

## Junior Phase Principles of Flight

1. The degree of air resistance which a moving body experiences can be decreased by:
  - a. streamlining.
  - b. increasing the body's attitude to the relative airflow (angle of attack).
  - c. increasing the velocity of the body.
  - d. increasing size.
  
2. A streamlined form offers less air resistance than a flat plate because:
  - a. it offers less frontal area.
  - b. it allows the air to flow smoothly past with minimum turbulence.
  - c. it increases the velocity of the airflow as it passes over the body.
  - d. it blocks air velocity thereby causing lift.
  
3. The Venturi principle illustrates that if an object is made to move through the air:
  - a. turbulence will always be present.
  - b. differences in air pressure surrounding the object will occur.
  - c. the weight of the object will decrease.
  - d. the temperature of the air surrounding the body will always increase.

4. Downwash is:
  - a. The deflection of air flowing over the mainplanes.
  - b. the turbulence produced by the propeller.
  - c. The tendency of air flowing over the lower surface of the airfoil to decrease in velocity.
  - d. the tendency for the nose of the aircraft to pitch down with an increase in power.
  
5. The angle of attack of an airfoil can be best defined as:
  - a. The angle formed between the upper surface (camber) of the airfoil and the chordline.
  - b. The angle formed between the lower surface of the airfoil and the direction of the airflow.
  - c. The angle formed between the chordline of the mainplane and the chordline of the elevators.
  - d. The angle formed between the chordline and the direction of the relative airflow.
  
6. The optimum angle of attack of an airfoil can best be defined as:
  - a. the angle at which lift is greater than drag.
  - b. The angle at which lift is maximum and drag is minimum.
  - c. the angle between the chordline and the relative airflow.
  - d. the angle at which turbulence is maximum.

7. The shape of an airfoil used on a highspeed/ high performance aircraft is:
- a. Thicker (lower fineness ratio) than that used on a transport type aircraft.
  - b. designed to produce more drag than that used on a transport type aircraft.
  - c. is thinner (higher fineness ratio) than either a high lift or general purpose type of airfoil.
  - d. designed to produce maximum lift and minimum drag.
8. A force couple is formed by two equal forces acting:
- a. in the same direction.
  - b. in opposite directions.
  - c. at right angles.
  - d. perpendicular to each other.
9. A moment may be defined as:
- a. two equal forces acting in opposite directions.
  - b. two unequal forces acting in parallel.
  - c. the product of force times the distance from a pivot point.
  - d. the amount of torque produced by a propeller.
10. An aircraft's centre of gravity is:
- a. an imaginary point through which the weight of the aircraft acts downward.
  - b. an imaginary point located at the centre of the chordline.
  - c. an imaginary point in line with the horizontal axis of the elevators.
  - d. an imaginary point in line with the lateral axis of the mainplanes.

11. The four forces acting on an aircraft in flight are:
- weight, torque, momentum, drag.
  - weight, thrust, gravity, drag.
  - gravity, torque, thrust, lift.
  - weight, thrust, drag, lift.
12. For an aircraft to remain in equilibrium, ie; fly straight and level at a constant speed:
- lift must equal thrust and drag must equal weight.
  - lift must equal weight and torque must equal drag.
  - lift must equal weight and thrust must equal drag.
  - lift must equal drag and weight must equal thrust.
13. Induced drag differs from parasite drag in that:
- it is unavoidable and always accompanies lift.
  - it is produced by drag created by the fuselage and not the mainplanes (wings).
  - it is produced by the friction of the airflow as it passes over the aircraft's skin.
  - it is something that is not produced by the aircraft, but rather the result of flying through another aircraft's vortex.
14. Aspect ratio can best be defined as the ratio of:
- fuselage length to wing length.
  - wing length to wing width.
  - wing length to elevator length.
  - fuselage width to wing width.

15. A high aspect ratio wing has a:
- a. long span and a narrow chord.
  - b. a short span and a wide chord.
  - c. a pronounced curvature of the upper surface.
  - d. a pronounced curvature of the lower surface.
16. The longitudinal axis of an aircraft runs:
- a. From wing tip to wing tip through the centre of gravity.
  - b. fore and aft, from the nose to the tail, passing through the centre of gravity.
  - c. parallel to the chord line.
  - d. parallel to the wing tips.
17. Rolling is a condition of flight whereby the aircraft:
- a. rotates around the longitudinal axis.
  - b. rotates around the lateral axis.
  - c. rotates around the vertical axis.
  - d. decelerates after the throttles are closed.
18. Pitching is a condition of flight whereby the aircraft:
- a. rotates around the longitudinal axis.
  - b. rotates around the vertical axis.
  - c. rotates around the lateral axis.
  - d. oscillates from side to side.

19. Yawing is a condition of flight whereby the aircraft:
- a. rotates around the vertical axis.
  - b. rotates around the longitudinal axis.
  - c. rotates around the lateral axis.
  - d. drops the right or left wing.
20. If an aircraft has the ability to correct any rolling motion about the longitudinal axis without pilot assistance it is said to possess:
- a. lateral stability.
  - b. longitudinal stability.
  - c. directional stability.
  - d. negative stability.
21. Which of the following components is NOT part of an aircraft's primary control surfaces:
- a. rudder
  - b. elevators
  - c. flaps
  - d. ailerons
22. The ailerons control:
- a. rolling movement
  - b. pitching movement
  - c. yawing movement
  - d. stability

23. The elevators control:
- a. movement about the lateral axis.
  - b. movement about the longitudinal axis.
  - c. yawing motion.
  - d. angle of attack.
24. The rudder controls:
- a. pitching motion.
  - b. rolling motion.
  - c. yawing motion.
  - d. downwash.
25. Approaching the stall:
- a. the airspeed begins to decrease rapidly.
  - b. the flight controls become progressively stiffer.
  - c. the control column begins to judder (shake).
  - d. the angle of attack decreases.