



Headquarters Air Cadets Examination

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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 _____

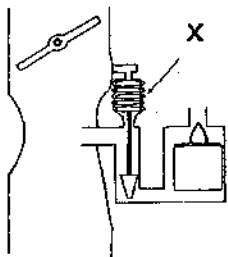
Date of Birth _____

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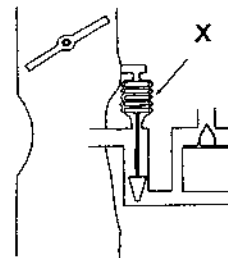
- 1 In this diagram of a simple carburettor of an aircraft piston engine, the carburettor is fitted with a control which automatically adjusts the mixture for changes in altitude. The arrow X points to an essential item. This item is:

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



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

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



- 3 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 ensure that all engine components are lubricated
- c ☐ To direct oil into the pressure chamber
- d ☐ To scavenge contaminants from the oil

- 4 Which of these is a turbojet engine?

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

- 5 Which of these is a turboshaft engine?

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

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

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

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

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

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

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

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

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

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

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

12 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 support the engine cowlings
- d ☐ To reduce the weight of the engine

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

- a ☐ Reverse thrust
- b ☐ Propeller braking
- c ☐ Windmilling
- d ☐ Contra rotating

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

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

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 ☐ Turboprop
- c ☐ Turbofan
- d ☐ Turboshaft

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

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

17 Propeller braking involves:

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

18 Which of these is a turbofan engine?

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

19 Which of these is a turboprop engine?

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

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

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

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 ☐ 15:01
- d ☐ 06:01

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 ☐ High voltage electrical impulses to the cylinders
- c ☐ Oil to all parts of the engine
- 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 ☐ The engine will be simpler
- d ☐ A steady operating temperature will be more easily maintained

24 Blade twist in a propeller helps to:

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

25 Who first patented, in 1930, the design of a reaction motor suitable for aircraft propulsion (that is, a jet engine)?

- a ☐ Henry Ford
- b ☐ Charles Rolls
- c ☐ Frank Whittle
- d ☐ Henry Royce