

U.S.C.G. Merchant Marine Exam

OSV – Chief Engineer

Q683 Engineering Safety & Environmental Protection

(Sample Examination)

Choose the best answer to the following Multiple-Choice Questions.

1. Which of the methods shown in the illustration is the correct way to fit shoring? Illustration SF-0016

- A. A
- B. B
- C. C
- D. D

Correct answer: A

2. In a compartment that has been completely flooded with water, the greatest pressure will be exerted _____.

- A. at a point that is one-third from the bottom of the bulkhead
- B. along the bottom of any bulkhead
- C. at the vertical center of the bulkhead
- D. along the top of the bulkhead

Correct answer: B

3. Your ship has run aground and it is necessary to determine whether or not a compartment has flooded. Therefore, you should _____.

- A. tap the bulkhead with a hammer to check for a water level
- B. open the watertight door and take a quick look
- C. open the hatch dogs on the side away from the hinges
- D. feel the bulkhead to see if it is hot

Correct answer: A

4. Progressive flooding in the engine room may be minimized by securing watertight boundaries and _____.

- A. transferring reserve feedwater
- B. evacuating the engine room
- C. pumping out flooded compartments
- D. dumping fuel oil

Correct answer: C

5. What is a major advantage of using a positive pressure type self-contained breathing apparatus?

- A. The speed with which it can be put into operation is around 45 seconds.
- B. Facial hair will not affect the mask performance.
- C. The equipment is lightweight and the wearer can work without difficulty in confined spaces.
- D. The average operating time is over an hour.

Correct answer: A

6. If the survival craft is not loaded to full capacity, the personnel should be _____.
- A. loaded more on port side to forward
 - B. loaded equally on both sides with more forward
 - C. loaded equally on both sides with more aft
 - D. allowed to sit anywhere

Correct answer: C

7. Which of the following statements is true concerning an immersion suit and its use?
- A. Only a light layer of clothing may be worn underneath.
 - B. They provide sufficient flotation to do away with the necessity of wearing a life jacket.
 - C. They should be tight fitting.
 - D. A tear in the suit will not appreciably reduce its value.

Correct answer: B

8. Which of the following statements concerning immersion suits is correct?
- A. Suits are not required to automatically turn an unconscious person face-up in the water.
 - B. The immersion suit seals in all body heat and provides protection against hypothermia for weeks.
 - C. The suit is flameproof and provides protection to the wearer while swimming through burning oil.
 - D. The suits provide for limited body movement such as walking, climbing a ladder, and picking up small objects like a pencil.

Correct answer: D

9. Puncture leaks in the lower tubes, or bottom of an inflatable life raft should first be stopped by using _____.
- A. a tube patch
 - B. sealing clamps
 - C. sail twine and vulcanizing kit
 - D. repair tape

Correct answer: B

10. Prior to entering a compartment containing an atmosphere potentially dangerous to life or health and deficient in oxygen, you should don an approved breathing apparatus. Which of the listed devices would be suitable?
- A. A canister-type gas mask.
 - B. An emergency escape hood.
 - C. An SCBA.
 - D. A filter-type mask.

Correct answer: C

11. A self-righting survival craft will return to an upright position provided that all personnel _____.
- A. are seated with seatbelts on and doors shut
 - B. are seated with seatbelts on and doors open
 - C. are to shift to one side to right it
 - D. escape from the craft

Correct answer: A

12. With the sprinkler system and air system on, and all hatches shut, the survival craft will be protected from _____.

- A. a nuclear environment
- B. a fire and toxic environment
- C. a hurricane
- D. a drop greater than ten feet

Correct answer: B

13. Which of the lifeboat parts listed must be painted bright red?

- A. Hatches
- B. Releasing gear lever
- C. Boat hooks
- D. Compass

Correct answer: B

14. The purpose of the four water pockets located on the underside of a life raft, is to _____.

- A. stow rainwater; these four spaces will not take up valuable space
- B. act as stabilizers by filling with sea water as soon as raft is inflated and in an upright position
- C. hold the fresh water required by regulation to be provided in the raft when packed
- D. none of the above

Correct answer: B

15. A fire, occurring in the windings, of an overloaded electrical motor, is considered a _____.

- A. class "A" fire
- B. class "B" fire
- C. class "C" fire
- D. class "D" fire

Correct answer: C

16. If the items shown in the illustration are burning, this fire would be a Class _____. Illustration SF-0001

- A. "A"
- B. "B"
- C. "C"
- D. "D"

Correct answer: A

17. All of the following are part of the fire triangle EXCEPT _____.

- A. fuel
- B. oxygen
- C. heat
- D. electricity

Correct answer: D

18. The upper explosive limit (UEL) of a mixture of flammable vapors and air is defined as _____.

- A. that concentration above which there is just enough flammable vapor to produce an explosion
- B. that concentration above which the mixture is too rich to burn
- C. the percentage of flammable vapor by volume in air sufficient to create an explosion
- D. the percentage of oxygen present in the air sufficient to support combustion

Correct answer: B

19. As chief engineer, you are discussing fire safety with a new unlicensed crew member. What would you expect the crew member to know having been onboard the vessel for two days?

- A. The starting procedures for the ship's fire pump.
- B. Ship's signals for fire and emergency and abandon ship.
- C. The release procedures for the low-pressure CO₂ system.
- D. The procedures to secure the fire detection system.

Correct answer: B

20. How would you ensure that your crew is prepared to combat a shipboard fire using ship's equipment?

- A. Check training records, to see if crew members have attended a firefighting training course.
- B. Show crew generic fire training videos.
- C. Conduct required drills, simulating fire conditions and training with ship's equipment.
- D. Have them read a firefighting text book.

Correct answer: C

21. Your ship is leaving port after almost a complete crew change out. The captain has ordered a fire drill simulating a fire in the engine room with full emergency gear and all hoses run out. What is the reason for drilling with this kind of simulation?

- A. The World Health Organization requires crews to get regular exercise in the form of fire drills.
- B. This ensures that your crew is prepared to combat a shipboard fire using ship's equipment.
- C. Regulations require a full fire drill when more than half the crew changes out.
- D. It provides a quick method to inventory all of the firefighting gear.

Correct answer: B

22. A simple precaution to reduce the possibility of accidental fires in the paint locker, is to _____.

- A. label the fixed firefighting system
- B. store paint cans on metal shelves only
- C. not allow oily rags to accumulate in the space
- D. place a portable fire extinguisher immediately outside the locker

Correct answer: C

23. Which of the following procedures reduces the possibility of an interior ventilation duct fire from rapidly spreading?

- A. Keeping the duct exterior clean.
- B. Having a portable CO2 ready at each duct opening.
- C. Having a fire hose charged at each duct opening.
- D. Keeping the duct interior clean.

Correct answer: D

24. The most likely location for a liquid cargo fire to occur on a tanker would be _____.

- A. in the amidships house
- B. at the main deck manifold
- C. at the vent header
- D. in the pumproom

Correct answer: D

25. In accordance with 46 CFR Part 109, the Muster List ("Station Bill") shows each crew lifeboat station, their duties during abandonment, basic instructions, and _____.

- A. work schedule
- B. the time each weekly drill will be held
- C. instructions for lowering the survival capsule
- D. all emergency signals

Correct answer: D

26. When required to work in an area where explosive gases may accumulate, you should use hand tools which are _____.

- A. high carbon steel
- B. fixed with a ferrous cover
- C. non-ferrous
- D. approved by the Coast Guard

Correct answer: C

27. The state of charge of a stored pressure type dry chemical fire extinguisher can be readily determined by _____.

- A. weighing the CO2 cartridge
- B. weighing the cylinder
- C. visual inspection of the pressure gage
- D. removing the lid and checking the level of dry chemical

Correct answer: C

- 28.** The physical difference of the water spray patterns developed by the high velocity tip and low velocity applicator is due to _____.
- A. the type of fire being fought
 - B. a difference in water pressure
 - C. the capacity of the fire pump
 - D. the method of breaking up the water stream

Correct answer: D

- 29.** Which portable fire extinguisher is normally recharged in a shore facility?
- A. Carbon dioxide
 - B. Water (cartridge-operated)
 - C. Water (pump tank)
 - D. Dry chemical (cartridge-operated)

Correct answer: A

- 30.** Why is it essential to introduce CO₂ from a fixed fire extinguishing system, into a large engine room, as quickly as possible?
- A. To keep the fire from spreading through the bulkheads.
 - B. Carbon dioxide takes a long time to disperse to all portions of a space.
 - C. Updraft from the fire tends to carry the CO₂ away.
 - D. The fire may warp the CO₂ piping.

Correct answer: C

- 31.** When an oil fire has been extinguished, the surface of the oil should be kept covered with foam to prevent _____.
- A. air from contacting the oil vapors permitting reignition
 - B. toxic fumes from escaping to the surface
 - C. spontaneous combustion below the oil surface
 - D. boiling of the heated oil

Correct answer: A

- 32.** What would be a major consequence of allowing the refrigeration system of a low-pressure fixed CO₂ fire extinguishing system to remain inoperable?
- A. The entire charge may eventually be lost due to CO₂ boil-off venting through the relief valve.
 - B. Liquid CO₂ would overflow from the tank through the drain line as the temperature is increased.
 - C. Excessive condensation inside the tank would freeze causing a restriction in the discharge piping.
 - D. The warmed charge of CO₂ would not be effective in extinguishing a fire.

Correct answer: A

- 33.** The principal personnel hazard unique to Halon fire extinguishers is _____.
- A. inhaling toxic vapors produced when exposed directly to a flame for extended periods
 - B. displacement of oxygen
 - C. eye irritation produced immediately after discharge from cylinder
 - D. skin irritation

Correct answer: A

- 34.** The primary function of an automatic sprinkler system is to _____.
- A. limit the spread of the fire and control the amount of heat produced
 - B. protect people in the areas which have had sprinkler heads installed
 - C. instantaneously extinguish the fire which triggered it
 - D. alert the crew to the fire

Correct answer: A

- 35.** What will happen if a fire hose is left unattended and under pressure with the nozzle shut off?
- A. It will burst under pressure
 - B. It will remain motionless
 - C. It will lash about violently
 - D. It will become elongated by 125%

Correct answer: B

- 36.** Which of the listed methods, is the most effective to fight a fire on the open deck of a vessel if using a dry chemical type fire extinguisher?
- A. Approach the fire from the windward side.
 - B. Direct the extinguisher discharge at the base of the fire.
 - C. Move the discharge stream back and forth in a rapid sweeping motion.
 - D. All of the above.

Correct answer: D

- 37.** You are the engineer on a vessel with a periodically unattended machinery space. A fire has been reported in the engine room and you cannot make entry into the space. How would you direct the emergency squad team leader to charge the fire main?
- A. Start the engine room fire pump from the bridge.
 - B. Start the emergency fire pump remotely from the chief mate's office.
 - C. Start the emergency fire pump remotely from the bridge or emergency gear locker.
 - D. Start the engine room fire pump from the chief engineer's office.

Correct answer: C

- 38.** You notice smoke coming from an open laundry room doorway, which smells like electrical insulation. After activating the fire alarm, which of the following would be the lowest action priority?
- A. Close the door to the room.
 - B. Locate the nearest CO2 or dry chemical extinguisher.
 - C. Secure power to the washers and dryers.
 - D. Break out the nearest fire hose.

Correct answer: D

- 39.** Your ship has a low-pressure carbon dioxide system that covers the engine room. Fire has been reported in the engine room and the decision has been made to dump the carbon dioxide system into the engine room. While following the procedures to release carbon dioxide you find one engine room supply fan damper that will not close. How should you proceed?
- A. Continue the release procedures and dump the carbon dioxide, after the release then try to seal the fan damper opening.
 - B. Cover the fan damper opening with a plastic tarp to stop the flow of air into the engine room and then continue with the release procedures.
 - C. Continue the release procedures and dump the carbon dioxide with the damper still open.
 - D. Cover the fan damper opening with burlap bags to slow the flow of air into the engine room and then continue with the release procedures.

Correct answer: B

- 40.** As first engineer you are the senior engineering officer in Emergency Squad #1. The fire alarm sounds and you report to the muster station where the bridge informs you smoke has been reported coming from the ship's laundry room. What should your first action be?
- A. Help dress out other crew members in fireman's outfit.
 - B. Start boundary cooling the area.
 - C. Charge the ship's fire main.
 - D. Secure power and ventilation to the laundry room and inform the bridge once this is done.

Correct answer: D

- 41.** When fighting a liquefied natural gas fire, you should _____.
- A. use only carbon dioxide
 - B. extinguish the fire, then secure the source of gas
 - C. secure the source of gas, then extinguish the fire
 - D. use only dry chemical

Correct answer: C

- 42.** In the event of an exhaust duct fire, most dry chemical and carbon dioxide galley range fixed extinguishing systems are automatically activated through the action of a stainless-steel cable, spring and a _____.
- A. fusible link
 - B. stack switch
 - C. thermostat
 - D. pyrostat

Correct answer: A

- 43.** The "flammable limits" of an atmosphere are the _____.
- A. upper and lower percentage of vapor concentrations in an atmosphere which will burn if an ignition source is present
 - B. two temperatures between which an atmosphere will self-ignite
 - C. upper and lower pressures between which an atmosphere will not burn
 - D. two temperatures between which an atmosphere will burn if an ignition source is present

Correct answer: A

- 44.** When preparing to pump flammable liquids with a centrifugal pump, you should _____.
- A. have a standby pump running with the discharge valve closed
 - B. draw a small quantity of liquid to prime the pump
 - C. check for gland leakage and any fire hazard
 - D. lift the relief valve by hand to check its operation

Correct answer: C

- 45.** Bunker "C" is classified as a grade _____.
- A. A liquid
 - B. B liquid
 - C. E liquid
 - D. D liquid

Correct answer: C

- 46.** According to Coast Guard Regulations (46 CFR 30), a flammable liquid with a Reid vapor pressure of 8-1/2 psi or less, and a flash point of 80°F or below, is a grade _____.
- A. A
 - B. E
 - C. C
 - D. D

Correct answer: C

- 47.** What term is listed on a Safety Data Sheet (SDS) to describe a chemical that can produce life-threatening or seriously disabling health hazards?
- A. Moderate toxicity
 - B. Low toxicity
 - C. High toxicity
 - D. Recommended toxicity

Correct answer: C

- 48.** The atmosphere of an empty fuel tank is tested and designated "gas free". Which of the following statements is correct concerning this tank?
- A. The gas free status is good as long as the initial conditions remain unchanged.
 - B. The tank should be frequently retested.
 - C. The concentration of flammable gas in the compartment is less than 10% of the lower flammable limit.
 - D. All of the above.

Correct answer: D

- 49.** An LNG carrier has an approved type of gas detecting system to detect methane leaks in the _____.
- A. barrier spaces
 - B. boiler burner supply piping
 - C. cargo handling rooms
 - D. all of the above

Correct answer: D

- 50.** Span gas is used aboard liquefied natural gas carriers to _____.
- A. inert the barrier spaces
 - B. odorize the cargo
 - C. calibrate the gas leak detectors
 - D. detect leaks in cargo piping

Correct answer: C

- 51.** During fueling operations oil is detected in the water adjacent to your vessel. If however, it is determined to be from some source other than your vessel, you should _____.
- A. secure operations until the exact type of oil is determined
 - B. notify the Coast Guard
 - C. make an entry in the Oil Record Book to that effect
 - D. all of the above

Correct answer: B

- 52.** Where will you find the procedures for the reporting of oil discharge into the water?
- A. The vessel's Certificate of Inspection
 - B. The vessel's Oil Transfer Procedures
 - C. The vessel's Oil Record Book
 - D. The vessel's International Oil Pollution Prevention Certificate

Correct answer: B

- 53.** Coast Guard regulations require a shipboard oil pollution emergency plan to be reviewed _____.
- A. once a year
 - B. once every two years
 - C. once every four years
 - D. once every five years

Correct answer: A

54. During fueling operations, which of the listed precautions should be taken when topping off fuel tanks?

- A. Close all overflow valves.
- B. Reduce the pumping rate and sound tanks frequently.
- C. Reduce the pumping rate by closing the deck filling valve.
- D. Place 5-gallon containers under all flange connections in the fuel line.

Correct answer: B

55. When making entries in the Oil Record Book, all quantities should be _____.

- A. consistently recorded through the Oil Record Book in one specified unit (gallons, barrels, cubic meters)
- B. recorded as cubic meters with a conversion to barrels
- C. recorded directly from the oil discharge monitor
- D. verified by the chief engineer

Correct answer: A

56. With regards to a ship's Oil Record Book, an oil tanker of 150 gross tons and above must maintain entries in _____.

- A. Part I only
- B. Part II only
- C. Both Part I and Part II
- D. Part III

Correct answer: C

57. The Oil Record Book must be maintained onboard the vessel for _____.

- A. the duration of the ship's active employment
- B. an annual inspection
- C. not less than 3 years and be readily available for inspection
- D. 6 months and then submitted to the nearest Marine Safety Office for review

Correct answer: C

58. Which of the following machinery space operations is required to be logged in the Oil Record Book?

- A. Daily inspection of engine room bilges.
- B. Changing out sprayer plates to adjust for steam demand.
- C. Ballasting or cleaning of fuel oil tanks.
- D. Shifting suction of main fuel pump to reserve fuel oil tank.

Correct answer: C

59. When a vessel is inclined, the tendency for it to return to its original position is caused by the _____.

- A. increased free surface in the buoyant wedge
- B. upward movement of the center of flotation
- C. movement of the center of gravity
- D. movement of the center of buoyancy toward the low side of the vessel

Correct answer: D

60. Your vessel was damaged in a collision and one compartment has partially flooded. The vessel has free communication with the sea with water flowing in and out as the vessel rolls. Which of the following is the most important factor contributing to free communication loss of stability?

- A. Distance from the vessel centerline to the centerline of the damaged compartment.
- B. Breadth of the damaged compartment affected.
- C. Whether or not the damaged compartment on the opposite side of the vessel is full or empty.
- D. Depth from the bottom of the damaged compartment to the waterline.

Correct answer: A

61. You are providing onboard training to your engineers on the factors affecting trim and stability. What instructions do you give your engineers to stabilize the ship should it experience an unstable rolling behavior?

- A. Discharge dirty ballast from a centerline double bottom tank.
- B. Add ballast to a centerline double bottom tank.
- C. Add ballast to wing tank to the side of the ship with an angle of list.
- D. Discharge water from the forepeak tank.

Correct answer: B

62. What standard mathematical formula is commonly used to calculate a vessels waterplane area for stability purposes?

- A. Pythagorean Rule
- B. Simpsons Rule
- C. Reynolds Number Rule
- D. Standard Logarithmic Rule

Correct answer: B

63. With no environmental forces acting on the vessel, the center of gravity of an inclined vessel is vertically aligned with the _____.

- A. metacenter
- B. center of flotation
- C. original vertical centerline
- D. longitudinal centerline

Correct answer: C

- 64.** As chief engineer of an oceangoing passenger vessel, it is important to know the effect of trim and stability of your ship in the event of damage to a compartment. To minimize the impact of flooding in the event of a grounding, what should be your ship's safe practice regarding watertight doors and hatches?
- A. All watertight doors in subdivision bulkheads shall be kept open during navigation to facilitate crew movement and in all cases they shall always be ready to be immediately closed.
 - B. All watertight doors in subdivision bulkheads shall be kept closed when the vessel is anchored except when necessarily opened for working of the vessel, and in such cases they shall always be ready to be immediately closed.
 - C. All watertight doors in subdivision bulkheads shall be kept open during normal operation, except during adverse weather when they shall be closed.
 - D. All watertight doors in subdivision bulkheads shall be kept closed during navigation except when necessarily opened for working of the vessel, and in such cases they shall always be ready to be immediately closed.

Correct answer: D

- 65.** According to Coast Guard Regulations (46 CFR), no vessel can come alongside or remain alongside a tank vessel while it is loading A, B, or C grade cargo without having the permission of the _____.
- A. tank vessel owner
 - B. officer in charge of the vessel which is loading
 - C. terminal manager
 - D. USCG captain of the port

Correct answer: B

- 66.** According to 46 CFR, Part 30, a Grade "E" petroleum product is _____.
- A. a flammable liquid
 - B. light fuel oil
 - C. kerosene
 - D. a combustible liquid

Correct answer: D

- 67.** As first engineer, you are standing by the #3 deep fuel oil storage tank as a crew member is working inside the tank. Before entering the tank, the atmosphere was checked and determined safe for men to work. While standing by you notice that the crew member is not moving. After attempts to communicate with the downed mariner receives no response, what action would you take?
- A. Call the captain and ask him how you should proceed.
 - B. Have additional crew members don a SCBA to enter the tank, to aid in the removal of the unconscious crew member.
 - C. Send another crew member, without a SCBA on, into the tank to retrieve the unconscious crew member.
 - D. Send two additional crew members, without a SCBA on, into the tank to retrieve the unconscious crew member.

Correct answer: B

- 68.** As chief engineer on a vessel, you and the first engineer are planning a welding job in the cargo-hold. How would you ensure that all safety precautions are reviewed prior to starting this job?
- A. Have the first engineer complete a hot-work permit after completing the job.
 - B. Have the first engineer complete a hot-work permit prior to starting the job.
 - C. Have the first engineer verbally review fire safety with crew working on the job.
 - D. Have the first engineer review the SOLAS manual prior to starting the job.

Correct answer: B

- 69.** The instrument shown in the illustration has not been used for several weeks. Prior to its use for testing a compartment, you should _____. Illustration SF-0003
- A. check or renew the batteries
 - B. purge the meter
 - C. adjust the meter pointer to zero
 - D. all of the above

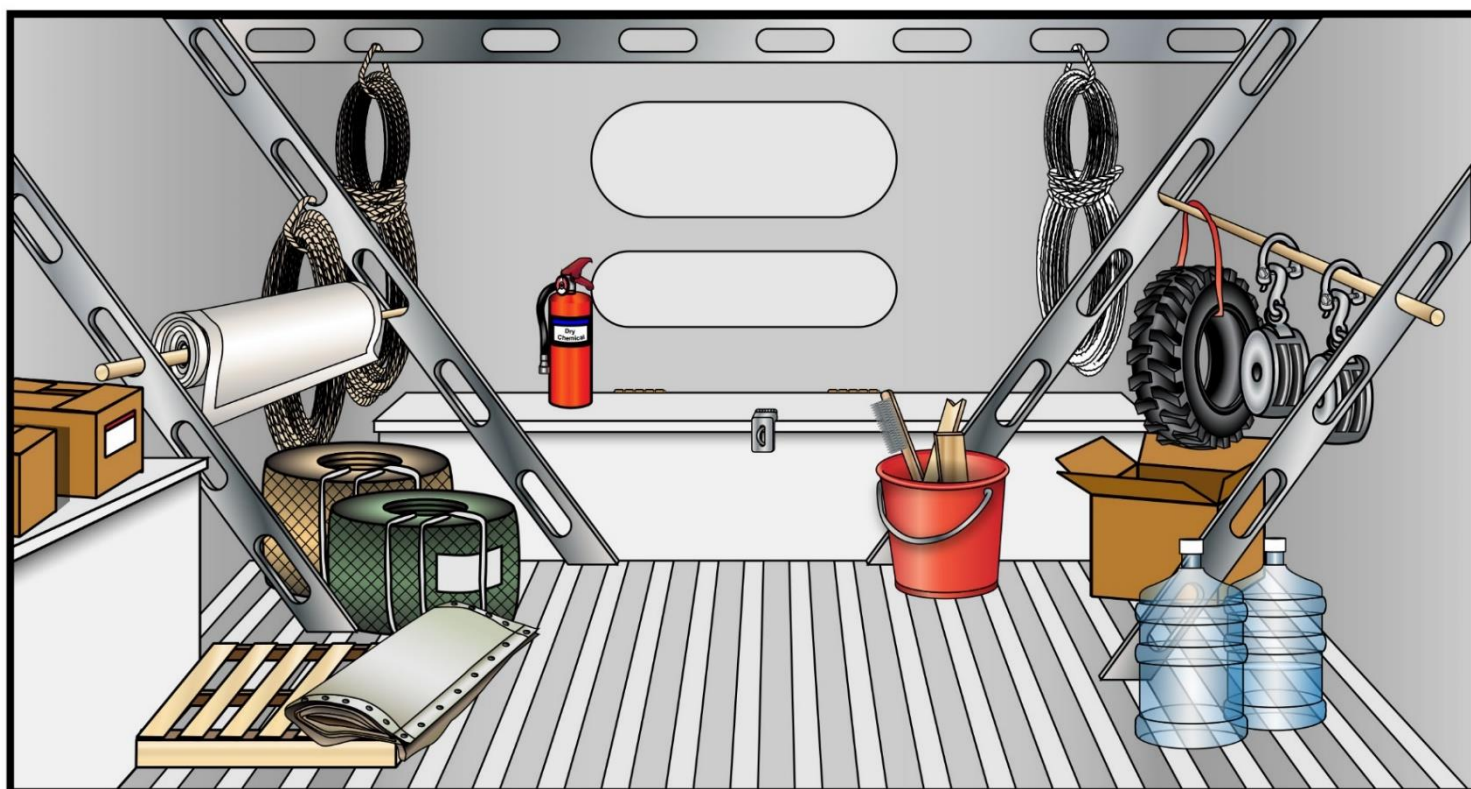
Correct answer: D

- 70.** The airborne concentrations of substances (such as hydrogen sulfide) under which nearly all workers may be repeatedly exposed without adverse effects are called _____.
- A. exposure limits
 - B. concentration limits
 - C. threshold limit values
 - D. substance limit values

Correct answer: C



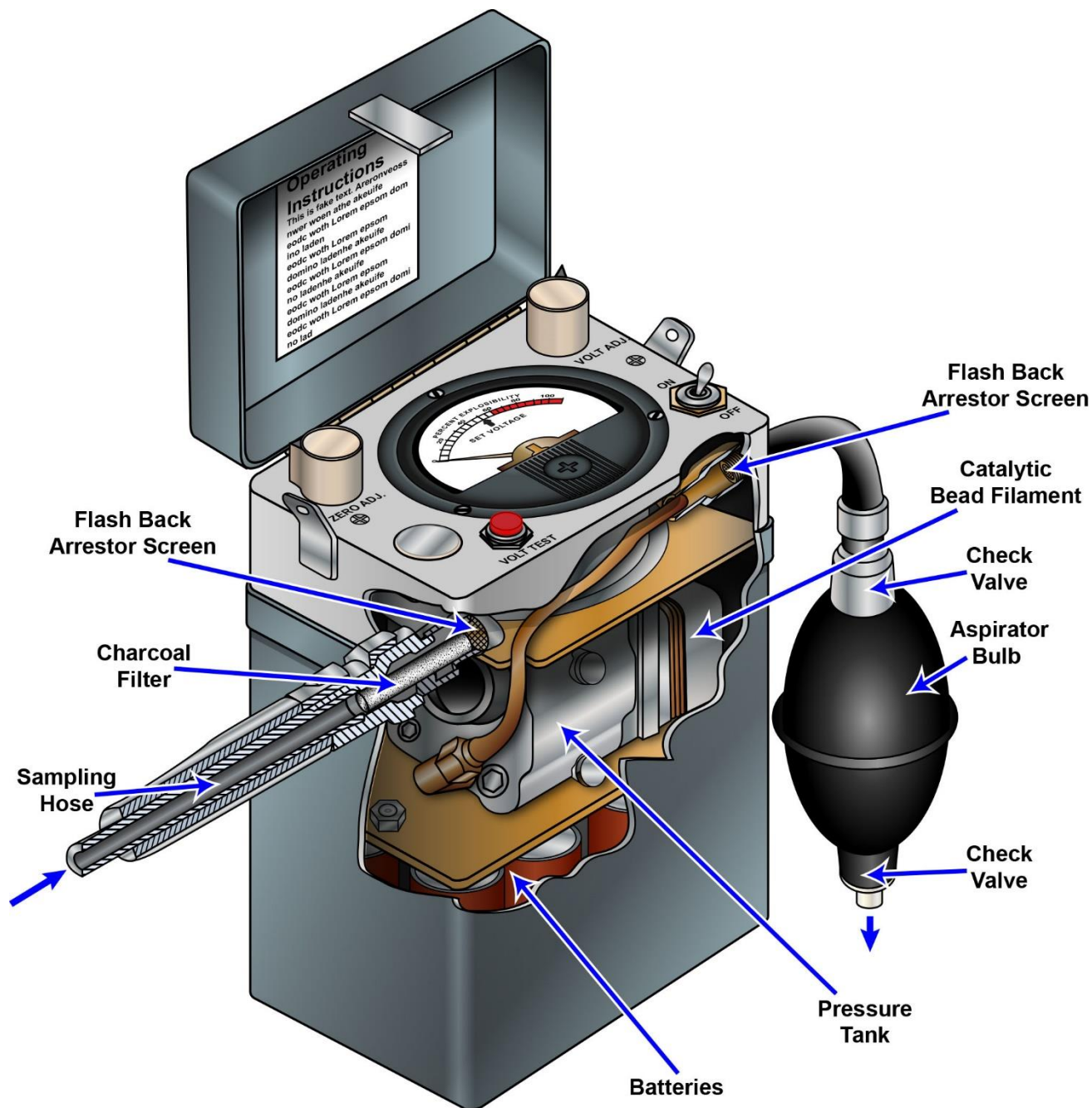
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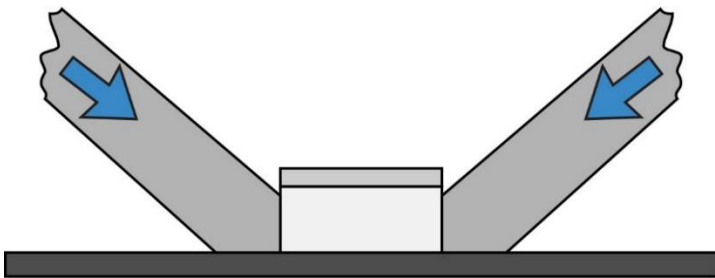
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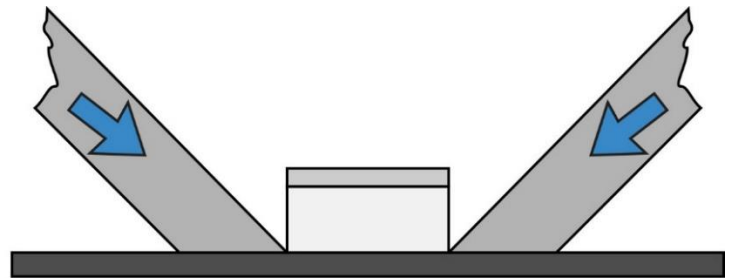
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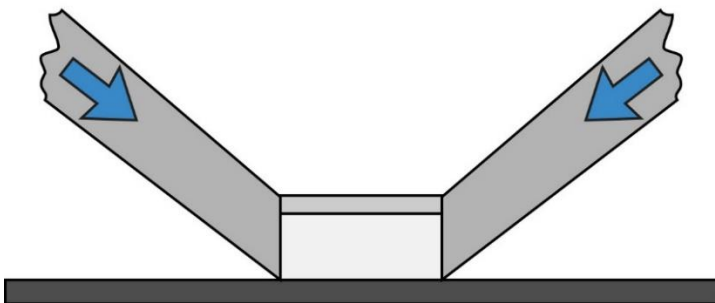
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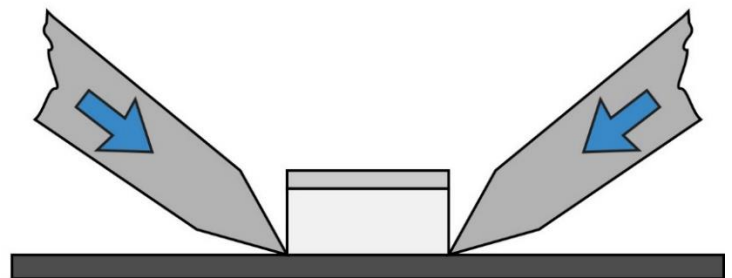
A



B



C



D

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