Headquarters Air Cadets
Examination

www.134.org.uk

Senior Cadet
33/3 Propulsion
Generated 17-Jul-00
Serial: 257

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 Initals _____ Date of Exam _____

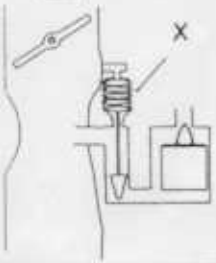
Date of Birth _____ Squadron/Unit _____ Wing _____

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

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

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 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

4 A jet engine's compressor is driven by:

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

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

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

6 Which of these is a turbojet engine?

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

7 Which of the following statements applies to the ramjet engine?

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

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

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

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

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

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

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

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

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

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

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

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

14 Which of these statements applies to a propeller that has been feathered?

a ☐ Its leading edges are facing forwards into the direction of flight

b ☐ Its leading edges are facing at 90 degrees to the direction of flight

c ☐ It is producing maximum power

d ☐ It is operating at its maximum rotational speed

---

15 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 ☐ Turboshaft

c ☐ Turboprop

d ☐ Turbofan

---

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

a ☐ TDC only

b ☐ 90 degrees after BDC and TDC

c ☐ Both BDC and TDC

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 ☐ It cannot operate inverted

b ☐ A throttle butterfly is unecessary

c ☐ There is no choke on the intake

d ☐ The fuel does not have to be vaporised

---

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

a ☐ A mechanical pump for circulating fuel

b ☐ A secondary compass system

c ☐ A dynamo to produce the spark for the spark plugs

d ☐ An instrument for metering the fuel flow

---

19 Which of these is a turbojet engine?

a ☐ Olympus 593

b ☐ Spey

c ☐ Tyne

d ☐ Pegasus

---

20 Which of these is a turboprop engine?

a ☐ RB 211

b ☐ Adour

c ☐ Spey

d ☐ Dart

---

21 In the modified 4-stroke cycle, ignition takes place:

a ☐ Just before TDC on the power stroke

b ☐ At TDC on the power stroke

c ☐ Just before TDC on the compression stroke

d ☐ At TDC on the compression stroke

---

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

a ☐ Driven by exhaust gases

b ☐ Fitted to turbo-fans only

c ☐ Fitted to turbojet engines only

d ☐ Driven by gears from the engine

---

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

a ☐ Increase the mixture strength

b ☐ Feather the propeller

c ☐ Retard the ignition timing

d ☐ Maintain a selected engine speed within the power available

---

24 Blade twist in a propeller helps to:

a ☐ Make feathering possible

b ☐ Even out the thrust along the length of the blade

c ☐ Make the blade stronger and lighter

d ☐ Reduce noise levels

---

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

a ☐ It requires an extra compressor to achieve the high ram pressure needed

b ☐ It is very susceptible to compressor stall

c ☐ It is like a turbojet from which the compressor and turbine have been removed

d ☐ It is used only in sub-sonic aircraft
