2025

Aerodynamics

TEST PREP

1
The left turning tendency of an airplane caused by P-factor is the result of the

a. gyroscopic forces applied to the rotating propeller blades acting 90° in advance of the point the force was applied.
b. propeller blade descending on the right, producing more thrust than the ascending blade on the left.
c. clockwise rotation of the engine and the propeller turning the airplane counter-clockwise.

2
When are the four forces that act on an airplane in equilibrium?

a. During unaccelerated flight.
b. When the aircraft is accelerating.
c. When the aircraft is at rest on the ground.

3
The four forces acting on an airplane in flight are

a. lift, weight, thrust, and drag.
b. lift, weight, gravity, and thrust.
c. lift, gravity, power, and friction.

4
When an aircraft is flying at a high AOA, the downward moving blade of the propeller has a higher resultant velocity, creating more lift than the upward moving blade causing:

a. The airplane's nose to pull to the left.
b. The airplane to start a climb.
c. The airplane's nose to pull to the right.

5
What is density altitude?

a. The altitude read directly from the altimeter.
b. The height above the standard datum plane.
c. The pressure altitude corrected for nonstandard temperature.

6
What are the three axes of rotation for an airplane?

a. Vertical, longitudinal, and aileron.
b. Lateral, rudder, and aileron.
c. Lateral, vertical, and longitudinal.

7
When flying at a very high AOA with a low airspeed and aft CG, T-tail aircraft are more susceptible to _____ ?

a. adverse yaw
b. dutch roll
c. a deep stall

8
What is parasite drag?

a. The drag caused by the fuselage and other protrusions disrupting the flow of air.
b. The drag caused by the lifting upward force of the elevator.
c. The rearward retarding force caused by the wings creating lift.

9
Which factor would tend to increase the density altitude at a given airport?

a. A decrease in relative humidity.
b. An increase in barometric pressure.
c. An increase in ambient temperature.

10
What effect does high density altitude have on aircraft performance?

a. It increases takeoff performance.
b. It increases engine performance.
c. It reduces climb performance.

11
What is true altitude?

a. The vertical distance of the aircraft above the surface.
b. The vertical distance of the aircraft above sea level.
c. The height above the standard datum plane.

12
Which statement is most correct regarding form drag?

a. It decreases as the speed of the airplane increases.
b. It increases when the weight of the airplane increases.
c. Form drag increases as airspeed increases.

13
Induced drag increases when airspeed is:

a. Increased by a factor of two.
b. Increased
c. Decreased.

14
What determines the longitudinal stability of an airplane?

a. The relationship of thrust and lift to weight and drag.
b. The effectiveness of the horizontal stabilizer, rudder, and rudder trim tab.
c. The location of the CG with respect to the center of lift.

15
Lateral or roll stability is normally achieved by:

a. The upward pitch of the wings, called dihedral.
b. The design of the ailerons.
c. The design of the horizontal stabilizer/stabilator.

16
What is pressure altitude?

a. The indicated altitude corrected for nonstandard temperature and pressure.
b. The altitude indicated when the barometric pressure scale is set to 29.92.
c. The indicated altitude corrected for position and installation error.

17
How will frost on the wings of an airplane affect takeoff performance?

a. Frost will cause the airplane to become airborne with a higher angle of attack, decreasing the stall speed.
b. Frost will change the camber of the wing, increasing its lifting capability.
c. Frost will disrupt the smooth flow of air over the wing, adversely affecting its lifting capability.

18
Which would provide the greatest gain in altitude in the shortest distance during climb after takeoff?

a. VX.
b. VA.
c. VY.

19
Why is frost considered hazardous to flight?

a. Frost spoils the smooth flow of air over the wings, thereby decreasing lifting capability.
b. Frost changes the basic aerodynamic shape of the airfoils, thereby decreasing lift.
c. Frost slows the airflow over the airfoils, thereby increasing control effectiveness.

20
When does P-factor cause the airplane to yaw to the left?

a. When at high airspeeds.
b. When at high angles of attack.
c. When at low angles of attack.

21
In steady unaccelerated flight:

a. Lift equals weight.
b. Lift equals drag.
c. Lift equals thrust.

22
Where may an aircraft's operating limitations be found?

a. On the Airworthiness Certificate.
b. In the aircraft airframe and engine logbooks.
c. In the current, FAA-approved flight manual, approved manual material, markings, and placards, or any combination thereof.

23
In what flight condition is torque effect the greatest in a single-engine airplane?

a. Low airspeed, high power, high angle of attack.
b. High airspeed, high power, high angle of attack.
c. Low airspeed, low power, low angle of attack.

24
Which statement relates to Bernoulli's principle?

a. For every action there is an equal and opposite reaction.
b. An additional upward force is generated as the lower surface of the wing deflects air downward.
c. Air traveling faster over the curved upper surface of an airfoil causes lower pressure on the top surface.

25
Induced drag increases with:

a. An increase in the angle of attack.
b. A decrease in the angle of attack.
c. The speed of the airplane.

26
Drag is produced by:

a. Moving the airplane through the air.
b. Starting the engine on the parking area.
c. Turns and glides only.

27
What causes an airplane (except a T-tail) to pitch nosedown when power is reduced and controls are not adjusted?

a. When thrust is reduced to less than weight, lift is also reduced and the wings can no longer support the weight.
b. The CG shifts forward when thrust and drag are reduced.
c. The downwash on the elevators from the propeller slipstream is reduced and elevator effectiveness is reduced.

28
Which items are included in the empty weight of an aircraft?

a. Unusable fuel and undrainable oil.
b. Full fuel tanks and engine oil to capacity.
c. Only the airframe, powerplant, and optional equipment.

29
What is the purpose of the rudder on an airplane?

a. To control yaw.
b. To control roll.
c. To control overbanking tendency.

30
Training airplanes are designed so that which part of the wing stalls first?

a. Middle of the wing
b. Wing tip
c. Wing root

31
An airplane said to be inherently stable will

a. require less effort to control.
b. be difficult to stall.
c. not spin.

32
Parasite drag increases when airspeed is:

a. Decreased.
b. Increased.
c. Parasite drag always remains constant.

33
What is meant by angle of attack?

a. How quickly the airplane is climbing.
b. The angle between the chord line and the relative wind.
c. Any increase in pitch attitude of the airplane.

34
What is induced drag?

a. The rearward retarding force caused by the wings creating lift.
b. The drag caused by the fuselage and other protrusions disrupting the flow of air.
c. The drag caused by the propeller blades when in motion.

35
Which gyroscopic instrument is the foundation for all instrument flight?

a. Attitude indicator.
b. Heading Indicator.
c. Turn Coordinator.

36
What effect does high density altitude, as compared to low density altitude, have on propeller efficiency and why?

a. Efficiency is increased due to less friction on the propeller blades.
b. Efficiency is reduced due to the increased force of the propeller in the thinner air.
c. Efficiency is reduced because the propeller exerts less force at high density altitudes than at low density altitudes.

37
What is the relationship of lift, drag, thrust, and weight when the airplane is in straight-and-level flight?

a. Lift and weight equal thrust and drag.
b. Lift equals weight and thrust equals drag.
c. Lift, drag, and weight equal thrust.

38
What force makes an airplane turn?

a. The vertical component of lift.
b. Centrifugal force.
c. The horizontal component of lift.

39
The amount of excess load that can be imposed on the wing of an airplane depends upon the

a. abruptness at which the load is applied.
b. speed of the airplane.
c. position of the CG.

40
Does the elevator of a T-tail airplane buffet as the main wing approaches a stall?

a. Yes
b. Yes, but only when flaps are extended
c. No

41
Which basic flight maneuver increases the load factor on an airplane as compared to straight-and-level flight?

a. Climbs.
b. Stalls.
c. Turns.

42
What effect, if any, does high humidity have on aircraft performance?

a. It decreases performance.
b. It has no effect on performance.
c. It increases performance.

43
The movement of the air affects the speed at which aircraft move:

a. In a turn.
b. Through the air.
c. Over the Earth's surface.

44
Select the four flight fundamentals involved in maneuvering an aircraft.

a. Aircraft power, pitch, bank, and trim.
b. Starting, taxiing, takeoff, and landing.
c. Straight-and-level flight, turns, climbs, and descents.

45
In straight-and-level flight, if thrust exceeds drag then:

a. There is no direct correlation between thrust and drag.
b. Speed decreases.
c. Speed increases.

46
A standard-rate turn is defined as:

a. A turn rate of 6° per second.
b. A turn rate of 3° per second.
c. A turn rate of 10° per second.

47
What is the purpose of a trim system on an airplane?

a. Increase the cruising speed of an airplane
b. Decreases the stall speed
c. Relieves the pilot of the need to maintain constant pressure on the flight controls

48
Which combination of atmospheric conditions will reduce aircraft takeoff and climb performance?

a. High temperature, low relative humidity, and low density altitude.
b. Low temperature, low relative humidity, and low density altitude.
c. High temperature, high relative humidity, and high density altitude.

49
How is the wing twisted on most training airplanes to increase controllability at low speeds?

a. The wing is twisted to a higher AOA at the wing tip.
b. The wing is twisted to a higher AOA at the wing root.
c. The wing is twisted to a lower AOA at the wing root.

50
Skin friction drag can be somewhat reduced by:

a. Adjusting the angle of the props.
b. Flush riveting, smooth paint, and waxing.
c. Keeping the intersection of different parts more streamlined.

51
How does frost affect the lifting surfaces of an airplane on takeoff?

a. Frost may cause the airplane to become airborne with a lower angle of attack at a lower indicated airspeed.
b. Frost will change the camber of the wing, increasing lift during takeoff.
c. Frost may prevent the airplane from becoming airborne at normal takeoff speed.

52
When rolling into a level turn, after which bank angle does load factor substantially increase?

a. 45 degrees
b. 15 degrees
c. 30 degrees

53
What is absolute altitude?

a. The height above the standard datum plane.
b. The altitude read directly from the altimeter.
c. The vertical distance of the aircraft above the surface.