



Headquarters Air Cadets Examination

Senior Cadet
33/3 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 the modified 4-stroke cycle, which of these is valve lead?

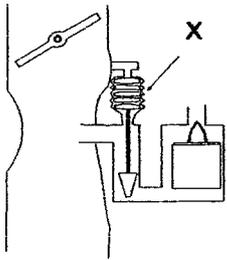
- a Inlet valve closing after the piston has passed BDC
- b Inlet and exhaust valves are open together
- c Exhaust valve closing after the piston has passed TDC
- d Exhaust valve opening before the piston reaches BDC

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

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

3 The arrow X points to a device which is often incorporated into the carburettor of a piston aero engine. What is its function?

- a Supplies extra fuel when needed for acceleration
- b Prevents the fuel/air mixture from becoming richer as the aircraft climbs
- c Encourages good atomisation of the fuel
- d Prevents the fuel/air ratio from becoming richer as the throttle valve is opened



4 What is the purpose of the scavenge pump in the dry-sump lubrication system of a piston engine?

- a To transfer oil from the crankcase to the oil tank
- b To scavenge contaminants from the oil
- c To direct oil into the pressure chamber
- d To ensure that all engine components are lubricated

5 The function of the turbine in a turbojet engine is to:

- a Energise the gas stream
- b Vaporise the fuel as much as possible
- c Drive the gas stream into the atmosphere
- d Drive the compressor

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

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

7 What ratio (by weight) of fuel to air should the carburettor normally supply in a piston engine?

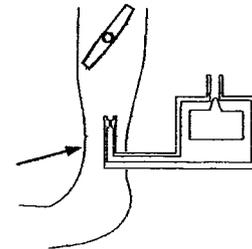
- a 01:15
- b 15:01
- c 02:01
- d 01:02

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

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

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

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



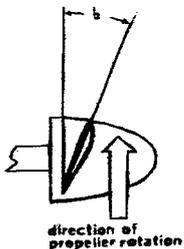
10 What is the purpose of the fins which are arranged about the cylinder and cylinder head of an air-cooled engine?

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

- 11 Which of these statements applies to a propeller that has been feathered?
- a Its leading edges are facing at 90 degrees to the direction of flight
 - b It is producing maximum power
 - c Its leading edges are facing forwards into the direction of flight
 - d It is operating at its maximum rotational speed

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

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



- 13 Direct fuel injection is often used in aero piston engines, in preference to float chamber carburettors. Which of these statements applies to the direct fuel injection system?

- a A throttle butterfly is unnecessary
- b It cannot operate inverted
- c The fuel does not have to be vaporised
- d There is no choke on the intake

- 14 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 An instrument for metering the fuel flow
- c A mechanical pump for circulating fuel
- d A secondary compass system

- 15 Propeller braking involves:

- a The selection of coarse pitch
- b The selection of fine pitch
- c Turning the blades beyond fine pitch
- d Feathering the propeller

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

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

- 17 Which of these is a turbojet engine?

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

- 18 Which of these is a turbofan engine?

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

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

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

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

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

- 21 In a simple 4-stroke piston engine, which of these air-to-fuel ratios (by weight) would be the normal mixture?

- a 12:01
- b 09:01
- c 06:01
- d 15:01

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

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

- 23 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

- 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 Henry Royce
- c Frank Whittle
- d Charles Rolls

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

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