



# Headquarters Air Cadets Examination

Senior Cadet

Propulsion

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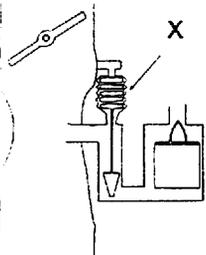
1. Use black or dark blue pen, NOT pencil.
2. Write only on the answer sheet. Add your personal details.

1 In the modified 4-stroke cycle, which of these is valve lead?

- a Exhaust valve closing after the piston has passed TDC
- b Inlet and exhaust valves are open together
- c Inlet valve closing after the piston has passed BDC
- d Exhaust valve opening before the piston reaches BDC

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



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

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

4 A jet engine's compressor is driven by:

- a The gearbox
- b Residual pressure in the tailpipe
- c The turbine
- d Air pressure at the air intake

5 Which of these is a turbojet engine?

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

6 Which of these is a turboshaft engine?

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

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

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

8 The purpose of gudgeon pins in a piston engine is to:

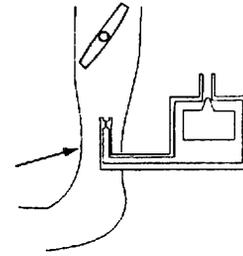
- a Attach the pistons to their connecting rods
- b Hold the sparking plugs in place
- c Retain the valves in their guides
- d Fasten together the two halves of the crankcase

9 What is the purpose of the accelerator pump fitted to the carburettor of a piston engine? When the engine is accelerating it:

- a Prevents the mixture from becoming too weak
- b Prevents the mixture from becoming too rich
- c Increases the air pressure in the choke tube
- d Decreases the air pressure in the choke tube

10 In this diagram of a simple carburettor, what does the arrow point to?

- a Throttle valve
- b Choke tube
- c Main jet
- d Float



11 Which application or type of operation best suits the turbojet engine?

- a In static engines in industrial use
- b In helicopters
- c In high speed aircraft where low frontal area is an advantage
- d In low speed aircraft operating at low altitudes

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

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

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

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

- 14 Propeller braking involves:
- a The selection of coarse pitch
  - b Feathering the propeller
  - c Turning the blades beyond fine pitch
  - d The selection of fine pitch

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

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

16 In the turbofan engine, some of the air is not compressed fully. This air is made to bypass the combustion chamber and the overall jet velocity is thereby reduced. An important consequence is that:

- a The residual thrust is higher
- b The propulsive efficiency at lower aircraft speeds is improved
- c All the residual thrust is removed
- d The propulsive efficiency at higher aircraft speed is improved

17 Which of these is a turbofan engine?

- a Spey
- b Gem
- c Dart
- d Tyne

18 After-burning in a jet engine involves burning additional fuel in the:

- a Combustion chamber
- b Turbine
- c Jet pipe
- d Compressor

19 What is the main function of a supercharger when fitted to a piston engine?

- a It ensures that the batteries are always fully charged
- b It increases the amount of lubricating oil delivered to the bearings
- c It delivers a stronger spark to the sparking plugs
- d It increases the amount of air and fuel delivered to the cylinders

20 Which of these statements refers to turbo-chargers? They are:

- a Fitted to turbojet engines only
- b Driven by gears from the engine
- c Driven by exhaust gases
- d Fitted to turbo-fans only

21 In a piston engine, far more oil is circulated than is needed to reduce friction alone. Why?

- a To ensure the scavenge pump is always fed
- b To cool the engine internally
- c To produce a full splash effect
- d To lubricate the pressure pump

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

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

23 Blade twist in a propeller helps to:

- a Reduce noise levels
- b Make the blade stronger and lighter
- c Make feathering possible
- d Even out the thrust along the length of the blade

24 Which of these statements applies to a turboprop engine?

- a It is very inefficient at low aircraft speeds
- b It has one less turbine than the turbojet
- c It has very high residual thrust
- d It has an extra turbine compared with the turbo jet

25 Which of these statements about the ramjet engine is true?

- a It is very susceptible to compressor stall
- b It requires an extra compressor to achieve the high ram pressure needed
- c It is used only in sub-sonic aircraft
- d It is like a turbojet from which the compressor and turbine have been removed