responsible to issue an AIP? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. ATS authority
2. AIS
3. State
4. Operators
   * 1. Based on which aircraft system, Answer **(D)** is correct.

the ACAS is operating? **DISCUSSION:** Refer to annex 2

* + - 1. SSR
      2. PSR
      3. Transponder
      4. Pressure altitude
    1. What will be the maximum ground speed to reduced Answer **(B)** is correct.

ground effect during air-taxing of VTOL aircraft? **DISCUSSION:** Refer to annex 2

* + - 1. 20 Kts
      2. 25 Kts
      3. 15 kts.
      4. 10 kts.
    1. What is the minimum height requires by a helicopter for Answer **(C)** is correct.

Air-taxing to reduce ground effect turbulence? **DISCUSSION:** Refer to annex 2

* + - 1. 45 ft
      2. 35 ft
      3. 25 ft
      4. 15 ft
    1. What is the minimum height AGL requires for air-taxing Answer **(B)** is correct.

of a helicopter to provide clearance for cargo sling loads? **DISCUSSION:** Refer to annex 2

* + - 1. 15 ft
      2. 25 ft
      3. 35 ft
      4. 45 ft.
    1. Aerodrome traffic means? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. All aircraft on the manoeuvring area.
2. All aircraft in the vicinity of an aerodrome.
3. All traffic on the manoeuvring area.
4. Items B and C are correct.
   * 1. How many class of ATS airspace are specified Answer **(D)** is correct.

for the operation of aircraft? **DISCUSSION:** Refer to annex 11.

A. 5

B. 2

C. 3

D. 7

* + 1. How many class of controlled airspace are Answer **(B)** is correct.

specified for the operations of aircraft? **DISCUSSION:** Refer to annex 11.

A. 3

B. 5

C. 2

D. 4

* + 1. How many class of uncontrolled airspace are Answer **(C)** is correct.

specified for the operations of aircraft? **DISCUSSION:** Refer to annex 11.

A. 3

B. 5

C. 2

D. 4

* + 1. Which controlled airspace with the specified Answer **(B)** is correct.

limitation, is in the form of corridor? **DISCUSSION:** Refer to annex 11.

* + - 1. Control area.
      2. Airway.
      3. CTR
      4. ATZ.
    1. Which of the following controlled airspace, Answer **(D)** is correct.

specified as control area? **DISCUSSION:** Refer to annex 11.

* + - 1. TMA.
      2. CTR
      3. Airway
      4. A and C.
    1. Which of the following type of airplane is required Answer **(C)** is correct.

to determine ETOPs alternate? **DISCUSSION:** Refer to annex 2

* + - 1. B747-400
      2. C130.
      3. A300-600.
      4. All of them.
    1. What is the vertical position of an aircraft Answer **(C)** is correct.

when set to a QNH? **DISCUSSION:** Refer to annex 2

* + - 1. Flight level.
      2. Elevation
      3. Altitude.
      4. Height.
    1. What is the vertical position of an aircraft Answer **(A)** is correct.

when set to a QFE? **DISCUSSION:** Refer to annex 2

* + - 1. Height.
      2. Flight level.
      3. Altitude.
      4. Level.
    1. What is the vertical position of an aircraft Answer **(C)** is correct.

when set to a QNE? **DISCUSSION:** Refer to annex 2

* + - 1. Height.
      2. Altitude.
      3. Flight level.
      4. Level.
    1. What is the vertical position of an aircraft Answer **(B)** is correct.

when set to 1013.2 hpa? **DISCUSSION:** Refer to annex 2

* + - 1. Altitude.
      2. Flight level.
      3. Height.
      4. None.
    1. What is the vertical position of an aircraft Answer **(C)** is correct.

at transition altitude? **DISCUSSION:** Refer to annex 2

* + - 1. Level.
      2. Flight level.
      3. Altitude.
      4. Height.
    1. What is the vertical position of an aircraft Answer **(A)** is correct.

at transition level? **DISCUSSION:** Refer to annex 2

* + - 1. Flight level.
      2. Altitude.
      3. Height.
      4. None.
    1. Who is the appropriate authority, regarding flight Answer **(C)** is correct.

over the high seas? **DISCUSSION:** Refer to annex 2

* + - 1. State of the operator.
      2. State having sovereignty.
      3. State of registry.
      4. All
    1. Who is the appropriate authority, regarding the flight Answer **(C)** is correct.

over the areas, other than high seas? **DISCUSSION:** Refer to annex 2

* + - 1. State of registry.
      2. State of the operator.
      3. State having sovereignty.
      4. None.
    1. What is the maximum height of ceiling? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. 1500 ft
2. 2000 ft
3. 15000ft
4. 20000ft
   * 1. What is the minimum amount of ceiling? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. Half the sky.
2. More than half the sky.
3. Less than half sky.
4. All above are correct.
   * 1. based on which navigational facility, the change-over point Answer **(A)** is correct.

may be established? **DISCUSSION:** Refer to annex 2

* + - 1. VOR
      2. NDB
      3. VOR/DME.
      4. NDB/DME.
    1. What is the class of the CTRs, within Tehran FIR? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. ‘’D’’
2. ‘’C’’
3. ‘’D’’ and ‘’A’’ above FL 200.
4. ‘’C’’ and ‘’A’’ above FL 200.
   * 1. What is the class of ATZ, within Tehran FIR, if specified Answer **(B)** is correct.

as controlled aerodrome? **DISCUSSION:** Refer to AIP.

* + - 1. ‘’C’’
      2. ‘’D’’
      3. ‘’G’’
      4. ‘’A’’
    1. What is the nationality letters, indicating a Answer **(C)** is correct.

danger area within Tehran FIR? **DISCUSSION:** Refer to AIP.

* + - 1. EP
      2. DR
      3. OI
      4. IR
    1. Based on what clearance, an airplane may leave Answer **(A)** is correct.

the holding point, for the purpose of landing? **DISCUSSION:** Refer to annex 2

* + - 1. Approach clearance.
      2. Descend clearance.
      3. Landing clearance.
      4. EAT clearance.
    1. Who is responsible to file a flight plane Answer **(D)** is correct.

with an ATS unit? **DISCUSSION:** Refer to annex 2

* + - 1. Pilot
      2. Operator.
      3. Designated representative.
      4. Items B is incorrect.
    1. Who is responsible to file repetitive flight plan? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. Pilot.
2. Operator.
3. Co-pilot
4. None.
   * 1. Based in which ICAO document, the flight crew member licences Answer **(C)** is correct.

shall be issued? **DISCUSSION:** Refer to annex 2

* + - 1. Flight crew licensing
      2. Document 9685
      3. Annex 1
      4. Annex 2
    1. Under what atmospheric pressure, the flight level Answer **(B)** is correct.

may be specified? **DISCUSSION:** Refer to annex 2

* + - 1. QNH.
      2. QNE.
      3. QFE.
      4. QFF.
    1. Within which controlled airspace, the SVFR Answer **(A)** is correct.

may be permitted? **DISCUSSION:** Refer to annex 2

* + - 1. CTR.
      2. CTA.
      3. ATZ.
      4. TMA.
    1. Who may provide traffic avoidance advice? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. Pilot.
2. ATS unit.
3. Co-pilot.
4. Radar unit.
   * 1. What is the vertical position of an airplane Answer **(D)** is correct.

under cruise within transition layer? **DISCUSSION:** Refer to annex 2

* + - 1. Flight level.
      2. Altitude.
      3. Height
      4. None.
    1. The general rules of annex 2 are stated to: Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. IFR.
2. VFR.
3. Both.
4. None.
   * 1. Who is responsible for the operations of an airplane Answer **(A)** is correct.

in accordance with the rules of the air? **DISCUSSION:** Refer to annex 2

* + - 1. Pilot in command.
      2. ATC
      3. Flight attendant.
      4. Pilot.
    1. When an arrival report shall be made, if the arrival aerodrome Answer **(A)** is correct.

has no communication facility?. **DISCUSSION:** Refer to annex 2

* + - 1. Prior to landing.
      2. After landing.
      3. Ant time.
      4. None.
    1. The familiarity with all available information, for Answer **(C)** is correct.

the purpose of departure is the responsibility of: **DISCUSSION:** Refer to annex 2

* + - 1. Operator.
      2. Dispatcher.
      3. Pilot-in-command.
      4. All.
    1. Who has the final authority as disposition Answer **(B)** is correct.

of an aircraft? **DISCUSSION:** Refer to annex 2

* + - 1. ATC unit.
      2. Pilot-in-command.
      3. Operator.
      4. Maintenance.
    1. Which authority may prescribe the condition, to drop or spray Answer **(D)** is correct.

some objects from an aircraft? **DISCUSSION:** Refer to annex 2

* + - 1. ATS authority.
      2. Operator.
      3. ATC unit.
      4. Appropriate authority.
    1. Which authority may prescribe the conditions under which, Answer **(B)** is correct.

the formation flight may take place **DISCUSSION:** Refer to annex 2 within a controlled airspace?

* + - 1. Appropriate authority.
      2. Appropriate ATS authority.
      3. Flight leader.
      4. Military commander.
    1. Who is responsible for the separation between Answer **(B)** is correct.

all aircraft practicing in formation flight? **DISCUSSION:** Refer to annex 2

* + - 1. Flight leader.
      2. All pilot in command.
      3. ATS unit.
      4. All.
    1. What is the maximum lateral separation of Answer **(D)** is correct.

each formation flight from the leader? **DISCUSSION:** Refer to annex 2

* + - 1. 2 NM
      2. 1.5NM
      3. 1 NM
      4. 0.5NM
    1. what is the maximum vertical separation of each Answer **(B)** is correct.

formation flight from the leader? **DISCUSSION:** Refer to annex 2

* + - 1. 50 ft
      2. 100 ft
      3. 150 ft
      4. 200 ft
    1. For the purpose of the formation flight, pre-arrangement Answer **(A)** is correct.

shall take place between? **DISCUSSION:** Refer to annex 2

* + - 1. Pilots in command
      2. Flight leader and ATS unit.
      3. Flight leader and operator.
      4. All together.
    1. restricted or prohibited areas, may not be established in? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 11.

1. FIR.
2. TMA.
3. CTR.
4. High seas.
   * 1. When an aircraft has the right of way, shall maintain its? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Speed.
2. Heading.
3. ‘’A’’ and ‘’’B’’
4. ‘’A’’ or ‘’B’’
   * 1. What action should be taken by two aircraft, Answer **(B)** is correct.

when approaching head on, at same level? **DISCUSSION:** Refer to annex 2

* + - 1. Change their level.
      2. Change their heading
      3. Change their speed.
      4. Change their cruise.
    1. When a helicopter is converging with an airplane, Answer **(A)** is correct.

which of them has the right of way? **DISCUSSION:** Refer to annex 2

* + - 1. Right side aircraft.
      2. Left side aircraft.
      3. Helicopter.
      4. Airplane.
    1. An airplane is towing some object, converging with helicopter, Answer **(D)** is correct.

which of them has the right of way? **DISCUSSION:** Refer to annex 2

* + - 1. Left side aircraft.
      2. Right side aircraft.
      3. Helicopter.
      4. Towing aircraft.
    1. Where a glider and a balloon are converging, Answer B**()** is correct.

which of them has the right of way? **DISCUSSION:** Refer to annex 2

* + - 1. Glider.
      2. Balloon.
      3. Right side aircraft.
      4. Left side aircraft.
    1. Which navigation light may be seen by overtaking aircraft? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. Rear light
2. Starboard light.
3. Port light.
4. Anti-collision light.
   * 1. What action shall be taken by an overtaking aircraft? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Alter its heading.
2. Alter its heading to the left.
3. Alter its heading to the right.
4. None.
   * 1. What action shall be taken by an overtaken aircraft? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. Alter its heading.
2. Alter its speed.
3. Alter its level.
4. Continue its flight as planned.
   * 1. When two aircraft are in the final stage of landing, Answer **(D** is correct.

which of them has the right of way? **DISCUSSION:** Refer to annex 2

* + - 1. Faster.
      2. Slower.
      3. Higher.
      4. Lower.
    1. Which of the following aircraft has the right of way, when Answer **(A)** is correct.

they are approaching on an aerodrome for landing? **DISCUSSION:** Refer to annex 2

* + - 1. Glider.
      2. Airship.
      3. Balloon
      4. Airplane.
    1. When two aircraft are approaching head-on on the surface Answer **(B)** is correct.

of an aerodrome, what shall they do? **DISCUSSION:** Refer to annex 2

* + - 1. Alter its heading.
      2. Alter its course.
      3. Alter its track.
      4. Alter its direction.
    1. Which lights may be used to indicate aeroplane structure, Answer **(C)** is correct.

on the movement area, if adequate **DISCUSSION:** Refer to annex 2 illumination is not provided?

* + - 1. Anti-collision lights
      2. Red anti-collision light.
      3. Navigation lights.
      4. Landing lights.
    1. Which light may be used, when an aircraft running Answer **(B)** is correct.

its engine on the movement area of an aerodrome? **DISCUSSION:** Refer to annex 2

* + - 1. Anti-collision lights.
      2. Red anti-collision lights.
      3. Navigation lights
      4. Flashing lights.
    1. Which lights may be switched off the authority of pilot? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. Landing lights.
2. Anti-collision lights.
3. Navigation lights.
4. Any flashing lights.
   * 1. Which direction may be turned by an airplane, Answer **(A)** is correct.

after taking off? **DISCUSSION:** Refer to annex 2

* + - 1. Left
      2. Right
      3. Left at 10,000 ft
      4. Right at 10,000 ft.
    1. How long before departure, a controlled flight Answer **(D)** is correct.

shall file a flight plan? **DISCUSSION:** Refer to annex 2

* + - 1. 90 minutes.
      2. 60 minutes.
      3. At least 90 minutes.
      4. At least 60 minutes.
    1. How long before departure, an uncontrolled VFR in Iran, Answer **(C)** is correct.

shall file a flight plan? **DISCUSSION:** Refer to AIP.

* + - 1. 90 minutes.
      2. 60 minutes.
      3. At least 60 minutes.
      4. At least 90 minutes.
    1. How long before departure, an IFR flight subject Answer **(B)** is correct.

to advisory service, shall file a flight plan? **DISCUSSION:** Refer to annex 2

* + - 1. 60 minutes.
      2. At least 60 minutes.
      3. 90 minutes.
      4. At least 90 minutes.
    1. How long before crossing any airway within Tehran FIR, Answer **(D)** is correct.

an aircraft shall file a flight plane? **DISCUSSION:** Refer to AIP.

* + - 1. 10 minutes.
      2. 60 minutes.
      3. 90 minutes.
      4. Not applicant in Iran.
    1. What information includes significant change shall be reported Answer **(D)** is correct.

to ATS unit, before departure if it is incorrect **DISCUSSION:** Refer to annex 2 than the information file in the flight plane?

* + - 1. fuel.
      2. Number of persons.
      3. Level.
      4. Both A and B.
    1. When an arrival report shall be made, if Answer **(B)** is correct.

the arrival aerodrome has no ATS unit? **DISCUSSION:** Refer to annex 2

* + - 1. Before landing.
      2. After landing.
      3. Any time.
      4. None.
    1. Which time shall be used to comply Answer **(C)** is correct.

rules of the air? **DISCUSSION:** Refer to annex 2

* + - 1. GMT.
      2. Local time.
      3. UTC.
      4. Standard.
    1. When the time check shall be obtained by Answer **(D)** is correct.

any controlled flight? **DISCUSSION:** Refer to annex 2

* + - 1. Before start up.
      2. Before filling flight plan.
      3. Before take-off.
      4. Before departure.
    1. What shall be the accuracy of time when Answer **(B)** is correct.

utilized in data link communication? **DISCUSSION:** Refer to annex 2

* + - 1. One second.
      2. Within one second.
      3. Two second.
      4. Within two second.
    1. When an ATC clearance shall be obtained? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. Prior to operating controlled flight.
2. Prior to take off.
3. Prior to entering CTR.
4. Prior to ensuring FIR.
   * 1. How shall an aircraft make taxi in the manoeuvring area Answer **(B)** is correct.

of a controlled aerodrome? **DISCUSSION:** Refer to annex 2

* + - 1. By pre-arrangement.
      2. By ATC clearance.
      3. Operator clearance.
      4. All above.
    1. Under what circumstances, may depart Answer **(B)** is correct.

from rules of the air? **DISCUSSION:** Refer to annex 2

* + - 1. Night.
      2. Interest of safety.
      3. Engine failure.
      4. With ATC clearance.
    1. According which flight plan, the pilot shall Answer **(C)** is correct.

adhere himself? **DISCUSSION:** Refer to annex 2

* + - 1. Filed flight plan.
      2. Operational flight plan.
      3. Current flight plan.
      4. None.
    1. How much of true airspeed at cruising level if Answer **(C)** is correct.

vary than the speed filed in the flight plan **DISCUSSION:** Refer to annex 2 shall be reported to ATS unit?

A. +5%

1. -5%
2. ±5%
3. ±5 NM
   * 1. how long of the time estimate constitute inadvertent Answer **(C)** is correct.

change and must be reported to ATS unit? **DISCUSSION:** Refer to annex 2

* + - 1. 3 minutes.
      2. Less than 3 minutes.
      3. In excess of 3 minutes.
      4. ±3 minutes.
    1. When an VFR aircraft operating within Tabriz CTR Answer **(D)** is correct.

as a local flight, visibility is deteriorating below VMC, **DISCUSSION:** Refer to annex 2 the pilot shall:

* + - 1. Request SVFR.
      2. Request IFR.
      3. Request any amendment clearance.
      4. One of A, B or C.
    1. Which of the following guidance shall be used for Answer **(A)** is correct.

precision approach? **DISCUSSION:** Refer to annex 6

* + - 1. Precision lateral and vertical guidance.
      2. Lateral and vertical guidance.
      3. Lateral and distance guidance.
      4. Vertical and distance guidance.

1. Which category of precision approach has no decision height? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 6

1. CAT III
2. CAT IIIc
3. CAT II
4. CAT I
5. Who is responsible for the safety of passengers of an aircraft Answer **(C)** is correct.

after the aircraft door is closed? **DISCUSSION:** Refer to annex 6

* 1. Safety person.
  2. Cabin crew.
  3. Pilot-in-command.
  4. All.

1. To whom, the pilot shall submit a report of its violation from Answer **(D)** is correct.

regulation has been made for the interest of safety? **DISCUSSION:** Refer to annex 6

* 1. State of event.
  2. State of registry.
  3. State of the operator.
  4. A and B.

1. TO whom, the pilot in command shall report an accident Answer **(C)** is correct.

which cause a serious injury of some passenger? **DISCUSSION:** Refer to annex 6

* 1. Operator.
  2. Appropriate authority.
  3. Nearest appropriate authority.
  4. All.

1. Lateral and vertical guidance to carry out an instrument Answer **(D)** is correct.

approach procedure may be provided by? **DISCUSSION:** Refer to annex 6

* 1. Computer generated navigation data.
  2. Ground based navigation aid.
  3. A and B.
  4. A or B.

1. Which category of precision approach requires visibility Answer **(C)** is correct.

or RVR as a part of aerodrome operating minima? **DISCUSSION:** Refer to annex 6

* 1. CAT III.
  2. CAT II.
  3. CAT I.
  4. All.

1. To whom, the pilot in command shall notify any violation Answer **(A)** is correct.

of local procedure has been done for interest of safety? **DISCUSSION:** Refer to annex 6

* 1. Local authority.
  2. Operator.
  3. State of registry.
  4. State of the operator.

1. Which of ICAO annexes has been provision of carriage Answer **(C)** is correct.

of dangerous good? **DISCUSSION:** Refer to annex 6

* 1. 16
  2. 15
  3. 18
  4. 17

1. What shall be the minimum cloud base of destination as Answer **(B)** is correct.

an operating minima when destination alternate **DISCUSSION:** Refer to annex 6 is not required?

* 1. 1000 M above minima.
  2. 1000 Ft above minima.
  3. 500 M above minima.
  4. 500 Ft above minima.

1. Who is responsible to be ensure that all passenger on board Answer **(B)** is correct.

an aeroplane are aware regarding the location of **DISCUSSION:** Refer to annex 6 emergency equipment for collective use?

* 1. Cabin crew.
  2. Pilot in command.
  3. Operator.
  4. State.

1. Which RVR is controlling RVR? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6

1. Touchdown.
2. Stop-end.
3. Mid-point.
4. All.
5. what is the responsibility of a pilot in command when Answer **(C)** is correct.

the capacity of a flight crew reduced **DISCUSSION:** Refer to annex 6 due to lack of oxygen?

* 1. Do not commence the flight.
  2. Land at the nearest aerodrome.
  3. Land at the nearest suitable aerodrome.
  4. Continue to the alternate.

1. Who is responsible to promulgate the instrument Answer **(B)** is correct.

approach procedure? **DISCUSSION:** Refer to annex 6

* 1. Operator.
  2. State.
  3. State of registry.
  4. ATC.

1. Who is authorize to prescribe operating limitation for Answer **(C)** is correct.

visual presentation by placards? **DISCUSSION:** Refer to annex 6

* 1. Maintenance.
  2. Operator.
  3. Certification authority.
  4. All.

1. How long before and after ETA, the current visibility shall be Answer **(C)** is correct.

either 5.5 km or 4 km more than minimum, **DISCUSSION:** Refer to annex 6 when destination alternate is not required?

* 1. At least 2 hours.
  2. Minimum 2 hours.
  3. 2 hours.
  4. None.

1. When an instrument approach procedure shall be continued Answer **(D)** is correct.

beyond outer marker fix? **DISCUSSION:** Refer to annex 6

* 1. VIS is above minima.
  2. RVR is above minima.
  3. Controlling RVR is above minima.
  4. B is incorrect.

1. How long fuel required an aeroplane which is operating IFR, Answer **(A)** is correct.

after destination alternate? **DISCUSSION:** Refer to annex 6

* 1. 45 minutes.
  2. 45 GAL.
  3. 45 litter
  4. 45 US GAL.

1. What is a responsibility of a pilot in command when Answer **(C)** is correct.

any flight crew is incapacitated due to drugs? **DISCUSSION:** Refer to annex 6

* 1. Do not continue the flight.
  2. Land at the nearest aerodrome.
  3. Do not commence the flight.
  4. Return to departure point.

1. Who is responsible to pay attention to the aircraft refuelling Answer **(D)** is correct.

when passengers are embarking? **DISCUSSION:** Refer to annex 6

* 1. Pilot in command.
  2. Qualified personal.
  3. A and B.
  4. A or B.

1. The standards of annex 6 relates to all aeroplane with Answer **(A)** is correct.

the MAX certificated take-off mass of over? **DISCUSSION:** Refer to annex 6

* 1. 5,700 kg
  2. 7,000 kg
  3. 27,000kg
  4. 15,000 kg

1. When the multi-engine aeroplane shall has equipment Answer **(D)** is correct.

for making a pyrotechnic signal? **DISCUSSION:** Refer to annex 6

* 1. Operating over water 50 NM.
  2. Operating over water 100 NM.
  3. Operating over water 200 NM.
  4. Operating over water 210 NM.

1. When the single engine aeroplane shall has an ELT? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 6

1. When operating over water beyond 50 NM.
2. When operating over water beyond 100 NM.
3. When operating over water beyond 100 Km.
4. When operating over water beyond 50 Km.
5. What is the minimum number of passengers to be considered for Answer **(D)** is correct.

the purpose of carrying oxygen when flying **DISCUSSION:** Refer to annex 6 at altitude with 676 hpa pressure?

* 1. All.
  2. 50%.
  3. 30%.
  4. 10%.

1. Which of the annex has provision attesting noise certification? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 6

1. 18.
2. 16.
3. 14.
4. 12.
5. When the flight recorder shall be off? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6

1. En-route.
2. Taxi.
3. Landing.
4. None.
5. Foe which level, ICAO recommended that throat Answer **(C)** is correct. microphone to be used? **DISCUSSION:** Refer to annex 6
   1. Below flight level 150.
   2. Below flight level 200.
   3. Below transition level.
   4. Below 10,000 ft.
6. What shall be the color of the making of break-in points? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6

1. Yellow.
2. Red.
3. A or B in white outline.
4. None.
5. When a single-engine aeroplane on extended flight Answer **(C)** is correct.

over water shall has sufficient life-saving rafts? **DISCUSSION:** Refer to annex 6

* 1. Operating 100 NM.
  2. Operating 30 minutes.
  3. Operating 150 NM.
  4. Operating 45 minutes.

1. How many ELT shall has a multi-engine aeroplane Answer **(A)** is correct.

when operating 280 NM over water? **DISCUSSION:** Refer to annex 6

* 1. One.
  2. Two.
  3. At least one.

1. What is the minimum period of oxygen for passengers Answer **(C)** is correct. compartment, when aeroplane cannot descend safely **DISCUSSION:** Refer to annex 6 within 4 minutes to reach at a level

with 620 hpa pressure?

* 1. 30 minutes.
  2. 45 minutes.
  3. 10 minutes.
  4. 15 minutes.

1. How many landing light shall have an aeroplane Answer **(A)** is correct.

when flying at night? **DISCUSSION:** Refer to annex 6

* 1. One.
  2. Two.
  3. Minimum one.

1. For which mass, an aeroplane shall be equipped with GPWS? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6

1. Landing.
2. Take-off.
3. Maximum certificated take-off.
4. Maximum certificated landing.
5. Which of the following certificated take-off mass Answer **(D)** is correct.

required F.D.R type 1A? **DISCUSSION:** Refer to annex 6

* 1. 5,800 kg.
  2. 15,000 kg.
  3. 27,100 kg.
  4. All.

1. Who is responsible to determine the age of person Answer **(D)** is correct.

to take a seat in an aeroplane? **DISCUSSION:** Refer to annex 6

* 1. State of the operator.
  2. ICAO.
  3. State.
  4. State of registry.

1. How many ELT shall have an aeroplane when operating Answer **(A)** is correct.

search and rescue on the designated area is difficult? **DISCUSSION:** Refer to annex 6

* 1. One.
  2. Two.
  3. Minimum one.
  4. Minimum two.

1. How many pressure altimeter shall have an aeroplane Answer **(B)** is correct.

when operating IFR? **DISCUSSION:** Refer to annex 6

* 1. Two.
  2. One.
  3. At least one.
  4. At least two.

1. An aeroplane has authorize to carry…………passengers Answer **(B)** is correct.

when it has been equipped with GPWS? **DISCUSSION:** Refer to annex 6

* 1. 9+2 crew.
  2. 10+2 crew.
  3. 9+3 crew.
  4. None.

1. How long shall be the duration of retraining the information Answer **(C)** is correct.

by FDR 1A? **DISCUSSION:** Refer to annex 6

* 1. 25 hours.
  2. 30 minutes.
  3. At least 25 hours.
  4. At least 30 minutes.

1. How many independent radio equipment shall be provided Answer **(A)** is correct.

for an aeroplane operating IFR or at night? **DISCUSSION:** Refer to annex 6

* 1. More than one.
  2. More than two.
  3. Two.
  4. All.

1. When an en-route VFR is authorized by appropriate authority, Answer **(C)** is correct.

the minimum distance of land mark for navigation is? **DISCUSSION:** Refer to annex 6

* 1. 100 NM.
  2. 110 NM.
  3. 60 NM.
  4. 50 NM.

1. Who is responsible to authorize an aeroplane to operate Answer **(C)** is correct.

within an area applying VSM of 1000 ft above FL 290? **DISCUSSION:** Refer to annex 6

* 1. State.
  2. State of the operator.
  3. State of the registry.
  4. All.

1. Which document specifies the number and Answer **(A)** is correct. composition of flight crew? **DISCUSSION:** Refer to annex 6
   1. Flight manual.
   2. Operation manual.
   3. Annex 6.
   4. Pilot hand book manual.
2. What shall be the threshold alert of the equipment of Answer **(D)** is correct.

an aeroplane when operating within RVSM area? **DISCUSSION:** Refer to annex 6

* 1. Minimum +/- 300 ft.
  2. Not exceed +/- 200 ft.
  3. More than +/- 300 ft.
  4. Not exceed +/- 300 ft.

1. Who may authorize an aeroplane to operate Answer **(D)** is correct.

within defined airspace of MNPS? **DISCUSSION:** Refer to annex 6

* 1. Operator.
  2. State of registry.
  3. Contracting state.
  4. State of the operating.

1. Where can find the difference between ICAO standards Answer **(C)** is correct.

and Iran regulation and procedure? **DISCUSSION:** Refer to AIP.

* 1. GEN 2.5.
  2. ENR 3.
  3. GEN 1.7
  4. ENR1.

1. Which part of AIP contain conversion table? Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. GEN 1.
2. GEN 2.
3. ENR 1.
4. AD 1.
5. Which part of AIP contain measuring system? Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. GEN 2.
2. ENR 1.
3. ENR 2.
4. AD 1.
5. Which one of the following statement is correct EP-TSC is? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. EP-TSC is a registration mark.
2. EP is a registration mark.
3. EP is a nationality mark.
4. A and C are correct.
5. The location indicator OICK is for? Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. Boroujerd.
2. Khoramabad.
3. Sanandaj.
4. Ilam.
5. Where can we find the abbreviations used in AIS publication? Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. GEN 2.
2. GEN 3.
3. ENR 1.
4. ENR 3.
5. Which part of AIP contain the list of radio navigation aids? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. ENR 1.
2. ENR 4.
3. GEN 2.5.
4. GEN 3.
5. What is the accuracy of the location of navigation aids which Answer **(A)** is correct.

are measured by GPS in Iran? **DISCUSSION:** Refer to AIP.

* 1. ±10 meters.
  2. ± 5 m
  3. Within 5 meters.
  4. A and C.

1. The Aghajari NDB may be used as a facility for the purpose of ? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. Aerodrome.
2. En-route.
3. Off route navigation aids.
4. A and B.
5. What is the purpose of using Ilam DVOR/DME? Answer **(D)** is correct.

**DISCUSSION:** Refer to AIP.

1. Aerodrome facility.
2. En-route facility.
3. Off route navigation aid.
4. A and B.
5. What is the accuracy of time for sunrise and sunset table Answer **(B)** is correct. published in AIP? **DISCUSSION:** Refer to AIP.
   1. Less than 3 minutes.
   2. Less than 2 minutes.
   3. 2 minutes.
   4. 3 minutes.
6. What is the color of regular AIP amendment cover Answer **(A)** is correct.

sheet paper? **DISCUSSION:** Refer to AIP.

* 1. Blue.
  2. Pink.
  3. Red.
  4. Yellow.

1. What is the color of AIRAC amendment cover sheet paper? Answer **(B** is correct.

**DISCUSSION:** Refer to AIP.

1. Blue.
2. Pink.
3. Red.
4. Yellow.
5. The AIP supplement cover sheet paper is ………… Answer **(D)** is correct.

**DISCUSSION:** Refer to AIP.

1. Blue.
2. Pink.
3. Red.
4. Yellow.
5. Which temporary changes may be included in AIP Answer **(B)** is correct. supplement? **DISCUSSION:** Refer to AIP.
   1. 2 months.
   2. 3 month and longer.
   3. 1 month.
   4. None.
6. Which section of AIP contain the information of NOTAM? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. GEN 2.
2. ENR 3.
3. GEN 3.
4. ENR 1.
5. The series of international NOTAM is …………. Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. A.
2. B.
3. C.
4. R.
5. The series of non-international NOTAM is……….. Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. A.
2. B.
3. C.
4. N.
5. What is the series of domestic NOTAM? Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. A.
2. B.
3. C.
4. NOTAM “A” contain the information regarding, Answer **(A)** is correct.

the operation of ? **DISCUSSION:** Refer to AIP.

* 1. International.
  2. Domestic.
  3. IFR.
  4. All.

1. NOTAM “B” contain the information about ……...operation. Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. International.
2. Domestic.
3. Snow.
4. All.
5. What is the validity of SNOWTAM? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. 12 hrs.
2. 30 min.
3. 24 hrs.
4. 60 min.
5. The SNOWTAM contain information about………… Answer **(D)** is correct.

**DISCUSSION:** Refer to AIP.

1. Slush.
2. Snow.
3. Compacted snow.
4. All.
5. What is the meaning of NOTAM “C”? Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. Replace.
2. Cancel.
3. New.
4. Snow.
5. What is the meaning of NOTAM “N”? Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. Snow.
2. New.
3. Cancel.
4. Replace.
5. In which Iranian airspace VFR flight is authorized Answer **(D)** is correct.

to operate? **DISCUSSION:** Refer to AIP.

* 1. B,C,D.
  2. B,D.
  3. D,E.
  4. C,D.

1. VFR flight shall not operate at night within Tehran FIR but Answer **(A)** is correct.

may be authorized to operate in aerodrome traffic zone **DISCUSSION:** Refer to AIP. by coordination with ATS authority:

* 1. True.
  2. False.

1. What is the minimum height for IFR flight within Answer **(D)** is correct. Tehran FIR if minimum flight level **DISCUSSION:** Refer to AIP. has not been establish?
   1. 1,000 ft.
   2. 1,500 ft.
   3. 2,000 ft.
   4. 2,500 ft.
2. which section of AIP contain information about Answer **(C)** is correct. “meteorological service” ? **DISCUSSION:** Refer to AIP.
   1. GEN 3.
   2. ENR 3.
   3. GEN 3.5.
   4. ENR 4.
3. How many MET reporting station are specified in Iran? Answer **(D)** is correct.

**DISCUSSION:** Refer to AIP.

1. 3.
2. 4.
3. 5.
4. 6.
5. How many compulsory MET reporting station Answer **(A)** is correct.

are specified in Iran? **DISCUSSION:** Refer to AIP.

* 1. 3.
  2. 4.
  3. 5.
  4. 6.

1. In which part of AIP we can find the “on request” Answer **(C)** is correct.

MET reporting station? **DISCUSSION:** Refer to AIP.

* 1. ENR 3.
  2. GEN 2.
  3. GEN 3.5.
  4. ENR 4.

1. The compulsory MET reporting station are: Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. Zahedan, Esfahan, Uromiyeh.
2. Abadan, Birjand, Sabzevar.
3. Zahedan, Abadan, Esfahan.
4. Sabzevar, Abadan, Esfahan.
5. METAR in Iran will be done every: Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. 1 hrs.
2. 30 minutes.
3. A or B.
4. None.
5. Which part of AIP contain VFR/IFR rules? Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. ENR 3.
2. ENR 1.
3. AD 1.
4. GEN 4.
5. Where can we find the information about flight plan? Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. ENR 1.
2. ENR 3.
3. GEN 3.
4. GEN 2.
5. How many SAR (search and rescue station) are specified Answer **(C)** is correct.

in Iran? **DISCUSSION:** Refer to AIP.

* 1. 6.
  2. 8.
  3. 9.
  4. 10.

1. Which part of AIP contain the information about Answer **(A)** is correct. interception procedures? **DISCUSSION:** Refer to AIP.
   1. ENR 1.
   2. ENR 3.
   3. GEN 3.
   4. GEN 2.5.
2. Which part of AIP contain the information about Answer **(A)** is correct. “unlawful interference” ? **DISCUSSION:** Refer to AIP.
   1. ENR 1.
   2. ENR 3.
   3. GEN 3.
   4. GEN 1.
3. Which part of AIP contain the information about Answer **(B)** is correct. “airspace classification” ? **DISCUSSION:** Refer to AIP.
   1. ENR 3.
   2. ENR 1.
   3. GEN3.
   4. GEN1.
4. How many airspace are classified in Iran ? Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. 4.
2. 3.
3. 5.
4. 2.
5. How many control airspace are classified in Iran? Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. 3.
2. 2.
3. 1.
4. 4.
5. How many uncontrolled airspace are classified Answer **(A)** is correct.

in Iran? **DISCUSSION:** Refer to AIP.

* 1. 1.
  2. 2.
  3. 3.
  4. 4.

1. Which class of airspace in Iran are control airspace? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. B,C,D.
2. A,B,C,D.
3. A,C,D.
4. A,D.
5. Which class of airspace in Iran are uncontrolled airspace? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. F,G.
2. F.
3. G.
4. E,F,G.
5. What is the class of airspace outside AIRWAY,TMA,CTR? Answer **(D)** is correct.

**DISCUSSION:** Refer to AIP.

1. A.
2. C.
3. D.
4. G.
5. What is the classification of Boushehr CTR? Answer **(C)** is correct.

**DISCUSSION:** Refer to AIP.

1. A.
2. D.
3. A,D.
4. C.
5. What is the classification of TMA up to FL 200? Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. C.
2. A.
3. A,C.
4. D.
5. What is the classification of Tabriz CTR Answer **(B)** is correct.

above FL 200? **DISCUSSION:** Refer to AIP.

* 1. C.
  2. A.
  3. A,C.
  4. D.

1. Which part of AIP contain information about Answer **(A)** is correct. altimeter setting procedure? **DISCUSSION:** Refer to AIP.
   1. ENR 1.
   2. BNR 3.
   3. GEN 3.
   4. GEN 1.
2. In which chart you can find transition altitude? Answer **(D)** is correct.

**DISCUSSION:** Refer to AIP.

1. Instrument approach.
2. SID.
3. STAR.
4. All.
5. The QNH value shall transit in …………..within Tehran FIR. Answer **(A)** is correct.

**DISCUSSION:** Refer to AIP.

1. Hpa.
2. Mb.
3. Inch.hg.
4. Psi.
5. The reported QNH in Iran is valid up to……. Answer **(B)** is correct.

**DISCUSSION:** Refer to AIP.

1. 25 km.
2. 25 nm.
3. 30 nm.
4. 30 km.
5. How long the test signal shall take place for the adjustment Answer **(C)** is correct.

of a receiver? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. 10 seconds.
  2. Minimum 10 seconds.
  3. Maximum 10 seconds.
  4. None.

1. What shall be the composed of test signal? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Alphabet.
2. Numerals.
3. A or B.
4. Composed of A and B.
5. How many category of messages may be handled Answer **(A)** is correct.

by the aeronautical mobile service? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. 6.
  2. 5.
  3. 4.
  4. 3.

1. Which message is constitute as an exceptional case and Answer **(D)** is correct.

preclude of message category? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Flight safety.
  2. Regulatory.
  3. Direction finding.
  4. Unlawful interference.

1. Which category of messages shall be handled by Answer **(D)** is correct.

inter-pilot air-to-air communication? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Safety.
  2. Regulatory.
  3. Urgency.
  4. A and B.

1. Which ICAO language shall be used in addition to language Answer **(A)** is correct.

used by ground station for the purpose of air-ground radio **DISCUSSION:** Refer to annex 10 (radio telephony) telephony communications?

* 1. English.
  2. French.
  3. Spanish.
  4. Russian.

1. Within which publication, each state shall publish Answer **(C)** is correct.

the availability of ground station language? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Annex 1.
  2. Annex 6.
  3. AIP.
  4. Annex 10.

1. The altimeter setting of 1025 shall be transmitted as: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Ten – Twenty five.
2. Ten – Twenty fife.
3. One – Zero – Two –Five.
4. One – Zero – Two –Fife.
5. The altitude of 10,500 ft shall be transmitted.as: Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. One – Zero –Five hundred.
2. Ten thousand – Fife hundred.
3. One – Zero – Five – Zero – Zero.
4. None.
5. What phrase shall be requested from a person for Answer **(B)** is correct.

the purpose of accurate reception of number? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. CONFIRM.
  2. READ BACK.
  3. CHECK.
  4. VERIFY.

1. How many words per minute shall be spoken for the purpose Answer **(C)** is correct.

of to maintain an even rate of speech? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. 100.
  2. 60.
  3. Maximum 100.
  4. Maximum 60.

1. What phrases need not to be transmitted on VHF? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. OUT.
2. OVER.
3. GO-AHEAD.
4. Both A and B
5. The ROGER shall not to be used in reply of a question Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. AFFIRM.
2. NEGATIVE.
3. READ BACK.
4. All.
5. The UNABLE shall normally be followed by? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. CLEARANCE.
2. REASON.
3. REQUEST.
4. CHECK.
5. The BREAK shall be used for the purpose of? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Separation between portion of messages.
2. Separation between messages transmitted to different aircraft.
3. Separation between messages transmitted to different ground stations.
4. All.
5. The WILCO is abbreviated for….. Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Will do.
2. Will comply.
3. Will co-ordinate.
4. Will contact.
5. Why the WORDS TWICE may be used in radio telephony Answer **(C)** is correct.

communication as: **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. An information.
  2. A request.
  3. Both A and/or B.
  4. None.

1. The CORRECT means: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. True.
2. Accurate.
3. O.K.
4. A or B.
5. The MONITOR means: Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Listen out.
2. Establish contact.
3. Check.
4. All.
5. The DISREGARD means: Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. No.
2. Ignore.
3. Cancel.
4. Negative.
5. What is the call sign suffix of approach control radar departure? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. RADAR.
2. APPROACH.
3. DEPARTURE.
4. A or C.
5. What is the call sign suffix of direction finding station? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. D.F control.
2. HOMER.
3. RADIO.
4. INFORMATION.
5. What is the call sign suffix of area control centre? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Control.
2. Centre.
3. Area.
4. Control centre.
5. What is the call sign suffix of precision approach radar? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Radar.
2. Precision.
3. Approach.
4. Control.
5. The full call sign of an aircraft shall be: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Characters of registration mark.
2. Telephony designator + A.
3. Telephony designator + last 4 characters of registration mark.
4. A or B are correct.
5. To which of the following call sign, the aircraft model Answer **(C)** is correct.

or manufacture may be added as prefix: **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Flight identification.
  2. Aircraft operating agency.
  3. Registration mark.
  4. All.

1. Which one of the following call sign has Answer **(D)** is correct.

no abbreviated form? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. EPIRN.
  2. Boeing PIRN.
  3. Airbus MDNS.
  4. BAW 328.

1. Who may change the call sign of an aeroplane temporarily? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Operator.
2. ATC.
3. Pilot.
4. ADIZ.
5. How shall reply, the general call as ALL STATION? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. READ BACK.
2. ACKNOWLEDGE.
3. WILCO.
4. Not reply.
5. What frequency specified for the purpose of Answer **(A)** is correct.

inter pilot air-to air communication? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. 123.45
  2. 121.45
  3. 132.45
  4. 113.45

1. When abbreviated call sign shall be used? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. After addressed by pilot.
2. After addressed by ATC.
3. By permission of operator.
4. By permission of state.
5. Who shall always add call sign of the aircraft, when issuing Answer **(C)** is correct.

ATC clearances and reading back such clearances? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Pilot.
  2. Controllers.
  3. Both A and B.
  4. None.

1. Which digit of high frequency (Khz) should be use, Answer **(A)** is correct.

when there is no confusion? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. First two.
  2. First three.
  3. First and last.
  4. All.

1. How many digit of VHF frequency by 8.33 khz spacing Answer **(C)** is correct.

shall be transmitted? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. 4.
  2. 5.
  3. 6.
  4. As indicated by ATC.

1. Which digit of frequency (119.000) by 25 khz spacing shall Answer **(B)** is correct.

be set on aircraft radio management panel? **DISCUSSION** Refer to annex 10 (radio telephony)**:**

* 1. 119.0
  2. 119.00
  3. 119.000
  4. None.

1. Which words should be used during test procedures for Answer **(D)** is correct.

the purpose of readability scale? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. How do you read.
  2. Request test.
  3. Radio test.
  4. Radio check.

1. The readability scale of 2 means: Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Readable now and then.
2. Unreadable.
3. Readable with difficulty.
4. Readable.
5. When the abbreviated procedures should be used? Answer **(B)** is correct.

**DISCUSSION** Refer to annex 10 (radio telephony)**:**

1. Advised by aeronautical station.
2. After initial contact.
3. Advised by operator.
4. All the time.
5. What word shall be spoken, when an error Answer **(C)** is correct.

has been made in transmission? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. CONFIRM.
  2. CORRECT.
  3. CORRECTION.
  4. REPORT.

1. On which VHF frequency shall an aircraft be guard when Answer **(B)** is correct.

required to be equipped with ELT? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. 243.
  2. 121.5
  3. 123.45
  4. 132.45

1. When every attempt by aircraft station for establishing Answer **(C)** is correct.

contact is failed, how many time the message shall be **DISCUSSION:** Refer to annex 10 (radio telephony) transmitted by phrase TRANSMITTING BLIND ?

* 1. One.
  2. At least one.
  3. Two.
  4. At least two.

1. On which frequency, the SELCAL should be utilized? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. VHF.
2. UHF.
3. HF.
4. Both A and C.
5. How many pre-selected audio tones, consists, a SELCAL? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. 5.
2. 4.
3. 3.
4. None.
5. Which station has the decoder on its receiver Answer **(A)** is correct.

for the purpose of (SELCAL code)? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Aircraft.
  2. Aeronautical.
  3. Both A and C.
  4. All.

1. Who is responsible to disseminate, at regular interval Answer **(B)** is correct.

the list of SELCAL code? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Pilot.
  2. Aircraft agency.
  3. ATS authority.
  4. None.

1. How should inform the appropriate ATS unit Answer **(A)** is correct.

the SELCAL of an aircraft? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. Submit in flight plan.
  2. Submit in operational flight plan.
  3. Forward a message.
  4. Any of A, B, or C.

1. How the pre-flight check should be made on the primary Answer **(C)** is correct.

and secondary frequency of SELCAL? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. First on primary.
  2. First on secondary.
  3. First on secondary then primary.
  4. First on primary then secondary.

1. How many call on the primary and the secondary frequency, Answer **(B)** is correct.

if unanswered, the aeronautical station **DISCUSSION:** Refer to annex 10 (radio telephony) should revert to voice calling?

* 1. One.
  2. Two.
  3. Three.
  4. Four.

1. When the MAYDAY and PAN PAN signal shall be used Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. At the commencement of communication.
2. At the first contact.
3. At the commencement of the first distress and urgency communication.
4. All.
5. How many time, MAYDAY signal is required to be spoken? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. One.
2. Two.
3. Three.
4. Preferably three.
5. What phrases shall be used by a station in distress or station Answer **(C)** is correct.

controlling distress traffic for the purpose of **DISCUSSION:** Refer to annex 10 (radio telephony) imposition of silence?

* 1. MAYDAY.
  2. STOP TRANSMITTING.
  3. B + A.
  4. A + B.

1. How the silence condition shall be terminated? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. Normal condition.
2. Distress traffic ended.
3. No distress.
4. None.
5. What phrases shall be used by a medical transport aeroplane? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 10 (radio telephony)

1. PANPAN MAYY-DEE-CAL.
2. PANPAN MEDICAL.
3. A three time.
4. B three time.
5. What is the appropriate SSR mode and code for Answer **(C)** is correct.

distress aircraft? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. A 7500.
  2. A 7600.
  3. A 7700.
  4. A 2000.

1. What is the appropriate SSR mode and code for Answer **(D)** is correct.

medical aircraft? **DISCUSSION:** Refer to annex 10 (radio telephony)

* 1. A 2000.
  2. A 7400.
  3. As pilot decision.
  4. A specified by ATC.

1. Which of ICAO annexes talks about the rules of the air? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Annex 8.
2. Annex 3.
3. Annex 2.
4. Annex 11.
5. ADS stand for ……… Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. Automatic deviation search.
2. Area development system.
3. Automatic independent system.
4. Automatic dependent surveillance.
5. Advisory service will be provided in: Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Uncontrolled airspace.
2. Air traffic control airspace.
3. Advisory airspace.
4. None.
5. Aerodrome traffic is: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. All traffic flying in the vicinity of an aerodrome.
2. All traffic departing from an aerodrome.
3. All traffic arriving to an aerodrome.
4. All traffic on the manoeuvring area and in the vicinity of an aerodrome.
5. Who is responsible for issuing AIP? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. State.
2. Operator.
3. Air traffic control unit.
4. Flight standard.
5. Airborne collision avoiding system is based on: Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. Primary surveillance radar.
2. Secondary surveillance radar.
3. Very high frequency.
4. Ultra high frequency.
5. Air taxing of helicopter or VTOL aircraft should be: Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. 20 knots.
2. 37 knots.
3. Less than 20 knots.
4. More than 20 knots.
5. Cargo sling loads by helicopters require air taxiing in order Answer **(B)** is correct.

to reduce ground effect turbulence with a height of: **DISCUSSION:** Refer to annex 2

* 1. 25 ft.
  2. Above 25 ft.
  3. Less than 25 ft.
  4. None.

1. Authorization for an aircraft to proceed under condition Answer **(D)** is correct.

specified by air traffic control unit is: **DISCUSSION:** Refer to annex 2

* 1. Flight permission.
  2. Authorized flight.
  3. Controlled flight.
  4. ATC clearance.

1. Which one are the objectives of air traffic control service: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. Prevent collision between aircraft.
2. Prevent collision between aircraft and obstruction.
3. Expediting and maintaining an orderly flow of air traffic.
4. All.
5. How many airspaces are classified by ICAO? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. 7.
2. 4.
3. 6.
4. 5.
5. How many of airspace classes are known as controlled airspace? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. 5.
2. 2.
3. 4.
4. 3.
5. What are the uncontrolled airspaces? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. F.
2. G.
3. D,E.
4. G,F.
5. How many airspaces are assigned for Iran FIR? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. 7.
2. 3.
3. 5.
4. 4.
5. Airway is a control area established in the form of: Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. Corridor.
2. Rectangle.
3. Circle.
4. Triangle.
5. Altitude is the expression of vertical distance of Answer **(A)** is correct.

an aircraft when using? **DISCUSSION:** Refer to annex 2

* 1. QNH.
  2. QNE.
  3. QFE.
  4. Standard pressure.

1. Who is the appropriate authority regarding Answer **(B)** is correct.

the flight over the high seas? **DISCUSSION:** Refer to annex 2

* 1. State of territory being over flown.
  2. State of registry.
  3. State of operator.
  4. State of manufacture.

1. Change over point is point of transfer to next facility Answer **(A)** is correct.

when the ATS route is defined by: **DISCUSSION:** Refer to annex 2

* 1. VOR's.
  2. NDB's.
  3. Any NAV aids.
  4. All.

1. The estimated time at which the aircraft will commence Answer **(A)** is correct. movement associated with departure is: **DISCUSSION:** Refer to annex 2
   1. EOBT.
   2. EET.
   3. TEET.
   4. ETA.
2. The vertical distance of an aircraft measured from Answer **(D)** is correct.

mean sea level, as flight level, is on the basis of: **DISCUSSION:** Refer to annex 2

* 1. QNE.
  2. 1013.2 hpa.
  3. QNH.
  4. A or B are correct.

1. Flight visibility is forwarded from: Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. Cockpit of an aircraft on the ground.
2. Cockpit of an aircraft in flight.
3. RVR.
4. All correct.
5. IMC is a meteorological condition…… Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. Equal to VMC.
2. Less than minimum for VMC.
3. Mare than minimum for VMC.
4. B and C are correct.
5. Who is safety sensitive personnel? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. Crew member.
2. Aircraft maintenance.
3. Air traffic controller.
4. All.
5. special VFR flight operates in: Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. ATZ.
2. CTR.
3. TMA.
4. All airspaces.
5. Runway holding position is a designed position Answer **(D)** is correct.

intended to ……… **DISCUSSION:** Refer to annex 2

* 1. Protect runway.
  2. Protect an obstacle limitation surface.
  3. Protect an ILS?MLS criteria/sensitive area.
  4. All.

1. Taxing is a surface movement of an aircraft under Answer **(C)** is correct.

its power……. **DISCUSSION:** Refer to annex 2

* 1. Including take-off.
  2. Excluding take-off.
  3. Excluding take-off and landing.
  4. All.

1. Traffic avoiding advice will be provided by: Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Operator.
2. Pilot in command.
3. ATS units.
4. None.
5. What is the intent of traffic avoidance advice? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. To make large separation.
2. To sequence the traffic.
3. To apply priority.
4. To avoid a collision.
5. Who has the final authority for disposition of aircraft? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. In flight security.
2. Pilot.
3. Pilot in command.
4. Operator.
5. The cruising level of an aircraft shall be in the term of Answer **(C)** is correct.

flight level……. . **DISCUSSION:** Refer to annex 2

* 1. At lowest usable flight level.
  2. Above lowest usable flight level.
  3. At or above lowest usable flight level.
  4. None.

1. The cruising level of an aircraft shall be in the term of altitude: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. At lowest usable flight level.
2. Below the lowest usable flight level.
3. At or below transition altitude.
4. B and C are correct.
5. The vertical distance between the formation flights Answer **(B)** is correct.

shall not exceed……from the leader. **DISCUSSION:** Refer to annex 2

* 1. 100 m.
  2. 100 ft.
  3. 30 ft.
  4. 50 ft.

1. The aircraft that has the right of way shall maintain: Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Listening on watch.
2. The landing lights on.
3. Heading and speed.
4. It's transponder on.
5. Which one is not correct? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Emergency aircraft shall have priority to other aircraft.
2. Aircraft landing shall have priority to departing aircraft.
3. The higher aircraft shall have priority to lower aircraft.
4. The urgency aircraft shall have priority to other aircraft.
5. Anti-collision and navigation light shall be displayed Answer **(D)** is correct.

on aircraft during….. **DISCUSSION:** Refer to annex 2

* 1. Sunset to sunrise.
  2. Sunrise to sunset.
  3. Any other time prescribed by appropriate ATS authority.
  4. A and C are correct.

1. What is the basis of expressing time in aeronautical operations? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. UTC.
2. Local.
3. UTC and local.
4. All.
5. The accuracy of time in data link communication is Answer **(A)** is correct.

expected to be within? **DISCUSSION:** Refer to annex 2

* 1. 1 second.
  2. 5 second.
  3. 30 second.
  4. 10 second.

1. The obtaining of time check shall be made? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 2

1. Prior to operating a controlled flight.
2. The other times during flight as may be necessary.
3. A and B are correct.
4. None.
5. Which one is the emergency radar code? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. 7700.
2. 7600.
3. 7500.
4. 2000.
5. An aircraft which is being subjected to unlawful interference, Answer **(B)** is correct.

shall: **DISCUSSION:** Refer to annex 2

* 1. Squawk 7600.
  2. Squawk 7500.
  3. Squawk 2000.
  4. Squawk ATC assigned code.

1. an aircraft experiencing radio communication failure, Answer **(B)** is correct.

shall squawk its transponder to ….. **DISCUSSION:** Refer to annex 2

* 1. 7700.
  2. 7600.
  3. 7500.
  4. 7400.

1. An intercepted aircraft shall set it's transponder to ….. Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. 7700.
2. 2000.
3. 7600.
4. 7500.
5. Intercepting aircraft shall set its transponder to: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2

1. 7600.
2. 2000.
3. 7500.
4. ATC assigned code.
5. Which one is distress signal? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. MAYDAY.
2. PAN,PAN.
3. XXX in data link.
4. All are correct.
5. What does the steady green light for aircraft Answer **(A)** is correct.

in flight mean? **DISCUSSION:** Refer to annex 2

1. Cleared to land.
2. Return for landing.
3. Give way to other aircraft.
4. None.
5. What does the red flash light for aircraft Answer **(C)** is correct.

on the ground mean? **DISCUSSION:** Refer to annex 2

* 1. Give way to other aircraft.
  2. Stop.
  3. Taxi clear of landing area in use.
  4. Return to starting point.

1. How much of deviation from true airspeed must be Answer **(A)** is correct.

reported to ATS units it is more than…. **DISCUSSION:** Refer to annex 2

* 1. ±5%.
  2. ±10%.
  3. ±2%.
  4. ±15%.

1. Inadvertent changes consisting deviation of ………time estimate Answer **(B)** is correct.

shall be reported to ATS units. **DISCUSSION:** Refer to annex 2

* 1. ±5 minutes.
  2. In excess of 3 minutes.
  3. ±2 minutes.
  4. Less than 3 minutes.

1. The time check for controlled flight must be done? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 2

1. Before to operating.
2. At the commence of taxiing.
3. Before taking-off.
4. Any time.
5. Which one is the urgency signal code? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 2

1. SOS.
2. PAN,PAN.
3. MAYDAY.
4. Parachute flare red light.
5. How many operations are defined in annex 6? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. 1.
2. 2.
3. 3.
4. 4.
5. The lowest height as an aerodrome operating minima for Answer **(B)** is correct.

the approach with vertical guidance is: **DISCUSSION:** Refer to annex 6-part 2

* 1. OCH.
  2. DH.
  3. MDH.
  4. VDH.

1. What is the reference of lowest height for circle-to-land? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Aerodrome elevation.
2. Landing threshold.
3. Touchdown elevation.
4. All.
5. What is the reference of lowest height for precision approach? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Threshold elevation.
2. Airport elevation.
3. Touchdown elevation.
4. None.
5. For which alternate, the departure aerodrome may Answer **(D)** is correct.

be considered for planning? **DISCUSSION:** Refer to annex 6-part 2

* 1. Destination.
  2. En-route.
  3. Take-off.
  4. Both A or B.

1. What alternates shall be determined, if departure aerodrome, Answer **(D)** is correct.

under all situation is unable for landing? **DISCUSSION:** Refer to annex 6-part 2

* 1. Take-off.
  2. En-route.
  3. Destination.
  4. A is wrong.

1. Which facility can provide lateral and vertical guidance? Answer **(D)** is correct.

**DISCUSSION** Refer to annex 6-part 2**:**

1. Ground based navigation AID.
2. Computer generated navigation data.
3. A and B.
4. A or B.
5. What is the difference between altitude indicated by the altimeter Answer **(B)** is correct.

display and pressure altitude corresponding to undisturbed **DISCUSSION** Refer to annex 6-part 2**:** ambient pressure?

* 1. target level of safety.
  2. Altimetry system error.
  3. Total vertical error.
  4. All.

1. Which category of precision approach may be use both Answer **(A)** is correct.

visibility or RVR as aerodrome cooperating minima? **DISCUSSION:** Refer to annex 6-part 2

* 1. CAT I.
  2. CAT II.
  3. CAT III.
  4. All.

1. If a DH is in the range of CAT IIIA but with RVR in range Answer **(B)** is correct.

CAT III B, the approach procedure would be conducted **DISCUSSION:** Refer to annex 6-part 2 in accordance with?

* 1. CAT IIIA.
  2. CAT III B.
  3. as indicated by ATC.
  4. None.

1. What is the minimum RVR for CAT II operation? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. 550 m.
2. 800 m.
3. 350 m.
4. 200 m.
5. What is the minimum height for CAT I operation? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. 210 ft.
2. 70 m.
3. 200 m.
4. 200 ft.
5. What is the minima height for CAT IIIC ? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. 100 ft.
2. 50 ft.
3. 10 ft.
4. Zero.
5. How many ELT are defined in ANNEX 6 part 2? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. 4.
2. 3.
3. 2.
4. 1.
5. According which ICAO annexes the flight crew member Answer **(C)** is correct.

shall be licensed? **DISCUSSION:** Refer to annex 6-part 2

* 1. Annex 6.
  2. Annex 2.
  3. Annex 1.
  4. Annex 7.

1. Which aircraft manual is associated with certificate Answer **(C)** is correct.

of airworthiness? **DISCUSSION:** Refer to annex 6-part 2

* 1. Aircraft operating manual.
  2. Operating manual.
  3. Flight manual.
  4. None.

1. How many type of recorder shall be installed in the aircraft Answer **(B)** is correct.

with maximum mass of 15,000 kg for the purpose of **DISCUSSION:** Refer to annex 6-part 2 accident investigation?

* 1. 1.
  2. 2.
  3. A and B.
  4. All.

1. The total time from first moves of an aeroplane until Answer **(A)** is correct.

the moment at the end of flight is called? **DISCUSSION:** Refer to annex 6-part 2

* 1. Flight time.
  2. Flight duty period.
  3. As specified by operator .
  4. As specified by the pilot.

1. The 95% of containment basis regarding navigation Answer **(C)** is correct.

accuracy (based on ±…..NM) is **DISCUSSION:** Refer to annex 6-part 2

* 1. RCP.
  2. RNP.
  3. RNP type.
  4. RCP type.

1. What is the lowest height on an instrument approach procedure Answer **(D)** is correct.

used in establishing compliance with appropriate **DISCUSSION:** Refer to annex 6-part 2 obstacle clearance criteria?

* 1. DH.
  2. MDH.
  3. TCH.
  4. OCH.

1. The label that represents of the value of parameters of Answer **(B)** is correct.

communication transaction time, continuity, **DISCUSSION:** Refer to annex 6-part 2 available and integrity is named as:

* 1. RCP.
  2. RCP type.
  3. RNP.
  4. RNP type.

1. Which ICAO annexes are contained the standard and Answer **(B)** is correct.

recommended practices for international **DISCUSSION:** Refer to annex 6-part 2 general aviation operation of aeroplane?

* 1. annex 6-1.
  2. Annex 6-2.
  3. Annex 6-3.
  4. All.

1. Who shall comply with the laws, regulation and procedure of a Answer **(C)** is correct.

state in which the aeroplane is operating? **DISCUSSION:** Refer to annex 6-part 2

* 1. ATC.
  2. Operator.
  3. Pilot in command.
  4. Crew members.

1. Who is responsible for the safety of the passengers and cargo, Answer **(A)** is correct.

when the aeroplane doors are closed? **DISCUSSION:** Refer to annex 6-part 2

* 1. Pilot in command.
  2. Cabin crew.
  3. Operator.
  4. Ground crew.

1. Who is responsible for the operation and safety of an aeroplane Answer **(D)** is correct.

during flight time? **DISCUSSION:** Refer to annex 6-part 2

* 1. Operator.
  2. ATC.
  3. Safety management.
  4. Pilot in command.

1. Which unit is the primary propulsion unit? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Push back.
2. Engine.
3. Aeroplane gears.
4. Tow car.
5. When any violation from local procedure shall be notified Answer **(C)** is correct.

to the local authority? **DISCUSSION:** Refer to annex 6-part 2

* 1. At the termination of flight.
  2. As soon as practicable.
  3. Without delay.
  4. None.

1. To which authority, a copy of violation report shall also Answer **(A)** is correct.

be submitted? **DISCUSSION:** Refer to annex 6-part 2

* 1. State of registry.
  2. State of authority.
  3. Contracting state.
  4. State of territory.

1. When the violation report shall be submitted to the appropriate Answer **(C)** is correct.

authority of such state by the pilot in command? **DISCUSSION:** Refer to annex 6-part 2

* 1. At the termination of flight.
  2. As soon as possible.
  3. Within 10 days.
  4. Without undue delay.

1. What action should be taken by a pilot when an accident Answer **(D)** is correct.

occur in an aeroplane with a result of death **DISCUSSION:** Refer to annex 6-part 2 of two persons?

* 1. Notify appropriate authority.
  2. Notify state of registry.
  3. Notify ATS authority.
  4. Notify nearest appropriate authority.

1. Where should the essential search and rescue information Answer **(C)** is correct.

be available? **DISCUSSION:** Refer to annex 6-part 2

* 1. Flight manual.
  2. Annex 13.
  3. On board the aeroplane.
  4. All.

1. Which ICAO annex talks about provisions of carrying of Answer **(B)** is correct.

dangerous goods? **DISCUSSION:** Refer to annex 6-part 2

* 1. 16.
  2. 18.
  3. 6.
  4. 2.

1. The required information published by aeronautical information Answer **(D)** is correct.

service which may be used by aviation persons is **DISCUSSION:** Refer to annex 6-part 2

* 1. AIP.
  2. NOTAM.
  3. AIP supplement.
  4. All.

1. Who is responsible to be ensure that all person on board Answer **(B)** is correct.

are aware of the general manner of use of the emergency **DISCUSSION:** Refer to annex 6-part 2 equipment's?

* 1. Crew member.
  2. Pilot in command.
  3. Cabin crew.
  4. Operator.

1. The pilot in command shall not operate…………than Answer **(C)** is correct.

aeroplane operating minima established by ……..? **DISCUSSION:** Refer to annex 6-part 2

* 1. Lower/operator.
  2. Lower/state of registry.
  3. Lower/state.
  4. Lower/ ATS authority.

1. How many destination alternate shall be selected for IFR flight. Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. One.
2. Two.
3. At least two.
4. At least one.
5. How many destination alternate shall be selected for IFR Answer **(D)** is correct.

flight if aerodrome of intended landing is possible? **DISCUSSION:** Refer to annex 6-part 2

* 1. One.
  2. At least one.
  3. One or two.
  4. None.

1. What shall be the minimum visibility of a destination when Answer **(C)** is correct.

no destination alternate is required? **DISCUSSION:** Refer to annex 6-part 2

* 1. 5.5 km.
  2. 4 km more than minima.
  3. A or B.
  4. A and B.

1. How long before and after ETA, the minimum cloud base Answer **(A)** is correct.

of a destination shall be 1000 ft if destination alternate **DISCUSSION:** Refer to annex 6-part 2 is not required?

* 1. Two hours.
  2. One hours.
  3. 30 minutes.
  4. 90 minutes.

1. How shall be the weather minima at destination and destination Answer **(B)** is correct.

alternate for an IFR flight? **DISCUSSION:** Refer to annex 6-part 2

* 1. Equal to aerodrome minima.
  2. Equal or above minima.
  3. Above minima.
  4. All are correct.

1. When an instrument approach shall be continued beyond Answer **(C)** is correct.

outer marker fix? **DISCUSSION:** Refer to annex 6-part 2

* 1. RVR is at and above minima.
  2. RVR is same as minima.
  3. RVR is above minima.
  4. None.

1. Which RVR is controlling RVR? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Touchdown.
2. Stop-end.
3. Mid-point.
4. All.
5. When an aeroplane is authorized to operate in icing condition? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Certify to operate.
2. Equipped for operation.
3. A or B.
4. A and B.
5. What is minimum amount of fuel for an aeroplane with Answer **(B)** is correct.

no destination alternate? **DISCUSSION:** Refer to annex 6-part 2

* 1. Departure to destination + 30 minutes.
  2. Departure to destination + 45 minutes.
  3. Departure to destination + 30 minutes + 15%.
  4. Departure to destination + 45 minutes + 15%.

1. An aeroplane operating at a level at which the atmosphere Answer **(A)** is correct.

pressure is 650 hpa, the minimum amount of breathing **DISCUSSION:** Refer to annex 6-part 2 oxygen for passengers shall be?

* 1. 10%.
  2. 10 minutes.
  3. 15%.
  4. 15 minutes.

1. If an aeroplane operating at a level at which the pressure is Answer **(B)** is correct.

361 hpa and is not able within 4 minutes to reach at a level **DISCUSSION:** Refer to annex 6-part 2 with a pressure of 62o hpa, the minimum amount of

oxygen for passengers shall be

1. 10%.
2. 10 minutes.
3. 15%.
4. 15 minutes.
5. When an aeroplane shall has quick donning type of mask Answer **(C)** is correct.

for flight crew members duty station? **DISCUSSION:** Refer to annex 6-part 2

* 1. Pressure is 376 hpa.
  2. Pressure is 620 hpa.
  3. Pressure is less than 376 hpa.
  4. None.

1. If a flight crew member capacity is reduced due to Answer **(B)** is correct.

lack of oxygen, what is the responsibility **DISCUSSION:** Refer to annex 6-part 2 of pilot in command.

* 1. Continue to destination.
  2. Not continue beyond nearest suitable aerodrome.
  3. Continue to en-route alternate.
  4. Back to departure.

1. Who is responsible to be ensure of the fitness of Answer **(D)** is correct.

flight crew members? **DISCUSSION:** Refer to annex 6-part 2

* 1. Operator.
  2. Owner.
  3. ATC.
  4. Pilot in command.

1. When a flight crew may leave the duty station in connection Answer **(B)** is correct.

with the aeroplane operation? **DISCUSSION:** Refer to annex 6-part 2

* 1. During take-off.
  2. En-route.
  3. During landing.
  4. Go-around.

1. Who is responsible to design instrument approach procedure? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. State.
2. State of registry.
3. Operator.
4. Controller.
5. An IFR flight shall comply with an instrument approach Answer **(D)** is correct.

procedure approved by: **DISCUSSION:** Refer to annex 6-part 2

* 1. ATC.
  2. Operator.
  3. Pilot in command.
  4. State.

1. Who is responsible to publish instrument approach Answer **(B)** is correct.

procedures?. **DISCUSSION:** Refer to annex 6-part 2

* 1. State of registry.
  2. State.
  3. ICAO.
  4. IATA.

1. How an aeroplane may be refuelled, when passengers are Answer **(D)** is correct.

on board the aeroplane? **DISCUSSION:** Refer to annex 6-part 2

* 1. Attended by pilot in command.
  2. Attended by qualified person on the ground.
  3. A and B.
  4. A or B.

1. The operating limitation shall be prescribed by the certificating Answer **(B)** is correct.

authority of ……. **DISCUSSION:** Refer to annex 6-part 2

* 1. State.
  2. State of registry.
  3. State of design.
  4. State of manufacture.

1. where the placards or listing containing the limitation shall be Answer **(D)** is correct.

displayed in….. **DISCUSSION:** Refer to annex 6-part 2

* 1. Flight manual.
  2. Aeroplane C of A.
  3. Aeroplane.
  4. Flight plan.

1. Which ICAO annexes has the provisions of airworthiness Answer **(A)** is correct.

of aeroplane over 5700 kg? **DISCUSSION:** Refer to annex 6-part 2

* 1. 8.
  2. 6.
  3. 7.
  4. 9.

1. Who is responsible to approve, the instrument and their Answer **(C)** is correct.

installation in an aeroplane? **DISCUSSION:** Refer to annex 6-part 2

* 1. State.
  2. State of manufacture.
  3. State of registry.
  4. Operator.

1. Who is responsible to accept prescribed equipment and Answer **(A)** is correct.

their installation on an aeroplane? **DISCUSSION:** Refer to annex 6-part 2

* 1. State of registry.
  2. State of design.
  3. State of manufacture.
  4. None.

1. How many first aids kit shall be carried by an aeroplane Answer **(C)** is correct.

operating in accordance with annex 6 part 2? **DISCUSSION:** Refer to annex 6-part 2

* 1. Two.
  2. At least two.
  3. One.
  4. At least one.

1. How many portable fire extinguisher shall be located in Answer **(A)** is correct.

the pilot's compartment? **DISCUSSION:** Refer to annex 6-part 2

* 1. At least one.
  2. One.
  3. At least two.
  4. Two.

1. Which of the following shall be carried on all flight? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Flight manual.
2. Suitable chart for route.
3. Interception information.
4. All.
5. Which of the following means should be on an aeroplane Answer **(C)** is correct.

on all flights? **DISCUSSION:** Refer to annex 6-part 2

* 1. Ground-air signal code for SAR.
  2. Safety for crew member seats.
  3. Both A and B.
  4. None.

1. What is the colour of break-in points markings? Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Red.
2. Yellow.
3. Black.
4. A or B.
5. How many sensitive pressure altimeter shall be equipped Answer **(A)** is correct.

by an aeroplane operating as a VFR flight? **DISCUSSION:** Refer to annex 6-part 2

* 1. One.
  2. Two.
  3. At least one.
  4. At least two.

1. How many attitude indicator shall has a controlled VFR? Answer **(A)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. One.
2. Two.
3. At least one.
4. At least two.
5. Which of the following aircraft shall be equipped with Answer **(D)** is correct.

a device for making sound signal? **DISCUSSION:** Refer to annex 6-part 2

* 1. Land plane.
  2. Sea plane.
  3. Amphibian.
  4. Both B and C.

1. When a single engine aeroplane shall be equipped with Answer **(C)** is correct.

the sufficient numbers of life-saving rafts? **DISCUSSION:** Refer to annex 6-part 2

* 1. Operating 100 NM from destination.
  2. Operating 100 NM from departure point.
  3. Operating more than 100 NM from suitable aerodrome.
  4. None.

1. What is the minimum distance of a flight over water, Answer **(B)** is correct.

that requires to carry life jackets by a landplane? **DISCUSSION:** Refer to annex 6-part 2

* 1. 50 KM.
  2. 50 NM.
  3. 100 NM.
  4. 100 NM.

1. What is the minimum distance over water from the land Answer **(C)** is correct.

suitable for emergency landing by multi-engine aeroplane **DISCUSSION:** Refer to annex 6-part 2 that require to carry life-saving raft?

* 1. 100 NM.
  2. 150 NM.
  3. 200 NM.

1. How many ELT shall has an aeroplane when operating Answer **(A)** is correct.

extended range over water? **DISCUSSION:** Refer to annex 6-part 2

* 1. At least one.
  2. At least two.
  3. Two.
  4. One.

1. When an area designated by a state where SAR is difficult, Answer **(C)** is correct.

how many ELT shall be carried by the aeroplane? **DISCUSSION:** Refer to annex 6-part 2

* 1. One.
  2. Two.
  3. At least one.
  4. At least two.

1. Which of the following atmospheric pressure requires Answer **(B)** is correct.

a device for positive warning? **DISCUSSION:** Refer to annex 6-part 2

* 1. 376 hpa.
  2. 367 hpa.
  3. 637 hpa.
  4. 620 hpa.

1. How many landing lights an aeroplane requires Answer **(A)** is correct.

when operating at night? **DISCUSSION:** Refer to annex 6-part 2

* 1. One.
  2. Two.
  3. At least one.
  4. At least two.

1. Within which document, an aeroplane shall carry Answer **(C)** is correct.

noise certification? **DISCUSSION:** Refer to annex 6-part 2

* 1. Flight manual.
  2. Annex 16.
  3. Any document approved by the state of registry.
  4. All.

1. What is the maximum certificated take-off mass of Answer **(D)** is correct.

an aeroplane that requires GPWS? **DISCUSSION:** Refer to annex 6-part 2

* 1. 7500 KG.
  2. 5000 KG.
  3. 7000 KG.
  4. 5700 KG.

1. The authorization of how many passengers requires Answer **(D)** is correct.

equipment GPWS? **DISCUSSION:** Refer to annex 6-part 2

* 1. 9.
  2. 10.
  3. 11.
  4. B or C.

1. The GPWS warnings are regarding to? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Excessive descent rate.
2. Unsafe terrain clearance.
3. A and B.
4. A or B.
5. Which equipment is able to warn a pilot regarding to Answer **(B)** is correct.

excessive altitude loss after take-off or go-around? **DISCUSSION:** Refer to annex 6-part 2

* 1. Radar altimeter.
  2. GPWS.
  3. Radio altimeter.
  4. ADS.

1. Which F.D.R shall record the configuration of lift and Answer **(D)** is correct.

drag devices only? **DISCUSSION:** Refer to annex 6-part 2

* 1. Type IA.
  2. Type IIA.
  3. Type I.
  4. Type II.

1. How many system of recorder comprise the flight recorder? Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. One.
2. Two.
3. Three.
4. Four.
5. What is the minimum capability of F.D.R type II for Answer **(D)** is correct.

the recording of information? **DISCUSSION:** Refer to annex 6-part 2

* 1. 30 hours.
  2. 30 minutes.
  3. 25 hours.
  4. 25 minutes.

1. Which of the following aeroplane shall be equipped with both Answer **(D)** is correct.

F.D.R and C.V.R when operating in accordance **DISCUSSION:** Refer to annex 6-part 2 with annex 6 part 2?

* 1. Max. mass 2,700 kg.
  2. Max. mass 7,000 kg.
  3. Max. mass 12,700 kg.
  4. None.

1. When the flight recorder shall be switch-off. Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Take-off.
2. En-route.
3. Landing.
4. None.
5. When the inspection of F.D.R and C.V.R shall take place?. Answer **(B)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Every day.
2. Prior to the first flight of the day.
3. Each calendar month.
4. All.
5. which of the following turbine-engine aeroplane, shall Answer **(D)** is correct.

be equipped with ACAS II? **DISCUSSION:** Refer to annex 6-part 2

* 1. Max. mass 15,000 kg.
  2. Max. mass 5,700 kg.
  3. Max. mass 7,000 kg.
  4. Max. mass 18,000 kg.

1. When an aeroplane authorized to carry more than ………passengers Answer **()A** is correct.

shall be equipped with ACAS II. **DISCUSSION:** Refer to annex 6-part 2

* 1. 31.
  2. 30.
  3. 19.
  4. 9.

1. When the flight crew should communication through Answer **(B)** is correct.

boom or throat microphone? **DISCUSSION:** Refer to annex 6-part 2

* 1. Below MEA.
  2. Below transition level.
  3. Below FL.150.
  4. Below FL. 200.

1. Which of the following operation shall be able to establish Answer **(D)** is correct.

two-way communication? **DISCUSSION:** Refer to annex 6-part 2

* 1. IFR.
  2. Controlled VFR.
  3. Night operation.
  4. All.

1. What should be the minimum distance of visual land mark Answer **(B)** is correct.

for the operation under VFR? **DISCUSSION:** Refer to annex 6-part 2

* 1. 110 NM.
  2. 60 NM.
  3. 160 Km.
  4. 100 NM.

1. Who may authorize an operation to take place in MNPS airspace? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Operator.
2. State.
3. State of registry.
4. ATS authorized.
5. What is the minimum deviation from selected flight level, Answer **(A)** is correct.

the alert system shall be active in RVSM airspace? **DISCUSSION:** Refer to annex 6-part 2

* 1. 300 ft.
  2. 200 ft.
  3. 100 ft.
  4. None.

1. Who shall be ensure that each flight crew members has been Answer **(B)** is correct.

trained to use ACAS II and avoidance collision? **DISCUSSION:** Refer to annex 6-part 2

* 1. Operator.
  2. Pilot in command.
  3. State.
  4. All.

1. Which document specify the composition of flight crew? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 6-part 2

1. Operation manual.
2. Aircraft operating manual.
3. Flight manual.
4. All.
5. For what type of operation, the advisory service Answer **(D)** is correct.

may be provided? **DISCUSSION:** Refer to annex 2.

* 1. Controlled IFR.
  2. SVFR.
  3. CVFR.
  4. IFR.

1. What is the purpose of air traffic control service? Answer **(C)** is correct.

**DISCUSSION:** Refer to annex 11

1. Prevent collision between aircraft.
2. Expedite flow of traffic.
3. A and B.
4. A or B.
5. How we can notify the pilot the limitation, or irregularity Answer **(D)** is correct.

of navigation and aerodrome facility? **DISCUSSION:** Refer to annex 2.

* 1. NOTAM.
  2. Direct communication.
  3. General call and broadcast.
  4. All above.

1. Manoeuvring area is not to be used for the purpose of: Answer **(D)** is correct.

**DISCUSSION:** Refer to annex 2.

1. Take-off.
2. Landing.
3. Taxing.
4. Loading passenger.
5. The controlled area established at the confluence Answer **(A)** is correct.

of ATS route is? **DISCUSSION:** Refer to annex 11

* 1. TMA.
  2. CTR.
  3. ATZ.
  4. AWY.

INTENTIONALLY

LEFT

BLANK

**PILOT NOTES**

**PILOT NOTES**

**APPENDIX**