



Headquarters Air Cadets Examination

Leading Cadet
33/2 Principles of Flight
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1. Use black or dark blue pen, NOT pencil.
2. Mark one answer per question with a cross.
3. If you wish to change an answer, cancel the original mark and mark another single answer.

☒ A selected answer.
☒ A cancelled answer.

Mark:

Name and Initials _____

Date of Exam _____

Date of Birth _____

Squadron/Unit _____

Wing _____

1 Newton's 3rd law states that:

- a ☐ Every force causes an object to move.
- b ☐ Every action has an equal and opposite reaction.
- c ☐ Weight equals lift during flight.
- d ☐ Every object has weight.

2 The effect of gravity on an aircraft is called?

- a ☐ Thrust
- b ☐ Drag
- c ☐ Lift
- d ☐ Weight

3 As air passes over the top surface of a wing in normal flight, its speed will:

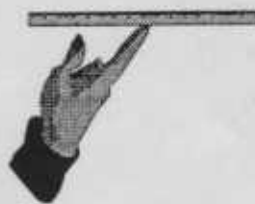
- a ☐ Reduce slightly
- b ☐ Remain constant
- c ☐ Reduce considerably
- d ☐ Increase

4 In what direction does lift operate relative to airflow?

- a ☐ Straight up
- b ☐ Straight down
- c ☐ Parallel to it
- d ☐ At 90degrees to it

5 In the diagram all the small forces of gravity acting on the ruler balance about a point called?

- a ☐ Static centre
- b ☐ The dynamic centre
- c ☐ The centre of gravity
- d ☐ The centre of pressure



6 What is the force called that drives an aircraft forwards?

- a ☐ Thrust
- b ☐ Lift
- c ☐ Drag
- d ☐ Weight

7 To slow an aircraft from straight and level flight which of the following statements is true?

- a ☐ Drag must exceed thrust
- b ☐ Thrust must equal drag
- c ☐ Drag must be half thrust
- d ☐ Thrust must exceed drag

8 Which axis of rotation on an aircraft generally runs from wing tip to wing tip?

- a ☐ Lateral
- b ☐ Diagonal
- c ☐ Normal
- d ☐ Longitudinal

9 The movement of an aircraft about its longitudinal axis is called?

- a ☐ Yawing
- b ☐ Pitching
- c ☐ Rolling
- d ☐ Damping

10 A well designed aircraft that is disturbed from level flight (say, by bumpy air) will tend to go back to level flight of its own accord, without the pilot having to make adjustments. This property is called?

- a ☐ Damping
- b ☐ Stability
- c ☐ Instability
- d ☐ Inertia

11 This aircraft is flying towards you. What angle is the arrow pointing to?

- a ☐ Anhedral angle
- b ☐ Dihedral angle
- c ☐ Cohedral angle
- d ☐ Lift angle



- 2 This aircraft is flying towards you. What angle is the arrow pointing to?

- a ☐ Lift angle
b ☐ Dihedral angle
c ☐ Anhedral angle
d ☐ Cohedral angle



- 13 On this diagram, what does the arrow point to?

- a ☐ Elevator trimming tab
b ☐ Fin
c ☐ Rudder trimming tab
d ☐ Elevator



- 14 What is the purpose of the trimming tabs on flying controls?

- a ☐ To cancel out the unwanted forces on the pilots controls
b ☐ To improve the manoeuvrability of the aircraft
c ☐ To increase the approach angle during landing
d ☐ To reduce the take off run of an overloaded aircraft

- 15 Name the three forces acting on a glider in a steady flight?

- a ☐ Drag, weight and thrust
b ☐ Drag, thrust and lift
c ☐ Drag, weight and lift
d ☐ Thrust, weight and lift

- 16 What is the purpose of a helicopter's tail rotor?

- a ☐ Control the aircraft in the rolling plane
b ☐ Provide thrust
c ☐ Reduce drag
d ☐ Counter torque reaction

- 17 What shape is the cross section of a helicopter blade?

- a ☐ Aerofoil
b ☐ Square
c ☐ Triangular
d ☐ Round

- 18 What is the main function of a helicopter's cyclic control?

- a ☐ Acts as a rudder
b ☐ Controls the helicopter's vertical movement
c ☐ Controls horizontal flight in any direction
d ☐ Controls the engine speed

- 19 On this diagram what does the arrow point to?

- a ☐ Fuselage
b ☐ Aileron
c ☐ Rudder
d ☐ Fin



- 20 Which of the following is a simple flap?

- a ☐ X
b ☐ Y
c ☐ W
d ☐ Z



- 21 On a general purpose wing, at which angle of attack is the greatest lift produced?

- a ☐ About 15degrees
b ☐ About 10degrees
c ☐ About 5degrees
d ☐ About 20degrees

- 22 If an aircraft in steady straight and level flight suffered a sudden reduction in weight (for example, by jettisoning fuel), and the pilot made no changes to the controls, the aircraft would begin to:

- a ☐ Speed up
b ☐ Descend
c ☐ Slow down
d ☐ Climb

- 23 When the angle of attack of a general purpose wing increases beyond about 15degrees the airflow becomes turbulent and lift decreases rapidly. This sudden loss of lift is known as:

- a ☐ The vortex
b ☐ Boundary layer separation
c ☐ The spin
d ☐ The stall

- 24 On this diagram, what does the arrow point to?

- a ☐ Fin
b ☐ Elevator
c ☐ Rudder
d ☐ Fuselage



- 25 A helicopter pilot uses the collective pitch control mainly to control:

- a ☐ Horizontal flight
b ☐ Vertical flight
c ☐ Movement of the nose in the yawing plane
d ☐ Movement of the nose in the rolling plane