Exam Number:-11.

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1. The upper part of the wing in comparison to the lower

a) develops more lift
b) develops the same lift
c) develops less lift

2. What effect would a forward CG have on an aircraft on landing?

a) Increase stalling speed
b) No effect on landing
c) Reduce stalling speed

3. QNH refers to

a) Quite near horizon
b) setting the altimeter to zero
c) setting the mean sea level atmospheric pressure so an altimeter reads the aerodrome altitude above mean sea level

4. QNE refers to

a) Setting an altimeter to read aerodrome altitude above sea level
b) Quite new equipment
c) setting the mean sea level atmospheric pressure in accordance with ICAO standard atmosphere i.e. 1013 millibars

5. An aspect ratio of 8 would mean

a) span 64, mean chord 8
b) mean chord 64 , span 8
c) span squared 64 ,chord 8

6. If an aircraft in level flight loses engine power it will

a) pitch nose up
b) pitch nose down
c) not change pitch without drag increasing

7. QFE is
a) sea level pressure
b) airfield pressure
c) difference between sea level and airfield pressure

8. The lift /drag ratio at stall
a) increases
b) decreases
c) is unchanged

9. On a straight unswept wing, stall occurs at

a) the thick portion at the wing root

b) the thick portion at the wing tip

c) the thin portion at the wing tip

10. During a climb from a dive

a) the thrust required is greater than required for level flight

b) the thrust required is lower than for level flight

c) the thrust required is the same as for level flight

==========

```
ans[1] = "a";
ans[2] = "a";
ans[3] = "c";
ans[4] = "a";
ans[5] = "a";
ans[6] = "b";
ans[7] = "b";
ans[8] = "b";
ans[9] = "a";
ans[10] = "b";
```

```
explain[1]="Look at the lift distribution diagram of an aerofoil and see how approximately 2/3rds of the lift is derived from the top surface.";
explain[2]="A forward CG would require the tail of the aircraft to exert more download to keep the nose level. This will increase the wing loading and thus the aircraft would stall at a higher speed.";
explain[3]="'Q' is the mathematical symbol for pressure. 'NH' stands for Nautical Height. QNH refers to the setting of the mean sea level atmospheric pressure (i.e. 1013mb) so the altimeter indicates the altitude above mean sea level.";
explain[4]="'Q' is the mathematical symbol for pressure. 'NE' stands for Nautical Elevation. QNE refers to the setting of sea level atmospheric pressure so the altimeter indicates the actual altitude above sea level of the non-standard day.";
explain[5]="Aspect Ratio is the ratio of the span to the chord.";
explain[6]="Assuming that the thrust-drag couple is a pitch-up couple (as it would be on a low engined aircraft) then losing engine power will lose the pitch up moment so the aircraft will pitch nose down.";
explain[7]="'Q' is the mathematical symbol for pressure. 'FE' stands for Field Elevation. QFE refers to setting airfield pressure so the altimeter indicates zero on the runway.";
explain[8]="At stall the lift drops drastically and drag increases. Therefore the lift/drag ratio decreases.";
explain[9]="On a straight unswept wing, the stall always occurs at the root. This is the preferred stall characteristic.";
explain[10]="Due to the speed and momentum gained during the dive, the aircraft will initially climb with less required thrust.";
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Exam Number:-12.

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1. When power is off, the aircraft will pitch

a) nose down
b) nose up
c) trim level

2. Angle of attack on a down going wing in a roll
a) increases
b) decreases
c) unaffected

3. For any given speed, a decrease in aircraft weight, the induced drag will

a) increase
b) decrease
c) remain the same

4. The amount of lift generated by a wing is
a) greatest at the root
b) greatest at the tip
c) constant along the span

5. Induced Drag is

a) greatest towards the wing root and downwash is greatest at the tip
b) greatest towards the wing tip and downwash is greatest towards the root
c) greatest towards the tip and downwash decreases from tip to root

6. Induced Drag is

a) equal to profile drag at stalling angle
b) equal to profile drag at Vmd
c) never equal to profile drag

7. With an increase in aircraft weight

a) Vmd will be at the same speed
b) Vmd will be at a lower speed
c) Vmd will be at a higher speed

8. For a given IAS an increase in altitude will result in

a) no change in the value of induced drag
b) an increase in induced drag
c) an increase in profile drag

9. As the angle of attack of a wing is increased in level flight

a) the Cof G moves aft and the Cof P forward
b) the Cof P and transition point move forward
c) the Cof P moves forward and the stagnation point aft over the upper surface

10. Stall inducers may be fitted to a wing

a) at the tip to cause the root to stall first
b) at the root to cause the tip to stall first
c) at the root to cause the root to stall first

==========

```
ans[1] = "a";
ans[2] = "a";
ans[3] = "b";
ans[4] = "a";
ans[5] = "c";
ans[6] = "b";
ans[7] = "c";
ans[8] = "b";
ans[9] = "b";
ans[10] = "c";
```

```
explain[1]="Assuming that the thrust-drag couple is a pitch-up couple (as it would be on a low engined aircraft) then losing engine power will lose the pitch up moment so the aircraft will pitch nose down.";
explain[2]="The downgoing wing experiences an upflow of air. This increases angle of attack and lift and thus opposes the role. Ths is the basic mechanism of dynamic stability.";
explain[3]="Induced drag is 'lift dependant drag'. Less lift and there will be less induced drag. Decreasing the lift decreases the induced drag.";
explain[4]="See a diagram of the lift distribution of the wing (viewed from the front) and you will see it is parabolic. The wing tip vortices decrease the lift at the tips.";
explain[5]="Induced drag is associated with wintip vortices. The greater the vortices at the tip, the greater is the induced drag.";
explain[6]="Sketch the drag curves (drag against speed). Induced drag decreases exponentially with speed. Profile drag increases exponentially with speed. Vmd (minimum drag speed) is where they meet.";
explain[7]="Sketch the drag curves (drag against speed). Induced drag decreases exponentially with speed. Profile drag increases exponentially with speed. The induced drag is elevated with weight (since it is lift dependant) and so cuts the profile drag further to the right (higher Vmd)";
explain[8]="The lift required when an aircraft increases altitude is the same, so with a decrease in density the aircraft must fly with a greater angle of attack (CL). Induced drag is dependant upon CL therefore induced drag increases with altitude..";
explain[9]="As angle of attack increases in level flight, CofP moves forward and the Transition Point (the point at which the laminar flow breaks away and forms into turbulent flow) also moves forward.";
explain[10]="Stall inducers (or stall strips) are placed at the root of the wing to trip up the airflow just before full stall to ensure the wing stalls first at the root (and maintains the aileron authority even with a partially stalled wing).";
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Exam Number:-13.

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1. With increasing altitude pressure decreases and

a) temperature decreases at the same rate as pressure reduces
b) temperature decreases but at a lower rate than pressure reduces
c) temperature remains constant to 8000 ft

2. The Centre of Pressure is

a) the point on the chord line at which the resultant lift force may be said to act
b) the point of maximum pressure on the under surface of the wing
c) the centre of gravity of the wing

3. If the angle of attack is increased the Centre of Pressure will

a) move forward
b) move rearward
c) remain stationary

4. The optimum angle of attack of an aerofoil is the angle at which

a) the aerofoil produces maximum lift
b) the aerofoil produces zero lift
c) the highest lift/drag ratio is produced

5. A high aspect ratio wing has a

a) increased induced drag
b) decreased induced drag
c) decreased skin friction drag

6. Minimum total drag of an aircraft occurs

a) at the stalling speed
b) when profile drag equals induced drag
c) when induced drag is least

7. If the weight of an aircraft is increased, the induced drag at a given speed

a) will increase
b) will decrease
c) will remain the same

8. The transition point on a wing is the point where

a) the flow separates from the wing surface
b) the boundary layer flow changes from laminar to turbulent
c) the flow divides to pass above and below the wing

9. The boundary layer of a body in a moving airstream is

a) a thin layer of air over the surface where the air is stationary
b) a layer of separated flow where the air is turbulent
c) a layer of air over the surface where the airspeed is changing from free stream speed to zero speed

10. A laminar boundary layer will produce

a) more skin friction drag than a turbulent one
b) less skin friction drag than a turbulent one
c) the same skin friction drag as a turbulent one

==========

ans[1] = "b";
ans[2] = "a";
ans[3] = "a";
ans[4] = "c";
ans[5] = "b";
ans[6] = "a";
ans[7] = "a";
ans[8] = "b";
ans[9] = "a";
ans[10] = "b";

explain[1]="See a graph of pressure against altitude and temperature against altitude. Pressure decreases faster than temperature therefore pressure has a greater effect upon the performance of the aircraft.";
explain[2]="The centre of Pressure is the point on the chord line at which the resultant lift force is said to act.";
explain[3]="If the angle of attack is increased the centre of pressure will move forwards.";
explain[4]="The optimum angle of attack is the angle at which the highest lift/drag ratio is produced.";
explain[5]="Induced drag decreases with increasing aspect ratio.";
explain[6]="Sketch the drag curves (drag against speed). Induced drag decreases exponentially with speed. Profile drag increases exponentially with speed. Vmd (minimum drag speed) is where they meet.";
explain[7]="If weight is increased, for a given speed the aircraft must fly at a greater angle of attack (CL). Induced drag increases with increased CL.";
explain[8]="The transition point is a point on the surface of the wing where the boundary layer changes from laminar to turbulent.";
explain[9]="The boundary layer is a thin layer of stationary air in contact with the surface of the skin.";
explain[10]="Skin friction drag is greater in a turbulent boundary layer than in a laminar boundary layer.";

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Exam Number:-14.

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1. Longitudinal stability is given by

a) the fin
b) the wing dihedral
c) the horizontal tailplane

2. Lateral stability is given by

a) the ailerons
b) the wing dihedral
c) the horizontal tailplane

3. Stability about the lateral axis is given by

a) wing dihedral
b) the horizontal tailplane
c) the ailerons

4. Sweepback of the wings will

a) increase lateral stability
b) decrease lateral stability
c) not affect the lateral stability

5. Dutch Roll is

a) a combined rolling and yawing motion
b) a type of slow roll
c) primarily a pitching instability

6. A high wing position gives

a) more lateral stability than a low wing
b) less lateral stability than a low wing
c) the same lateral stability as a low wing

7. On an aircraft in an unpowered steady speed descent

a) the lift equals the weight
b) the weight equals the drag
c) the weight equals the resultant of the lift and drag

8. When an aircraft rolls to enter a turn and power is not increased

a) the lift equals the weight
b) the lift is greater than the weight
c) the lift is less than the weight

9. The boundary layer is

a) thickest at the leading edge
b) thickest at the trailing edge
c) constant thickness from leading to trailing edges

10. The amount of thrust produced by a jet engine or a propeller can be calculated using

a) Newton's 1st law
b) Newton's 2nd law
c) Newton's 3rd law

==========

```
ans[1] = "c";
ans[2] = "b";
ans[3] = "b";
ans[4] = "a";
ans[5] = "a";
ans[6] = "a";
ans[7] = "c";
ans[8] = "c";
ans[9] = "b";
ans[10] = "b";


explain[1]="The horizontal stabilizer (tailplane) provides longitudinal stability.";
explain[2]="The wing dihedral provides lateral stability.";
explain[3]="Stability about the lateral axis is longitudinal stability. The horizontal stabilizer (tailplane) provides longitudinal stability.";
explain[4]="Wing sweepback increases the 'effective' dihedral of the wing (10 degrees of sweepback has the same effect as 1 degree of dihedral) and therefore increases lateral stability.";
explain[5]="Dutch role is a combination of role and yaw.";
explain[6]="The pendulum effect produced by the fuselage of a high wing aircraft provides more lateral stability.";
explain[7]="In an unpowerd descent, the weight equals the resultant of the lift and the drag.";
explain[8]="When an aircraft roles into a turn and power is not increased, the lift is greater than the weight and the aircraft will begin to descend.";
explain[9]="The boundary layer is thickest at the trailing edge.";
explain[10]="Newton's second law is Force = Mass x Acceleration.";
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Exam Number:-15.

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1. An engine which produces an efflux of high speed will be

a) more efficient
b) less efficient
c) speed of efflux has no affect on the engine efficiency

2. When an aircraft with a Cof G forward of the Cof P rolls, the nose of the aircraft will

a) stay level
b) raise
c) drop

3. Directional stability may be increased with

a) pitch dampers
b) horn balance
c) yaw dampers

4. Lateral stability may be increased with

a) increased lateral dihedral
b) increased lateral anhedral
c) increased longitudinal dihedral

5. Longitudinal stability is increased if the

a) CP moves forward of the CG
b) Thrust acts on a line below the total drag
c) CG is forward of the CP

6. Wing loading is calculated by weight

a) divided by gross wing area
b) divided by lift
c) multiplied by gross wing area

7. Induced drag is

a) inversely proportional to the square of speed
b) proportional to speed
c) nothing to do with speed

8. In a bank, the weight is

a) increased
b) decreased

c) the same

9. L/D ratio is

a) higher at supersonic cruise speed
b) higher at sub sonic speed
c) the same

10. The power required at low altitude for a given IAS is
a) the same as at high altitude
b) higher
c) lower

==========

ans[1] = "b";
ans[2] = "c";
ans[3] = "c";
ans[4] = "a";
ans[5] = "c";
ans[6] = "a";
ans[7] = "a";
ans[8] = "c";
ans[9] = "b";
ans[10] = "a";

explain[1]="A pure turbojet accelerates a low mass of air at a high rate and is less efficient than a turbo fan or turbo prop.";
explain[2]="Since the weight-lift couple is a nose down moment, a reduction of the lift (when the aircraft roles some of the lift vector is used to turn the aircraft) will cause the nose to rise.";
explain[3]="Yaw dampers increase directional stability.";
explain[4]="Lateral dihedral increases lateral stability. (BTW: Longitudinal stability is the difference between mainplane and tailplane angles of incidence)";
explain[5]="If the CG is forward of the CP it will have a nose-down tendancy which makes the aircraft less likely to stall and therefore it will have more longitudinal stability.";
explain[6]="Wing loading is weight divided by wing area and measured in Newtons per square metre.";
explain[7]="Induced drag is inversely proportional to the square of the speed - i.e. it reduces with the square of the speed.";
explain[8]="The weight is not changed unless you throw something out of the aircraft.";
explain[9]="Because drag increases in thew supersonic range the lift/drag ratio will be higher at subsonic speed.";
explain[10]="Since drag is the same at all altitudes , the power required is the same at all altitudes.";

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Exam Number:-16.

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1. If the stall speed is 75 knots what is the same stall speed in mph

a) 75 x 0.87
b) 75 / 0.87
c) 75 / 0.87 x relative density

2. As the angle of attack increases the stagnation point

a) moves towards the upper surface
b) moves towards the lower surface
c) does not move

3. The term pitch-up is due to

a) compressibility effect
b) ground effect
c) longitudinal instability

4. In a steady climb at a steady IAS, the TAS is

a) more than IAS
b) less than IAS
c) the same

5. An untapered wing will

a) have no yaw effect in banking
b) have no change in induced drag in the bank
c) stall at the root first

6. With the ailerons away from the neutral, induced drag is

a) unchanged but profile drag is higher
b) higher on the lower wing plus profile drag increases
c) higher on the upper wing plus profile drag increases

7. The lift drag ratio is

a) higher at mach numbers above supersonic
b) higher at sub sonic mach numbers
c) the same

8. The force opposing thrust is

a) drag
b) lift

c) Weight

9. Directional stability is about the

a) normal axis
b) longitudinal axis
c) lateral axis

10. Lateral stability is about the
a) longitudinal axis
b) normal axis
c) vertical axis

==========

```
ans[1] = "b";
ans[2] = "b";
ans[3] = "a";
ans[4] = "a";
ans[5] = "c";
ans[6] = "c";
ans[7] = "b";
ans[8] = "a";
ans[9] = "a";
ans[10] = "a";


explain[1]="MPH = Knots/0.87   and   Knots = MPH x 1.15.";
explain[2]="The stagnation point is the stationary air at the leading edge of the wing.  As the angle of attack increases the stagnation point moves towards the lower surface.";
explain[3]="'Pitch-up' is a term given to the instability caused by the compressibility effect in the transonic range.";
explain[4]="IAS is a function of density.  If density reduces with altitude, the TAS must increase if the aircraft maintntains a steady IAS.";
explain[5]="The straight wing will always stall at the root first.  This is the desired stall characteristic.";
explain[6]="Induced drag is 'lift dependant drag'.  The upper wing has more lift and hence more induced drag.  It also has more profile drag due to the aileron's protrusion into the airflow.";
explain[7]="Since drag is higher in supersonic flight, the Lift/Drag ratio will be higher at sub-sonic speeds.";
explain[8]="The force opposing thrust is drag.";
explain[9]="Directional stability is stability about the normal axis.";
explain[10]="Lateral stability is stability about the longitudinal axis.";
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Exam Number:-17.

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1. All the lift can be said to act through the

a) centre of pressure
b) centre of gravity
c) normal axis

2. Longitudinal stability is provided by the

a) horizontal stabilizer
b) vertical stabilizer
c) mainplane

3. The concept of thrust is explained by

a) Newton's 1st law
b) Newton's 3rd law
c) Bernoulli's theorem

4. The camber of an aerofoil section is

a) the curvature of the median line of the aerofoil
b) the angle of incidence towards the tip of a wing
c) the angle which the aerofoil makes with the relative airflow

5. If the aircraft turns and side-slips

a) the sweepback of the wing will correct the sideslip
b) the dihedral of the wing will correct the sideslip
c) the keel surface will correct the sideslip

6. Movement of an aircraft about its lateral axis

a) is pitching
b) is rolling
c) is yawing

7. Induced drag

a) is caused by skin friction
b) results from disturbed airflow in the region of mainplane attachments
c) is associated with the lift generated by an aerofoil

8. The centre of pressure is

a) the point on the chord line through which the total resultant lift force on the aerofoil may be said to act
b) the point of maximum pressure on the undersurface of a mainplane

c) the point at which the four forces acting on an aircraft are said to act

9. At what altitude is tropopause

a) 63,000 ft.
b) 36,000 ft.
c) 57,000 ft.

10. What approximate percentage of oxygen is in the atmosphere
a) 12%
b) 21%
c) 78%
==========

```
ans[1] = "a";
ans[2] = "a";
ans[3] = "b";
ans[4] = "a";
ans[5] = "b";
ans[6] = "a";
ans[7] = "c";
ans[8] = "a";
ans[9] = "b";
ans[10] = "b";


explain[1]="All the lift is said to act through the centre of pressure.";
explain[2]="Longitudinal stability is provided by the horizontal stabiliser (tailplane).";
explain[3]="Newton's Third Law states 'Every action has an equal and opposite reaction'.";
explain[4]="Aerofoil camber is the curvature of the median line of the aerofoil.";
explain[5]="As the aircraft turns and sideslips the dihedral of the wing will correct the sideslip due to the increased lift on
the downgoing wing.";
explain[6]="Movement of an aircraft about its lateral axis is 'pitching'.";
explain[7]="Induced drag is often called 'lift dependant drag' because it increases with increasing lift.";
explain[8]="The C of P is the point at which the sum of all the forces on the aircraft can be said to act.";
explain[9]="The tropopause is 36,000 ft.  Above the tropopause is the troposphere.";
explain[10]="21% oxygen, 78% nitrogen, 1% other gases.";

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Exam Number:-18.

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1. Which has the greater density

a) air at low altitude
b) air at high altitude
c) it remains constant

2. As air flows over the upper cambered surface of an aerofoil, what happens to velocity and pressure?

a) Velocity decreases, pressure decreases
b) Velocity increases, pressure increases
c) Velocity increases, pressure decreases

3. What is the force that tends to pull an aircraft down towards the earth?

a) Drag
b) Thrust
c) Weight

4. Which of the following act in opposition to forward movement?

a) Lift
b) Gravity
c) Drag

5. The angle at which the chord line of the aerofoil is presented to the airflow is known as

a) angle of attack
b) angle of incidence
c) resultant

6. The imaginary straight line which passes through an aerofoil section from leading edge to trailing edge is called

a) centre of pressure
b) the direction of relative airflow
c) the chord line

7. What is the angle between the chord line of the wing, and the longitudinal axis of the aircraft, known as
a) angle of attack
b) angle of incidence
c) angle of dihedral

8. An aircraft disturbed from its normal flight path, and automatically returns to that normal flight path, without any action on the part of the pilot is known as
a) aircraft stability
b) aircraft instability
c) aircraft stall

9. Directional control is provided by

a) horizontal stabilizer
b) rudder
c) elevator

10. About which axis of the aircraft does a rolling motion take place?

a) Normal axis
b) Longitudinal axis
c) Lateral axis
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```
ans[1] = "a";
ans[2] = "c";
ans[3] = "c";
ans[4] = "c";
ans[5] = "a";
ans[6] = "c";
ans[7] = "b";
ans[8] = "a";
ans[9] = "b";
ans[10] = "b";


explain[1]="Air density reduces with altitude.";
explain[2]="As airflows over the upper cambered surface of an aerofoil, velcity increases and pressure decreases.  This is Bernoulli's effect.";
explain[3]="Weight tends to pull the aircraft down towards the earth.";
explain[4]="Drag is opposition to forward movement.";
explain[5]="Angle of Attack is the angle at which the chord line of the aerofoil is presented to the airflow.";
explain[6]="The Chord Line is the imaginary straight line which passes through the aerofoil from leading edge to trailing edge.";
explain[7]="Angle of incidence is the angle between the chord line of the wing and the longitudinal axis of the aircraft.";
explain[8]="Stability is the aircraft's ability for the aircraft to return to its normal flightpath after being disturbed.";
explain[9]="The rudder provides directional control.";
explain[10]="Rolling takes place about the longitudinal axis.";

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Exam Number:-19.

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1. Which motion happens about the lateral axis?

a) Pitching
b) Yawing
c) Rolling

2. Wing tip vortices create a type of drag known as

a) form drag
b) induced drag
c) profile drag

3. Which of the following describes the “Empennage”?

a) Nose section of an aircraft, including the cockpit
b) Tail section of the aircraft, including fin, rudder, tail plane and elevators
c) The wings, including the ailerons

4. At what altitude does stratosphere commence approximately?

a) Sea level
b) 63,000 ft
c) 36,000 ft

5. When an aircraft is in straight and level unaccelerated flight, which of the following is correct?

a) Lift and weight are equal, and thrust and drag are equal
b) Lift greater than weight, and thrust greater than drag
c) Lift greater than weight, and thrust is less than drag

6. As the angle of attack is increased (up to the stall point), which of the following is correct?

a) Pressure difference between top and bottom of the wing increases
b) Lift increases
c) Both a) and b) are correct

7. The fin gives stability about which axis?

a) Lateral axis
b) Normal axis
c) Longitudinal axis

8. What is the horizontal movement of the nose of the aircraft called?

a) Rolling movement
b) Pitching movement

c) Yawing movement

9. What type of drag, depends on the smoothness of the body, and surface area over which the air flows?

a) Parasite drag

b) Form drag

c) Skin friction drag

10. If the nose of the aircraft is rotated about its lateral axis, what is its directional movement?

a) Turning to the left or right

b) Rolling or banking to the left or right

c) Climbing or diving

==========

ans[1] = "a";
ans[2] = "b";
ans[3] = "b";
ans[4] = "b";
ans[5] = "a";
ans[6] = "c";
ans[7] = "b";
ans[8] = "c";
ans[9] = "c";
ans[10] = "c";

explain[1]="Pitching is movement about the lateral axis.";
explain[2]="Induced drag is associated with wingtip vortices.";
explain[3]="'Empannage' is the whole tail of the aircraft including fin, rudder, tailplane and elevator.";
explain[4]="The stratosphere is above 63,000 ft.";
explain[5]="In straight and level unaccelerated flight, lift equals weight and thrust equals drag.";
explain[6]="As the angle of attack is increased the pressure difference between the upper and lower surfaces of the wing is increased. This causes the lift to increase.";
explain[7]="The fin gives stability about the normal axis.";
explain[8]="Horizontal movement of the nose of the aircraft is 'yawing'.";
explain[9]="Skin friction drag depends upon the smoothness of the body and the surface area.";
explain[10]="For an aircraft to climb or dive it must be rotated about ts lateral axis.";

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