



# Headquarters Air Cadets Examination

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Senior Cadet

Propulsion

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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 \_\_\_\_\_

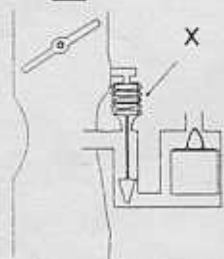
Wing \_\_\_\_\_

- 1 In a 4-stroke piston engine, what is the force which closes the exhaust and inlet valves?

a ☐ Suction  
b ☐ A pushrod  
c ☐ Gravity  
d ☐ A spring

- 2 In this diagram of a simple carburettor of an aircraft piston engine, the carburettor is fitted with a control which automatically adjusts the mixture for changes in altitude. The arrow X points to an essential item. This item is:

a ☐ A bi-metallic strip  
b ☐ A reserve fuel chamber  
c ☐ An aneroid capsule  
d ☐ A pitot tube



- 3 In a magneto, one purpose of the capacitor (condenser) is to:

a ☐ Reduce erosion at the sparking plug gaps  
b ☐ Make the secondary current flow evenly  
c ☐ Reduce pitting of the contact breaker points  
d ☐ Make the primary current flow evenly

- 4 Which of these is a turbajet engine?

a ☐ Pegasus  
b ☐ Spey  
c ☐ Adour  
d ☐ Viper

- 5 Which of these is a turboshaft engine?

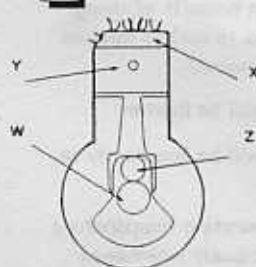
a ☐ The Lynx Helicopter's Gem  
b ☐ Boeing 747's RB211  
c ☐ Concorde's Olympus  
d ☐ Harrier's Pegasus

- 6 Which of the following statements applies to the ramjet engine?

a ☐ It is most efficient at subsonic speeds  
b ☐ It has only one turbine  
c ☐ It has only one compressor  
d ☐ It has no moving parts

- 7 Four items are labelled on this diagram of a piston engine. Which item (W,X,Y or Z) is the crankshaft main journal?

a ☐ W  
b ☐ Y  
c ☐ X  
d ☐ Z

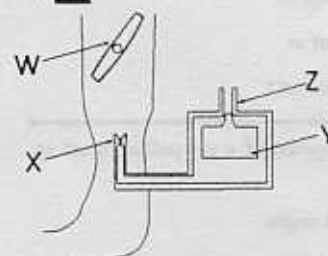


- 8 What characteristic of the piston engine permits the use of such efficiency-enhancing features as valve lead, valve lag and valve overlap?

a ☐ Its ability to be mounted at any angle  
b ☐ Ineffective crank angle at TDC and BDC  
c ☐ The ease with which extra cylinders may be added at the design stage  
d ☐ Its wide tolerance of operating temperatures

- 9 In this diagram of a simple carburettor, which arrow (W,X,Y or Z) points to the main jet?

a ☐ Y  
b ☐ X  
c ☐ W  
d ☐ Z



- 10 When a piston engine is accelerating, the purpose of an accelerator pump when fitted to the carburettor is:

a ☐ Prevent the mixture from becoming weak  
b ☐ Decrease the air pressure in the float chamber  
c ☐ Increase the air pressure in the float chamber  
d ☐ Prevent the mixture from becoming rich

- 11 What is the purpose of the fins which are arranged about the cylinder and cylinder head of an air-cooled engine?

a ☐ To reduce the weight of the engine  
b ☐ To allow heat to dissipate rapidly  
c ☐ To support the engine cowlings  
d ☐ To direct air through the engine compartment

- 12 When the airflow over the propeller blades of a failed engine keeps the propeller turning, this is known as:

a ☐ Contra rotating  
b ☐ Windmilling  
c ☐ Propeller braking  
d ☐ Reverse thrust

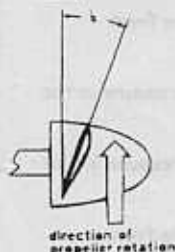
- 13 Which application or type of operation best suits the turbojet engine?
- a ☐ In helicopters
  - b ☐ In low speed aircraft operating at low altitudes
  - c ☐ In high speed aircraft where low frontal area is an advantage
  - d ☐ In static engines in industrial use

- 14 In a bypass engine, part of the air is fully compressed and is passed into the combustion chamber, whilst the remainder is compressed to a lesser extent and is ducted around the hot section. Which of the following types of engine normally employs this?

- a ☐ Turbojet
- b ☐ Turboprop
- c ☐ Turbofan
- d ☐ Turboshift

- 15 In this diagram of a propeller, what is angle 'b'?

- a ☐ Blade angle
- b ☐ Pitch angle
- c ☐ Prop angle
- d ☐ Fine angle



- 16 In a piston engine, ineffective crank angle occurs in the region of:

- a ☐ 90° after BDC and TDC
- b ☐ Both BDC and TDC
- c ☐ TDC only
- d ☐ BDC only

- 17 What is the primary function of a supercharger on a piston engine?

- a ☐ To speed up the extraction of exhaust gases
- b ☐ To make use of unburnt fuel in the exhaust gases
- c ☐ To ensure the battery is charged throughout the full range of engine speeds
- d ☐ To increase the pressure in the induction manifold

- 18 Which of the following describes a magneto as used in an aircraft's piston engine?

- a ☐ A dynamo to produce the spark for the spark plugs
- b ☐ A mechanical pump for circulating
- c ☐ A secondary compass system
- d ☐ An instrument for metering the fuel flow

- 19 On a variable-pitch propeller, the largest obtainable pitch angle is known as:

- a ☐ Optimum pitch
- b ☐ Fine pitch
- c ☐ Take-off pitch
- d ☐ Coarse pitch

- 20 Which of these is a turbojet engine?

- a ☐ Olympus 593
- b ☐ Spey
- c ☐ Pegasus
- d ☐ Tyne

- 21 In a piston aero engine, the purpose of the distributor is to distribute:

- a ☐ High voltage electrical impulses to the cylinders
- b ☐ Cooling air to all external parts
- c ☐ Oil to all parts of the engine
- d ☐ The correct mixture of air and fuel to the cylinders

- 22 What is the main benefit of using liquid (as opposed to air) to cool an aircraft piston engine?

- a ☐ The engine will be lighter
- b ☐ The engine will be less costly to produce
- c ☐ A steady operating temperature will be more easily maintained
- d ☐ The engine will be simpler

- 23 The blade angle on a propeller is varied from a coarse angle at the root to a fine angle at the tip. This is called:

- a ☐ Variable pitch
- b ☐ Blade twist
- c ☐ Adjustable pitch
- d ☐ Blade translation

- 24 Who first patented, in 1930, the design of a reaction motor suitable for aircraft propulsion (that is, a jet engine)?

- a ☐ Henry Ford
- b ☐ Charles Rolls
- c ☐ Henry Royce
- d ☐ Frank Whittle

- 25 Which of the following statements applies to the process of afterburning, as used in some jet engines? It provides extra thrust without:

- a ☐ Increasing the exhaust velocity
- b ☐ Removing any more oxygen from the exhaust gases
- c ☐ Increasing the engine's frontal area
- d ☐ The use of additional fuel