



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?
- Exhaust valve closing after the piston has passed TDC
 - Inlet and exhaust valves are open together
 - Inlet valve closing after the piston has passed BDC
 - 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?
- Gravity
 - Suction
 - A pushrod
 - A spring

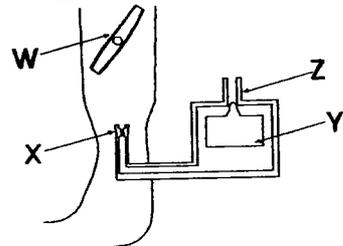
- 3 A jet engine's compressor is driven by:
- The gearbox
 - The turbine
 - Air pressure at the air intake
 - Residual pressure in the tailpipe

- 4 Which of these is a turbojet engine?
- Spey
 - Pegasus
 - Viper
 - Adour

- 5 Which of the following statements applies to the ramjet engine?
- It is most efficient at subsonic speeds
 - It has no moving parts
 - It has only one turbine
 - It has only one compressor

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

- Z
- Y
- X
- W



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

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

- 8 Which of these statements, about an exhaust-driven turbocharger, is true?

- It is more effective than an engine-driven supercharger at increasing the power output
- It operates best at low engine speeds
- It operates as soon as the throttle is opened
- It operates best at high engine speeds

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

- To direct air through the engine compartment
- To allow heat to dissipate rapidly
- To support the engine cowings
- To reduce the weight of the engine

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

- Contra rotating
- Propeller braking
- Windmilling
- Reverse thrust

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

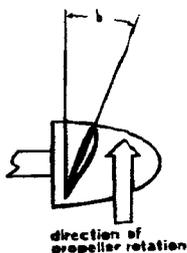
- In low speed aircraft operating at low altitudes
- In high speed aircraft where low frontal area is an advantage
- In static engines in industrial use
- In helicopters

- 12 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:

- Turbofan
- Turboshaft
- Turbojet
- Turboprop

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

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



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

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



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

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

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

17 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 increase the pressure in the induction manifold
- d To speed up the extraction of exhaust gases

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

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

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

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

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

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

22 In an aircraft propeller system the function of the constant speed unit (CSU) is to:

- a Retard the ignition timing
- b Increase the mixture strength
- c Maintain a selected engine speed within the power available
- d Feather the propeller

23 Blade twist in a propeller helps to:

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

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