Headquarters Air Cadets
Examination

Senior Cadet
33/3 Propulsion
Generated 16-Jul-02
Serial: 523

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.

X A selected answer.
X A cancelled answer.

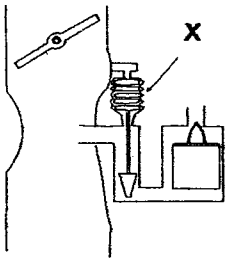
Mark:

Name and Initals _____ Date of Exam _____

Date of Birth _____ Squadron/Unit _____ Wing _____

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



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

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

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

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

4 Which of these is a turbojet engine?

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

5 Which of these is a turboshaft engine?

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

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

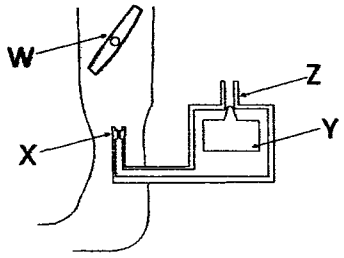
a ☐ It has only one compressor
b ☐ It is most efficient at subsonic speeds
c ☐ It has no moving parts
d ☐ It has only one turbine

7 In a piston engine, the camshaft runs at :

a ☐ A quarter of the engine speed
b ☐ Engine speed
c ☐ Half engine speed
d ☐ Twice engine speed

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

a ☐ Z
b ☐ X
c ☐ Y
d ☐ W



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

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

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

a ☐ To direct air through the engine compartment
b ☐ To allow heat to dissipate rapidly
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 ☐ It is producing maximum power
b ☐ It is operating at its maximum rotational speed
c ☐ Its leading edges are facing at 90 degrees to the direction of flight
d ☐ Its leading edges are facing forwards into the direction of flight

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

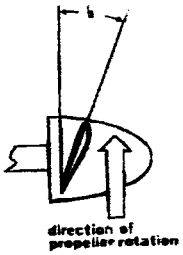
a ☐ In high speed aircraft where low frontal area is an advantage
b ☐ In static engines in industrial use
c ☐ In low speed aircraft operating at low altitudes
d ☐ In helicopters

.3 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 ☐ Turbofan
d ☐ Turboshaft

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

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



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

a ☐ BDC only
b ☐ Both BDC and TDC
c ☐ TDC only
d ☐ 90 degrees after 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 ☐ A throttle butterfly is unecessary
c ☐ The fuel does not have to be vaporised
d ☐ There is no choke on the intake

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

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

18 Which of these is a turbojet engine?

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

19 Which of these is a turboprop engine?

a ☐ Spey
b ☐ RB 211
c ☐ Adour
d ☐ Dart

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

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

21 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 ☐ 15:01
c ☐ 06:01
d ☐ 12:01

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

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

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

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

24 Blade twist in a propeller helps to:

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

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 used only in sub-sonic aircraft
c ☐ It requires an extra compressor to achieve the high ram pressure needed
d ☐ It is very susceptible to compressor stall