



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 _____

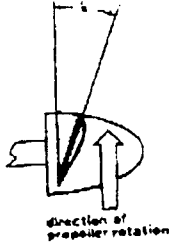
Squadron/Unit _____

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- 1 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
-
- 2 In a magneto, one purpose of the capacitor (condenser) is to:
- a Reduce pitting of the contact breaker points
- b Make the secondary current flow evenly
- c Reduce erosion at the sparking plug gaps
- d Make the primary current flow evenly
-
- 3 A jet engine's compressor is driven by:
- a The gearbox
- b Air pressure at the air intake
- c The turbine
- d Residual pressure in the tailpipe
-
- 4 Which of these is a turbojet engine?
- a Spey
- b Viper
- c Pegasus
- d Adour
-
- 5 Which of the following statements applies to the ramjet engine?
- a It has only one turbine
- b It has no moving parts
- c It has only one compressor
- d It is most efficient at subsonic speeds
-
- 6 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 ability to be mounted at any angle
- c Ineffective crank angle at TDC and BDC
- d Its wide tolerance of operating temperatures
-
- 7 The purpose of gudgeon pins in a piston engine is to:
- a Hold the sparking plugs in place
- b Fasten together the two halves of the crankcase
- c Attach the pistons to their connecting rods
- d Retain the valves in their guides
-
- 8 What ratio (by weight) of fuel to air should the carburettor normally supply in a piston engine?
- a 02:01
- b 01:15
- c 01:02
- d 15:01
-
- 9 When a piston engine is accelerating, the purpose of an accelerator pump when fitted to the carburettor is:
- a Decrease the air pressure in the float chamber
- b Prevent the mixture from becoming rich
- c Prevent the mixture from becoming weak
- d Increase the air pressure in the float chamber
-
- 10 Which of these statements, about an exhaust-driven turbocharger, is true?
- a It operates best at high engine speeds
- b It is more effective than an engine-driven supercharger at increasing the power output
- c It operates best at low engine speeds
- d It operates as soon as the throttle is opened
-
- 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 Which of these statements applies to a propeller that has been feathered?
- a It is operating at its maximum rotational speed
- b Its leading edges are facing forwards into the direction of flight
- c Its leading edges are facing at 90 degrees to the direction of flight
- d It is producing maximum power
-
- 13 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 type of engine normally employs this system:
- a Turbojet
- b Turboprop
- c Turboshaft
- d Turbofan

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

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



15 In this diagram of a piston engine's valve mechanism, the arrow X points to:

- a A cam
- b A scraper
- c A pushrod
- d A tappet



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

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

17 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

18 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 ensure the battery is charged throughout the full range of engine speeds
- c To speed up the extraction of exhaust gases
- d To increase the pressure in the induction manifold

19 A variable-pitch propeller is said to be feathered when:

- a It is in fully coarse pitch
- b It is in fully fine pitch
- c The leading edges are at 90 degrees to the direction of flight
- d The leading edges face forward in the direction of flight

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

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

21 Which of these is a turbofan engine?

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

22 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

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

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

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

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

25 Blade twist in a propeller helps to:

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