Questions

1. What happens to the drag of a jet aeroplane if, during the initial climb after take-off, a constant IAS and constant configuration is maintained? (Assume a constant mass.)

a. The drag decreases
b. The drag increases initially and decreases thereafter
c. The drag remains almost constant
d. The drag increases considerably

2. The speed for best rate of climb is called:

a. V_O
b. V_Y
c. V_X
d. V_2

3. An increase in atmospheric pressure has, among other things, the following consequences on take-off performance:

a. a reduced take-off distance and degraded initial climb performance
b. a reduced take-off distance and improved initial climb performance
c. an increased take-off distance and degraded initial climb performance
d. an increased take-off distance and improved initial climb performance

4. A higher outside air temperature:

a. does not have any noticeable effect on climb performance
b. reduces the angle of climb but increases the rate of climb
c. reduces the angle and the rate of climb
d. increases the angle of climb but decreases the rate of climb

5. In unaccelerated climb:

a. thrust equals drag plus the uphill component of the gross weight in the flight path direction
b. thrust equals drag plus the downhill component of the gross weight in the flight path direction
c. lift is greater than the gross weight
d. lift equals weight plus the vertical component of the drag

6. A jet aeroplane is climbing at a constant IAS with maximum climb thrust. How will the climb angle / the pitch angle change?

a. Remain constant / decrease
b. Remain constant / become larger
c. Reduce / decrease
d. Reduce / remain constant

7. Take-off performance data, for the ambient conditions, show the following limitations with flap 10° selected:

Runway or field limit mass: 5270 kg
Obstacle limit mass: 4630 kg

If the estimated take-off mass is 5000 kg, it would be prudent to consider a take-off with flaps at:

a. 20°, both limitations are increased
b. 5°, the obstacle limit mass is increased but the runway limit mass decreases
c. 5°, both limitations are increased
d. 20°, the obstacle limit mass is increased but the runway limit mass decreases

8. A four jet engine aeroplane whose mass is 150 000 kg is established on climb with engines operating. The lift over drag ratio is 14:1. Each engine has a thrust of 75 000 Newtons.
The gradient of climb is: (given: g = 10 m/s^2)

a. 12.86%
b. 27%
c. 7.86%
d. 92%

9. How does the best angle of climb and best rate of climb vary with increasing altitude?

a. Both decrease
b. Both increase
c. Best angle of climb increases while best rate of climb decreases
d. Best angle of climb decreases while best rate of climb increases

10. Following a take-off determined by the 50 ft (15 m) screen height, a light twin climbs on a 10% ground gradient. It will clear a 900 m high obstacle situated at 10 000 m from the 50 ft clearing point with an obstacle clearance of:

a. 85 m
b. It will not clear the obstacle
c. 115 m
d. 100 m

11. The rate of climb:

a. is approximately the climb gradient multiplied by the true airspeed divided by 100
b. is the downhill component of the true airspeed
c. is angle of climb multiplied by the true airspeed
d. is the horizontal component of the true airspeed

12. Assuming that the required lift exists, which forces determine an aeroplane's angle of climb?

a. Thrust and drag only
b. Weight and thrust only
c. Weight, drag and thrust
d. Weight and drag only

13. Which of the following provides maximum obstacle clearance during climb?

a. $1.2V_S$
b. The speed for maximum rate of climb
c. The speed at which the flaps may be selected one position further UP
d. The speed for maximum climb angle V_X

14. Which speed provides maximum obstacle clearance during climb?

a. The speed which gives maximum excess thrust
b. V_2 + 10 kt
c. The speed for maximum rate of climb
d. V_2

15. Which of the equations below expresses approximately the unaccelerated percentage climb gradient for small climb angles?

a. Climb Gradient = (Thrust - Drag)/Weight × 100
b. Climb Gradient = (Thrust + Drag)/Lift × 100
c. Climb Gradient = (Thrust - Mass)/Lift × 100
d. Climb Gradient = Lift/Weight × 100

16. The absolute ceiling:

a. is the altitude at which the best climb gradient attainable is 5%
b. is the altitude at which the aeroplane reaches a maximum rate of climb of 100 ft/min
c. is the altitude at which the rate of climb is theoretically zero
d. can be reached only with minimum steady flight speed

17. The climb gradient of an aircraft after take-off is 6% in standard atmosphere, no wind, at 0 ft pressure altitude.

Using the following corrections:

± 0.2% / 1000 ft field elevation
± 0.1% / °C from standard temperature
- 1% with wing anti-ice
- 0.5% with engine anti-ice

The climb gradient after take-off from an airport situated at 1000 ft, 17°C; QNH 1013.25 hPa, with wing and engine anti-ice operating for a functional check is:

a. 3.9%
b. 4.3%
c. 4.7%
d. 4.9%

18. As long as an aeroplane is in a positive climb:

a. V_X is always below V_Y
b. V_X is sometimes below and sometimes above V_Y depending on altitude
c. V_X is always above V_Y
d. V_Y is always above V_{MO}

19. A constant headwind component:

a. increases the angle of flight path during climb
b. increases the best rate of climb
c. decreases the angle of climb
d. increases the maximum endurance

20. A higher gross mass at the same altitude will cause:

a. V_Y and V_X to decrease
b. V_X to increase and V_Y to decrease
c. V_Y and V_X to remain constant since they are not affected by a higher gross mass
d. V_Y and V_X to increase

21. With a true airspeed of 194 kt and a vertical speed of 1000 ft/min, the climb gradient is approximately:

a. 3°
b. 3%
c. 5°
d. 8%

22. With take-off flaps set, V_X and V_Y will be:

a. lower than that for clean configuration
b. higher than that for clean configuration
c. the same as that for clean configuration
d. changed so that V_X increases and V_Y decreases compared to clean configuration

23. The maximum rate of climb that can be maintained at the absolute ceiling is:

a. 0 ft/min
b. 125 ft/min
c. 500 ft/min
d. 100 ft/min

24. A headwind will:

a. increase the rate of climb
b. shorten the time of climb
c. increase the climb flight path angle
d. increase the angle of climb

25. V_X is:

a. the speed for best rate of climb
b. the speed for best specific range
c. the speed for best angle of flight path
d. the speed for best angle of climb

26. The best rate of climb at a constant gross mass:

a. decreases with increasing altitude since the thrust available decreases due to the lower air density
b. increases with increasing altitude since the drag decreases due to the lower air density
c. increases with increasing altitude due to the higher true airspeed
d. is independent of altitude

27. With a jet aeroplane, the maximum climb angle can be flown at approximately:

a. $1.2V_S$
b. $1.1V_S$
c. the highest L/D ratio
d. the highest L/D^2 ratio

28. During a climb with all engines operating, the altitude where the rate of climb reduces to 100 ft/min is called:

a. thrust ceiling
b. maximum transfer ceiling
c. service ceiling
d. absolute ceiling

29. With all other factors remaining constant, how does increasing altitude affect V_X and V_Y as a TAS:

a. V_X will decrease and V_Y will increase
b. Both will increase
c. Both will remain the same
d. Both will decrease

30. Any acceleration in climb, with a constant power setting:

a. improves the climb gradient if the airspeed is below V_X
b. improves the rate of climb if the airspeed is below V_Y
c. decreases rate of climb and increases angle of climb
d. decreases the rate of climb and the angle of climb

31. For an aircraft maintaining 100 kt true airspeed and a climb gradient of 3.3% with no wind, what would be the approximate rate of climb?

a. 3.30 m/s
b. 33.0 m/s
c. 330 ft/min
d. 3300 ft/min

32. During a climb to the cruising level, any headwind component:

a. decreases the climb time
b. decreases the ground distance flown during that climb
c. increases the amount of fuel for the climb
d. increases the climb time

33. The pilot of a single-engine aircraft has established the climb performance. The carriage of an additional passenger will cause the climb performance to be:

a. degraded
b. improved
c. unchanged
d. unchanged, if a short field take-off is adopted

34. A headwind component increasing with altitude, as compared to zero wind condition: (assuming IAS is constant.)

a. improves angle and rate of climb
b. decreases angle and rate of climb
c. has no effect on rate of climb
d. does not have any effect on the angle of flight path during climb

35. Which of the following combinations adversely affects take-off and initial climb performance?

a. High temperature and low relative humidity
b. Low temperature and low relative humidity
c. High temperature and high relative humidity
d. Low temperature and high relative humidity

36. A decrease in atmospheric pressure has, among other things, the following consequences on take-off performance:

a. a reduced take-off distance and degraded initial climb performance
b. an increased take-off distance and degraded initial climb performance
c. a reduced take-off distance and improved initial climb performance
d. an increased take-off distance and improved initial climb performance

37. The angle of climb with flaps extended, compared to that with flaps retracted, will normally be:

a. increased at moderate flap setting, decreased at large flap setting
b. smaller
c. larger
d. not changed

38. What is the effect of tailwind on the time to climb to a given altitude?

a. The time to climb increases
b. The time to climb decreases
c. The effect on time to climb will depend on the aeroplane type
d. The time to climb does not change

39. Changing the take-off flap setting from flap 15° to flap 5° will normally result in:

a. a longer take-off distance and a better climb
b. a shorter take-off distance and an equal climb
c. a better climb and an equal take-off distance
d. a shorter take-off distance and a better climb

40. What is the influence of the mass on maximum rate of climb (ROC) speed if all other parameters remain constant?

a. The ROC is affected by the mass, but not the ROC speed
b. The ROC and the ROC speed are independent of the mass
c. The ROC speed increases with increasing mass
d. The ROC speed decreases with increasing mass

41. Following a take-off to the 50 ft (15 m) screen height, a light twin climbs on a gradient of 5%. It will clear a 160 m obstacle situated at 5000 m from the 50 ft point with an obstacle clearance margin of:

a. it will not clear the obstacle
b. 105 m
c. 90 m
d. 75 m

42. The climb "gradient" is defined as the ratio of:

a. true airspeed to rate of climb
b. rate of climb to true airspeed
c. the increase of altitude to horizontal air distance expressed as a percentage
d. the horizontal air distance over the increase of altitude expressed as a percentage

43. When flying an aircraft at:

i. V_X without flap.
ii. V_X with flap.
iii. V_Y without flap.
iv. V_Y with flap.

the aircraft should be achieving:

a.
i. the best rate of climb
ii. the best rate of climb, but using a slightly faster speed than in (i)
iii. the best angle of climb
iv. the best angle of climb, but using a slightly faster speed than in (iii)

b.
i. a good angle of climb
ii. the best angle of climb
iii. a good rate of climb
iv. the best rate of climb

c.
i. the best angle of climb
ii. a slightly reduced angle of climb compared to (i) if using a slightly reduced speed than in (i)
iii. the best rate of climb
iv. a slightly reduced rate of climb compared to (iii) if using a slightly reduced speed than in (iii)

d.
i. a good rate of climb
ii. the best rate of climb
iii. a good angle of climb
iv. the best angle of climb