AIRFRAME & POWERPLANT MECHANICS

GENERAL TEST GUIDE

Written, Oral, and Practical

ALIGNS WITH

FAA-H-8083-30B & FAA-H-8083-30B-ATB

Airframe & Powerplant Mechanics General Handbook

2026 EDITION

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SAFETY, GROUND OPERATIONS, AND SERVICING

Shop Safety, Flight Line Safety, Fire Protection, Tiedown Procedures, Land Plane Tiedown, Ground Movement, and Support Equipment

CHAPTER 1

QUESTIONS

1-1 AM.I.F.K15
The Material Safety Risk Diamond illustrated in Figure 1-1 below indicates the _____
A. material is mildly radioactive.
B. material flammability risk is high; and reactivity to water is high.
C. material is biologically hazardous, but not flammable.

1-3 AM.I.F.K7
When should oil levels on a turbine engine be checked?
A. When the engine is cold.
B. Immediately after engine shutdown.
C. When the engine is running at an idle speed.

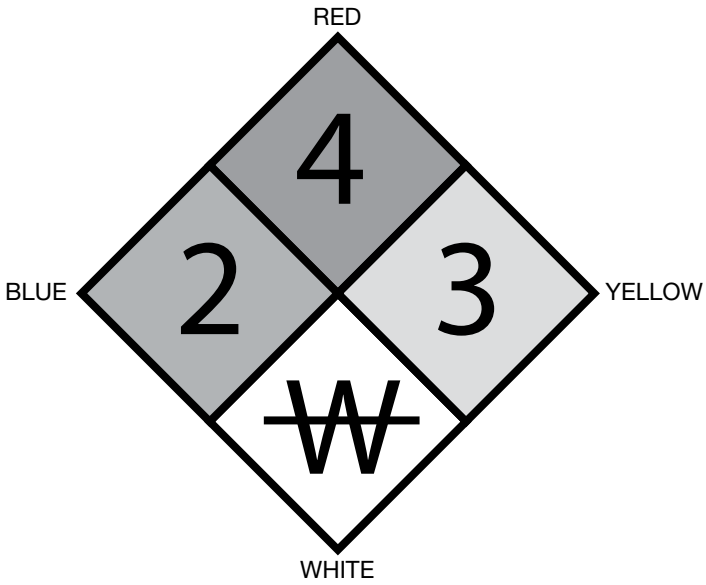

Figure 1-1. Risk Diamond.

1-2 AM.I.F.K15
A risk diamond diagram contains the letter W with a line drawn through it. What does this mean?
A. The material is soluble in water.
B. If exposed to the material, flush with water.
C. There is a danger if the material is exposed to water.

1-4 AM.I.F.K5
A person should approach or leave a helicopter in the pilot's field of vision whenever the engine is running in order to avoid _____
A. the tail rotor.
B. the main rotor.
C. blowing dust or debris caused by rotor downwash.

ANSWERS

1-1 Answer B
The risk diamond on the Safety Data Sheet (SDS) label provides a quick reference to the risks associated with the product. Its four color segments represent Flammability (Red), Reactivity (Yellow), Health (Blue), and Special Hazards (White). The numbers (0-4) in the blocks represent the various levels for each hazard; the higher the number the higher the risk. There are only two approved symbols for Special Hazards: letter W with a line through it meaning that the material has a high reactivity to water and OX meaning that the material is a strong oxidizer.
Ref: General Handbook H-8083-30B-ATB, Chapter 1 Page 2

1-3 Answer B
While on a reciprocating engine oil is checked after the engine has been inactive, a turbine engine's oil level is checked immediately after shutdown. This is because dry sump oil systems tend to hide oil that has seeped from the oil tank into the gear case of the engine. This oil in the gear case does not show up on the dipstick in the oil tank. Oil levels should be checked quickly after shutdown, before it has a chance to seep into the gear case.
Ref: General Handbook H-8083-30B-ATB, Chapter 1 Page 21

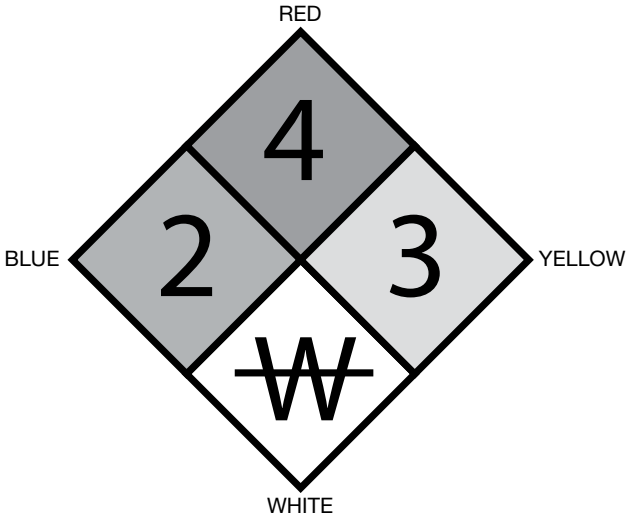

Figure 1-1. Risk Diamond.

1-2 Answer C
A risk diamond typically contains a white segment on the bottom which will alert the user to special or unusual hazards involving the use of the material. The W segment (with a line through it) signifies that the material is highly reactive when exposed to water. For example, when exposed to water the material can ignite or give off toxic gasses.
Ref: General Handbook H-8083-30B-ATB, Chapter 1 Page 2

1-4 Answer A
Always approach the helicopter in view of the pilot. Approaching for any other direction is dangerous; the tail rotor is invisible when operating and the pilot will not see you. Additional safety precautions is not to approach the helicopter if the main rotor is turning, unless approved to do so and in the pilot's field of vision. If you should get dust or debris in your eyes while approaching or leaving a helicopter, immediately sit down to avoid further possible injury.
Ref: General Handbook H-8083-30B-ATB, Chapter 1 Page 4

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AIRCRAFT STRUCTURES

CHAPTER 1

Major Structural Stresses, Fixed-Wing Aircraft, Wings, Empennage, Flight Control Surfaces, and Aircraft Structure Maintenance

QUESTIONS

1-1 AM.II.A.K17
What is meant when a component of an aircraft is said to be fail-safe?
A. It is strong enough to manage any conceivable load.
B. If the structure fails, other structures will assume the load.
C. Being non-structural Its failure would not critically endanger the aircraft.

1-2 AM.II.A.K17
Which type of stress does a stringer in a semi-monocoque fuselage absorb?
A. Shear
B. Tension
C. Torsion

1-3 AM.II.A.K17
Which type of skin material would most likely be found on a monocoque fuselage?
A. Fabric
B. Wood
C. Metal

1-4 AM.II.A.K17
Which of the following creates a critical need for frequent inspections on a pressurized fuselage?
A. Corrosion
B. Metal fatigue
C. Humidity and temperature changes

1-5 AM.II.A.K17
Which of the following wing design features will provide the greatest amount of lateral stability?
A. Sweepback
B. Dihedral
C. Cantilever

1-6 AM.II.A.K17
Which of the following wing components are positioned chordwise within a wing's structure?
A. Stringers and formers.
B. Ribs and stingers.
C. Ribs and formers.

ANSWERS

1-1 Answer B
Fail-safe means that should one portion of a complex structure fails, another part of the structure assumes the load of the failed member and so safe operation may continue. This fail-safe strategy exists on many structural aircraft components as it offers a reliable margin of safety with less weight than if an alternate structure were built so strong to carry the load on its own.
Ref: Airframe Handbook H-8083-31B-ATB, Chapter 1 Page 13

1-2 Answer B
Of the 5 stresses that may act on airframe parts, (tension, compression, torsion, shear, bending) horizontally installed stringers and longerons prevent tension and compression from bending the fuselage.
Ref: Airframe Handbook H-8083-31B-ATB, Chapter 1 Page 6-8

1-3 Answer C
A monocoque fuselage relies on the strength and stiffness of the skin to carry the primary loads in all directions. Thus metal or composites (or in rare cases, wood) would be the likely skin material of choice.
Ref: Airframe Handbook H-8083-31B-ATB, Chapter 1 Page 8

1-4 Answer B
Pressurized fuselages are constantly stretching and shrinking as the pressurization inside the fuselage cycles higher and lower with each flight. Thus frequent inspections are required for minute cracks caused by this constant flexing.
Ref: Airframe Handbook H-8083-31B-ATB, Chapter 1 Page 9

1-5 Answer B
Dihedral is the measure of the angle the span of the wing has to the fuselage. The higher this angle, the greater is the lateral stability of the aircraft. Cantilever is a construction method allowing the absence of external bracing. Sweepback provides benefits regarding critical mach numbers in high speed flight.
Ref: Airframe Handbook H-8083-31B-ATB, Chapter 1 Page 9

1-6 Answer C
The chordwise direction is from the leading to training edge of the wing; versus spanwise which is from the root to the tip. Ribs and formers are positioned chordwise and are mostly responsible for determining and forming the structure for the aerodynamic shape of the wing.
Ref: Airframe Handbook H-8083-31B-ATB, Chapter 1 Page 11

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AIRCRAFT ENGINES

CHAPTER 1

Types of Engines, Connecting Rods, Piston Rings, Firing Order, Valves and Valve Operating Mechanisms, Bearings, Propellers, and Efficiencies

QUESTIONS

1-1 AM.III.B.K4
Based on the criteria of efficiency of an engine's weight to the power it produces, which type of engine is the best choice for an aircraft operating at speeds of 300 mph at altitudes between 20,000-25,000 feet?

A. Reciprocating Engines
B. Turbofan Engines
C. Turboprop Engines

1-2 AM.III.A.K5
An aircraft engine has 9 cylinders. From this information alone we can deduce that _____

A. it contains both master and articulating rods.
B. its firing order is 1-3-5-7-9-2-4-6-8.
C. it is water cooled.

1-3 AM.III.A.K4
The crankcase of an aircraft engine _____

A. houses the valve operating mechanism and the engine cylinders.
B. is lightweight and primarily used as a reservoir for the engine oil.
C. is the foundation of the engine containing crankshaft bearings and cylinder pads.

1-4 AM.III.A.K4
The cylinders of an aircraft engine are mounted on cylinder pads that are machined onto the crankcase. The common method of attachment of the cylinders to the crankcase is _____

A. by studs mounted in threaded holes in the crankcase.
B. by bolts into locking helicoils mounted in the crankcase.
C. by heating the crankcase and cooling the cylinder for an interference fit.

1-5 AM.III.A.K4
The crankpin is _____

A. used to ensure the crankshaft does not shift in the crankcase.
B. a solid, heavy journal to withstand crankshaft shock loads.
C. hardened by nitriding and is hollow to reduce weight.

1-6 AM.III.A.K5
Which statement is correct about radial engine crankshafts?

A. Movable counterweights serve to reduce the torsional vibrations in an aircraft reciprocating engine.
B. Movable counterweights serve to reduce the dynamic vibrations in an aircraft reciprocating engine.
C. Movable counterweights are designed to resonate at the natural frequency of the crankshaft.

ANSWERS

1-1 Answer C
In the cruising speed range of 180-300 mph, the turboprop engine delivers more power per weight than the reciprocating engine. Below this speed and altitude reciprocating engines provide the greatest efficiency based on cost. At higher speeds and altitudes, the turbofan engine provides the greatest efficiency. Turbo jet engines and low bypass turbofans are the only type capable of speeds higher than Mach 1.
Ref: Powerplant Handbook H-8083-32B-ATB Chapter 1 Page 3, 4

1-2 Answer B
All radial engines contain an odd number of cylinders with firing orders starting with consecutive odd number cylinders followed by consecutive even cylinders. Articulated rods exist only on multiple row radial engines. This would not be possible with a 9 cylinder engine. Generally, radial engines are air cooled.
Ref: Powerplant Handbook H-8083-32B-ATB Chapter 1 Page 5, 16

1-3 Answer C
The cast or forged crankcase is the foundation of the aircraft engine. It contains the bearings which support the crankshaft. Cylinders are bolted to the crankcase and the crankcase provides the attach points for the engine to be secured to the airframe. As such it must be very strong to receive the many variations of mechanical loads and forces from these components while keeping the crankshaft stable. The crankcase does act as a reservoir for the engine oil, but with all of its other functions and relatively heavyweight construction, this is not the crankcase's primary function.
Ref: Powerplant Handbook H-8083-32B-ATB Chapter 1 Page 5

1-4 Answer A
Several studs are installed into the crankcase around the circumference of each machined cylinder pad. These are used to mount the cylinders securely to the crankcase with nuts. The inner portion of a cylinder pad may be chamfered or tapered to permit the installation of a large rubber o-ring around the cylinder skirt. This seals the joint between the cylinder and the crankcase pad against oil leakage.
Ref: Powerplant Handbook H-8083-32B-ATB Chapter 1 Page 6

1-5 Answer C
Crankpins are the machined journals on the crankshaft to which the piston connecting rods are attached. They are off center from the main journal. The two crank cheeks and the crankpin together make a "throw". When the force of combustion is applied to the crankpin, it causes the crankshaft to rotate. Crankpins are hardened by nitriding to resist wear and are hollow to keep the total weight of the crankshaft as light as possible. The hollow crankpin also permits the passage of oil as it turns in the crankcase.
Ref: Powerplant Handbook H-8083-32B-ATB Chapter 1 Page 8

1-6 Answer B
Vibration occurs as the crankshaft rotates due to the forces of combustion acting on the pistons, connecting rods, and crankpins. These power impulses cause even a statically balanced crankshaft to vibrate. Movable counterweights are dynamic dampeners are located in the counterweight lobes of the crankshaft. Using pendulum motion, the dampeners oscillate out of time with the crankshaft vibration thus reducing overall vibration.
Ref: Powerplant Handbook H-8083-32B-ATB Chapter 1 Page 8, 9