

U.S.C.G. Merchant Marine Exam
Third Assistant Engineer, Unlimited
Q534 Engineering Safety and Environmental Protection
(Sample Examination)

Choose the best answer to the following Multiple Choice Questions.

1. Excessive free surface occurring in tanks carrying liquid cargo should be avoided in order to _____.

- (A) maintain good stability
- (B) maintain hog and sag
- (C) prevent oil pollution
- (D) all of the above

If choice A is selected set score to 1.

2. A high concentration of hydrogen sulfide gas is most likely to be found in which of the locations listed?

- (A) Fire room bilges where hydrazine has accumulated.
- (B) Sewage compartment bilges where leaked sewage has accumulated.
- (C) Engine room bilges where chemical cleaners and solvents have accumulated.
- (D) Emergency battery storage compartment where discharge gases have accumulated.

If choice B is selected set score to 1.

3. Kapok life jackets require proper care and should NOT be _____.

- (A) stowed near open flame or where smoking is permitted
- (B) used as seats, pillows, or foot rests
- (C) left on open decks
- (D) all of the above

If choice D is selected set score to 1.

4. The source of power for the CO₂ discharge alarm siren is obtained from _____.

- (A) the general alarm 24 volt DC bus
- (B) the flow of CO₂ under pressure
- (C) the emergency power and lighting bus
- (D) all of the above

If choice B is selected set score to 1.

5. While adrift in an inflatable life raft in hot, tropical weather _____.

- (A) the canopy should be deflated so that it will not block cooling breezes
- (B) the pressure valve may be periodically opened to prevent excessive air pressure
- (C) deflating the floor panels may help to cool personnel
- (D) the entrance curtains should never be opened

If choice C is selected set score to 1.

6. The component shown in the illustration would be installed in which of the following types of fire detection systems? Illustration SF-0004

- (A) Line-type pneumatic
- (B) Fixed temperature
- (C) Rate-of-rise
- (D) Combined fixed temperature and rate-of-rise

If choice B is selected set score to 1.

7. Which of the following statements is true concerning Halon 1301 fire extinguishing equipment?

- (A) Halon extinguishes the fire by smothering action.
- (B) The agent cannot be used on electrical fires because it leaves a residue.
- (C) The agent is highly toxic at normal room temperature.
- (D) For portable extinguishers, the agent is only available in a 2 pound unit.

If choice D is selected set score to 1.

8. Before entering a fuel tank that has been cleaned, it should be checked with an oxygen indicator and a/an _____.

- (A) halide torch
- (B) flame safety lamp
- (C) Orsat apparatus
- (D) combustible gas indicator

If choice D is selected set score to 1.

9. The external flotation bladder on an immersion suit should be inflated _____.

- (A) before you enter the water
- (B) after you enter the water
- (C) after one hour in the water
- (D) after you notice that your suit is losing buoyancy

If choice B is selected set score to 1.

10. During cargo operations, a deck fire has occurred due to a leaking cargo line. You should FIRST _____.

- (A) stop the transfer of cargo
- (B) prevent the spread of fire with a foam dam
- (C) apply CO₂ on the burning fuel at its source
- (D) blanket the cargo spill with foam

If choice A is selected set score to 1.

11. Symbol number "3" shown in the illustration represents which of the following? Illustration SF-0022

- (A) amidships
- (B) baseline
- (C) forward perpendicular
- (D) displacement

If choice A is selected set score to 1.

12. Which of the following statements is true concerning the fire extinguisher shown in the illustration? Illustration SF-0006

- (A) The agent may be applied in short bursts by opening and closing the squeeze nozzle piece No.1.
- (B) The illustrated extinguisher must never be used in conjunction with water.
- (C) The initial discharge of the extinguisher should be at close range to scatter the burning material.
- (D) There is no danger of reflash in using the illustrated extinguisher on a class "B" fire.

If choice A is selected set score to 1.

13. In order to prevent the unnecessary release of hydrocarbons to atmosphere, when taking on departure ballast, one method used is to _____.

- (A) allow entering ballast to displace the inert gas to a tank where cargo is currently being discharged
- (B) manually open the pressure/vacuum device
- (C) use blowers to purge the inert gas from tanks
- (D) completely open the mast riser valve

If choice A is selected set score to 1.

14. When checking the level of a volatile liquid in a tank on the weather deck of a tank vessel, you should position yourself _____.

- (A) on the windward side of the opening
- (B) on the leeward side of the opening
- (C) at a right angle to the wind direction
- (D) so that the obstruction of your body will protect you from the fumes

If choice C is selected set score to 1.

15. A tank has been sealed and unventilated for a long period of time. Which of the following statements is true?

- (A) The tank is safe to enter.
- (B) The tank is especially dangerous to enter.
- (C) Carbon monoxide is present.
- (D) Water vapor present when the tank was sealed has oxidized.

If choice B is selected set score to 1.

16. If deck cargo is carried, it should be stowed so that it _____.

- (A) will cover less than 25 percent of deck space
- (B) does not block access to the fire station hydrant
- (C) will be easily visible from the bridge
- (D) is not higher than 12 inches above the deck

If choice B is selected set score to 1.

17. The horizontal fore and aft movement of a vessel is called _____.

- (A) surge
- (B) sway
- (C) heave
- (D) yaw

If choice A is selected set score to 1.

18. Except in rare cases, it is impossible to extinguish a shipboard fire by _____.

- (A) removing the fuel
- (B) removing the heat
- (C) interrupting the chain reaction
- (D) removing the oxygen

If choice A is selected set score to 1.

19. A fire can be extinguished by removing _____.

- (A) the fuel
- (B) the heat
- (C) the oxygen
- (D) any of the above

If choice D is selected set score to 1.

20. Victual waste is _____.

- (A) the final waste product of a manufacturing process
- (B) the resultant sludge that is collected after water washing a boiler
- (C) the final discharge of sewage treatment plants
- (D) any garbage that comes from food or food provisions

If choice D is selected set score to 1.

21. The amount of garbage disposed must be entered into the records maintained by each ship and stated in _____.

- (A) barrels, measured in 55 gallon drums
- (B) weight in either kilogram or pounds
- (C) cubic yards convertible to long tons
- (D) cubic meters

If choice D is selected set score to 1.

22. The physical data term on a Material Safety Data Sheet (MSDS) that indicates if the vapor formed by a material is lighter or heavier than air is called _____.

- (A) vapor density
- (B) vapor pressure
- (C) vapor level
- (D) vapor gravity

If choice A is selected set score to 1.

23. If emergency welding repairs must be made to the upper area of a fuel tank, the tank and/or adjacent compartments may need to be _____.

- (A) filled with water
- (B) gas freed
- (C) inerted
- (D) all of the above as necessary

If choice D is selected set score to 1.

24. A fire that has developed in a pile of rubber gasket material would be classified as a _____.

- (A) class "A"
- (B) class "B"
- (C) class "C"
- (D) class "D"

If choice A is selected set score to 1.

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

- (A) transferring reserve feed water
- (B) evacuating the engine room
- (C) pumping out flooded compartments
- (D) dumping fuel oil

If choice C is selected set score to 1.

26. To activate an air regeneration canister on a survival craft, you _____.

- (A) put it into a container of water
- (B) tear off the tabs on the canister
- (C) turn it upside down
- (D) push "on" button

If choice B is selected set score to 1.

27. In accordance with 33 CFR Subchapter O (Pollution), the overall responsibility in maintaining the Oil Record Book is given to the _____.

- (A) master
- (B) cargo engineer
- (C) chief engineer
- (D) chief mate

If choice A is selected set score to 1.

28. The water in which a vessel floats provides vertical upward support. The point through which this support is assumed to act is known as the center of _____.

- (A) effort
- (B) buoyancy
- (C) gravity
- (D) flotation

If choice B is selected set score to 1.

29. After ballasting a fuel tank, which of the listed valves should you close FIRST?

- (A) Sea suction valve
- (B) Tank manifold filling valve
- (C) Deck filling valve
- (D) Pump discharge valve

If choice A is selected set score to 1.

30. When lowering lifeboats as the vessel is pitching in heavy seas, a good practice is to rig frapping lines _____.

- (A) on only the forward falls
- (B) on only the after falls
- (C) fore and aft with a lead of about 45° to the boat
- (D) from the falls to the tricing gear

If choice C is selected set score to 1.

31. The most important reason for taking anti-seasickness pills as soon as possible after entering a life raft is to _____.

- (A) assist in sleeping
- (B) reduce appetite by decreasing nausea
- (C) prevent loss of body moisture by vomiting
- (D) prevent impaired judgment due to motion-induced deliriousness

If choice C is selected set score to 1.

32. Which of the following components provides a direct source of sea water for the fire main system?

- (A) Sea chest suction
- (B) Cofferdam sluice valve
- (C) Rose box suction
- (D) Fire pump stuffing box

If choice A is selected set score to 1.

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

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

If choice D is selected set score to 1.

34. The longer an oil fire is permitted to burn, the _____.

- (A) easier it is to extinguish
- (B) less chance there is of reignition
- (C) harder it is to extinguish
- (D) easier it is to control

If choice C is selected set score to 1.

35. Hazardous conditions exist which may result in spontaneous combustion when _____.

- (A) powdered aluminum is stowed dry
- (B) oil soaked rags are stowed in the machine shop
- (C) dry metal turnings accumulate
- (D) all of the above

If choice B is selected set score to 1.

36. If a vessel rolls to the starboard side, and there are no movable or moving weights onboard, the center of gravity will _____.

- (A) move to starboard
- (B) move to port
- (C) move directly down
- (D) stay in the same position

If choice D is selected set score to 1.

37. Which type of respiratory protection is preferable for the repair/investigation personnel in a hydrogen sulfide (H_2S) environment?

- (A) Emergency Escape Breathing Apparatus (EEBA)
- (B) U.S. Navy Oxygen Breathing Apparatus (OBA)
- (C) Positive Self-Contained Breathing Apparatus (SCBA)
- (D) Self-Contained Demand-Type Breathing Apparatus (SCDBA)

If choice C is selected set score to 1.

38. If a fire ignites in the engine room as a result of a high-pressure fuel oil leak, you should FIRST _____.

- (A) secure the ventilation
- (B) secure the generator
- (C) find a soda acid extinguisher
- (D) shut off the fuel oil supply

If choice D is selected set score to 1.

39. The highest concentration of a harmful substance to which a person may be exposed without danger to health, is termed the _____.

- (A) vapor pressure
- (B) tolerance point
- (C) threshold limit value
- (D) odor threshold

If choice C is selected set score to 1.

40. The reading of a combustible gas indicator indicates the percentage of the _____.

- (A) lower explosive limit of a flammable gas concentration
- (B) upper explosive limit of a flammable gas concentration
- (C) concentration of flammable gas in a compartment
- (D) concentration by weight of nonflammable gas in a compartment

If choice A is selected set score to 1.

41. When launching an inflatable life raft, you should make sure that the operating cord is _____.

- (A) fastened to some substantial part of the vessel
- (B) secured to the hydrostatic release
- (C) fastened to the raft container
- (D) not fastened to anything

If choice A is selected set score to 1.

42. When compared to other fire extinguishing agents, water fog _____.

- (A) has the greatest ability to produce foam
- (B) has the greatest cooling ability
- (C) will completely remove toxic fumes from the air
- (D) will completely remove combustible vapors from the air

If choice B is selected set score to 1.

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

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

If choice B is selected set score to 1.

44. 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

If choice D is selected set score to 1.

45. When combating a major electrical fire at sea, the main consideration is _____.

- (A) preventing salt water damage to electrical equipment
- (B) reducing the possibility of electrical shock to personnel
- (C) preventing a total loss of electrical power
- (D) eliminating the toxic fumes from burning insulation

If choice B is selected set score to 1.

46. A compartment is tested and found to contain 20.8% oxygen by volume, permissible concentrations of toxic materials, and concentrations of flammable gas just below the lower flammable limit. If the residues are not capable of producing toxic materials or flammable concentrations, what would be the designation listed on the marine chemist's certificate?

- (A) Safe for men - Safe for Fire
- (B) Not safe for men - Not Safe for Fire
- (C) Safe for men - Not Safe for Fire
- (D) Not safe for men - Safe for Fire

If choice C is selected set score to 1.

47. The air flow depicted in figure 1 of the illustration is an example of which type of ventilation?
Illustration SF-0013

- (A) Combination.
- (B) Vertical.
- (C) Horizontal.
- (D) Parallel.

If choice A is selected set score to 1.

48. Wooden shoring is used in shipboard damage control to _____.

- (A) prevent fractures from spreading
- (B) support a damaged bulkhead in position
- (C) force a warped bulkhead back into its normal position
- (D) force a sprung bulkhead back into place

If choice B is selected set score to 1.

49. Which of the following statements is true concerning the Halon 1301 fire extinguishing agent?

- (A) The agent is less effective than carbon dioxide.
- (B) Halon extinguishes the fire by a chain breaking reaction.
- (C) The agent cannot be used on electrical fires because it leaves a residue.
- (D) The agent is highly toxic as stored in pressurized cylinders.

If choice B is selected set score to 1.

50. Which of the components listed are interchangeable between different backpack self-contained breathing apparatus produced by various manufacturers?

- (A) The face piece
- (B) The air cylinder
- (C) The regulator
- (D) All of the above

If choice B is selected set score to 1.

51. When the cotton cover of a fire hose becomes oily or greasy, it should be washed with a solution of mild soapy fresh water and _____.

- (A) a soft-bristled brush
- (B) paint thinner
- (C) a wire brush
- (D) cornstarch

If choice A is selected set score to 1.

52. Which extinguishing agent is the best for use on electrical fires?

- (A) Water fog
- (B) Dry chemical
- (C) Foam
- (D) CO₂

If choice D is selected set score to 1.

53. Which of the following statements is true regarding oxygen indicators?

- (A) The instrument is capable of providing an immediate accurate reading of any space with no delay.
- (B) Prolonged exposure to gases such as CO₂ may affect the accuracy of the indicator.
- (C) A cotton filter placed in the end of the sampling tube prevents damaging the instrument when exposed to strongly acidic gases.
- (D) All of the above.

If choice B is selected set score to 1.

54. A magnesium fire would be classified as a _____.

- (A) class "A"
- (B) class "B"
- (C) class "C"
- (D) class "D"

If choice D is selected set score to 1.

55. While retrieving the survival craft, the engine should be stopped _____.

- (A) when the craft clears the water
- (B) when the cable has been attached
- (C) on approach to the platform
- (D) at the embarkation

If choice A is selected set score to 1.

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

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

If choice D is selected set score to 1.

57. A low velocity fog applicator is retained in an all-purpose nozzle by a bayonet joint. The applicator is prevented from rotating in the joint by _____.

- (A) a locknut
- (B) a keeper screw
- (C) a spring-loaded catch
- (D) water pressure

If choice C is selected set score to 1.

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

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

If choice B is selected set score to 1.

59. The weight of the liquid displaced by a vessel floating in sea water is equal to the _____.

- (A) displaced submerged volume
- (B) weight required to sink the vessel
- (C) total weight of the vessel
- (D) reserve buoyancy

If choice C is selected set score to 1.

60. The term "oil", as used in the Pollution Prevention Regulations 33 CFR Subchapter O, means _____.

- (A) crude oil only
- (B) liquefied petroleum gas
- (C) petroleum oil of any kind
- (D) fuel oil only

If choice C is selected set score to 1.

61. In order for the automatic lifeboat drain to operate properly _____.

- (A) the cap should be removed to drain the boat when it is waterborne
- (B) the cage must be free of rubbish or the ball may not seat properly
- (C) there is an automatic ball check located in a siphon tube
- (D) the small lever to release the rubber ball float must be turned counter-clockwise

If choice B is selected set score to 1.

62. Which of the following statements represents the correct action to take when three crew members discover a fire?

- (A) One man report the fire, one man fight the fire, and one man act as a safety observer.
- (B) One man report the fire, and the other two men fight the fire.
- (C) One man report the fire, one man fight the fire and one man evacuate and secure the area.
- (D) All three men fight the fire and report it immediately after it is extinguished.

If choice C is selected set score to 1.

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

- (A) fuel
- (B) oxygen
- (C) heat
- (D) electricity

If choice D is selected set score to 1.

64. The wooden plug fitted tightly in the vent of a damaged tank may prevent the tank from _____.

- (A) collapsing
- (B) developing free surface moments
- (C) developing free surfaces
- (D) filling completely

If choice D is selected set score to 1.

65. Many uninspected motor vessels require load lines. For the purpose of the Load Line Regulations, the term "surveyor" means _____.

- (A) any person designated by the American Bureau of Shipping who actually examines the vessel
- (B) an officer of the Coast Guard designated by the commandant to command all Coast Guard activities within his district
- (C) any person from the Coast Guard who is in charge of a marine inspection zone
- (D) any person from the Coast Guard who performs duties with respect to the inspection, enforcement, and administration of Title 52 of the revised statute

If choice A is selected set score to 1.

66. The explosive range of methane is 5% to 15% by volume in air. This means a vapor/air mixture of _____.

- (A) 3 percent methane by volume is too rich to burn
- (B) 5 percent methane by volume will give a reading of 100 percent LEL on a combustible gas indicator
- (C) 10 percent methane by volume is too rich to burn
- (D) 20 percent methane by volume is too lean to burn

If choice B is selected set score to 1.

67. Which of the petroleum products listed has a flash point below 150°F?

- (A) Light fuel oils
- (B) Lubricating oils
- (C) Road oils
- (D) Asphalt

If choice A is selected set score to 1.

68. 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 pump room

If choice D is selected set score to 1.

69. If the cause of a sudden severe list is due to negative initial stability, counter-flooding into empty ballast tanks may _____.

- (A) cause an increase in the righting arm
- (B) bring the unit to an upright equilibrium position
- (C) cause the unit to flop to a greater angle
- (D) increase the righting moment

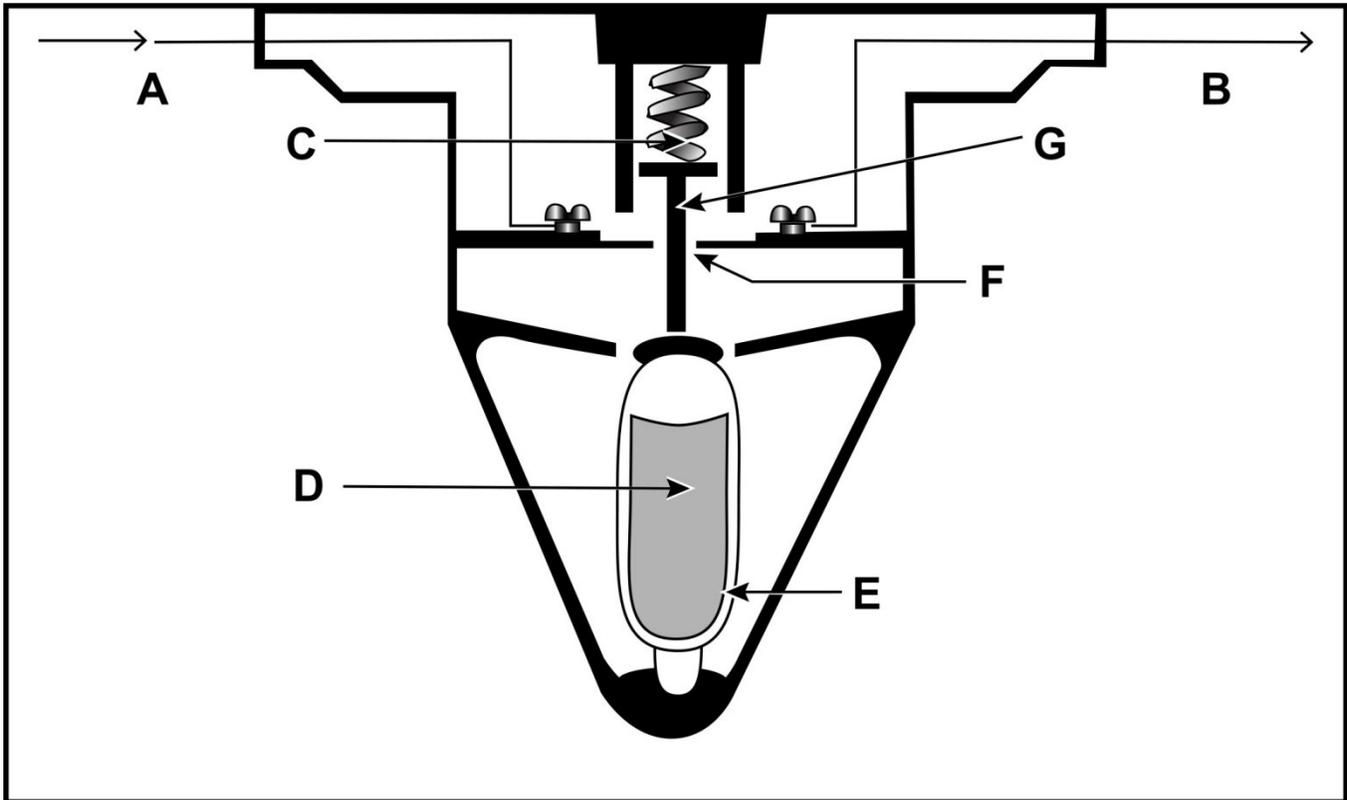
If choice C is selected set score to 1.

70. In accordance with 33 CFR Subchapter O (Pollution), the definition of gray water includes drainage from which of the following?

- (A) dishwashers
- (B) hospital sinks
- (C) toilets
- (D) cargo spaces

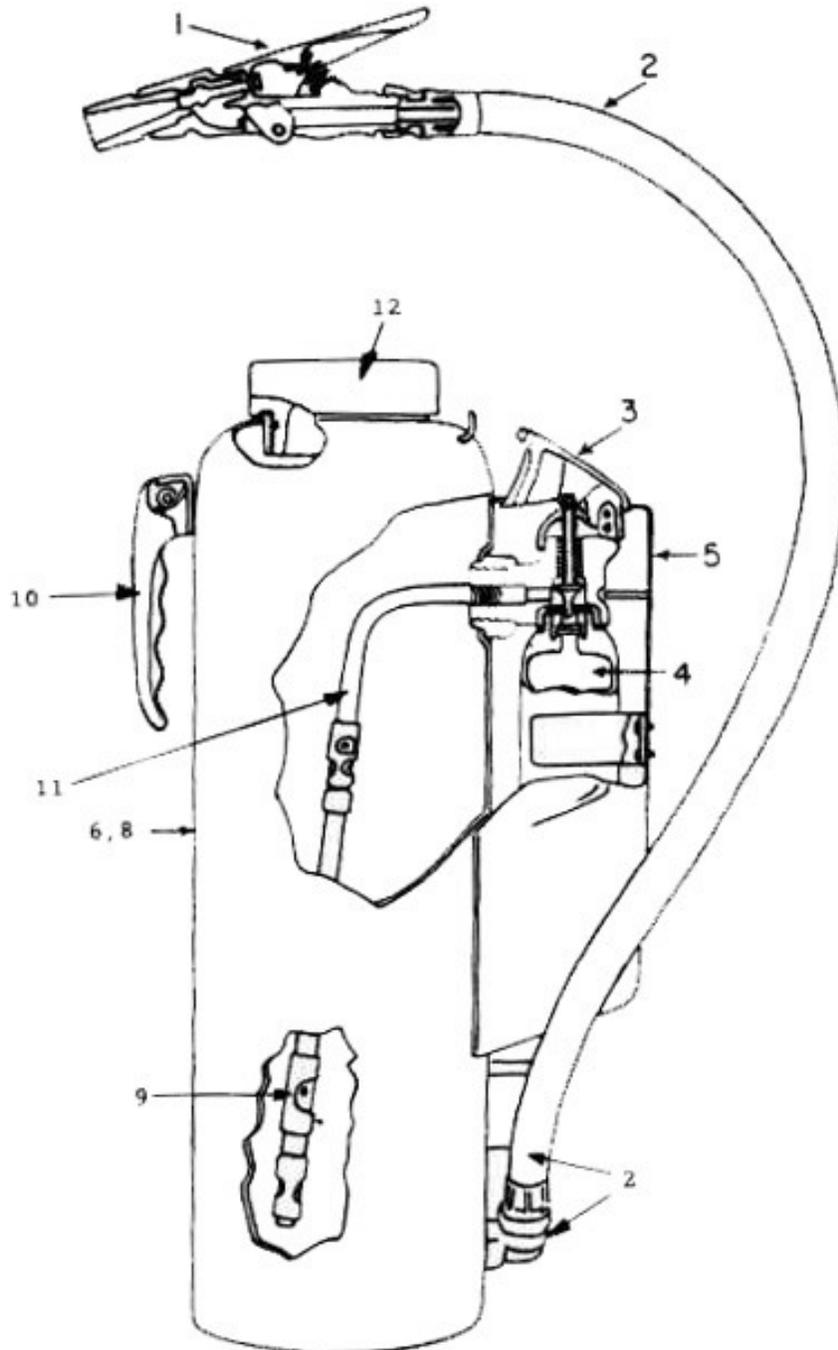
If choice A is selected set score to 1.

SF-0004



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SF-0006



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SF-0013

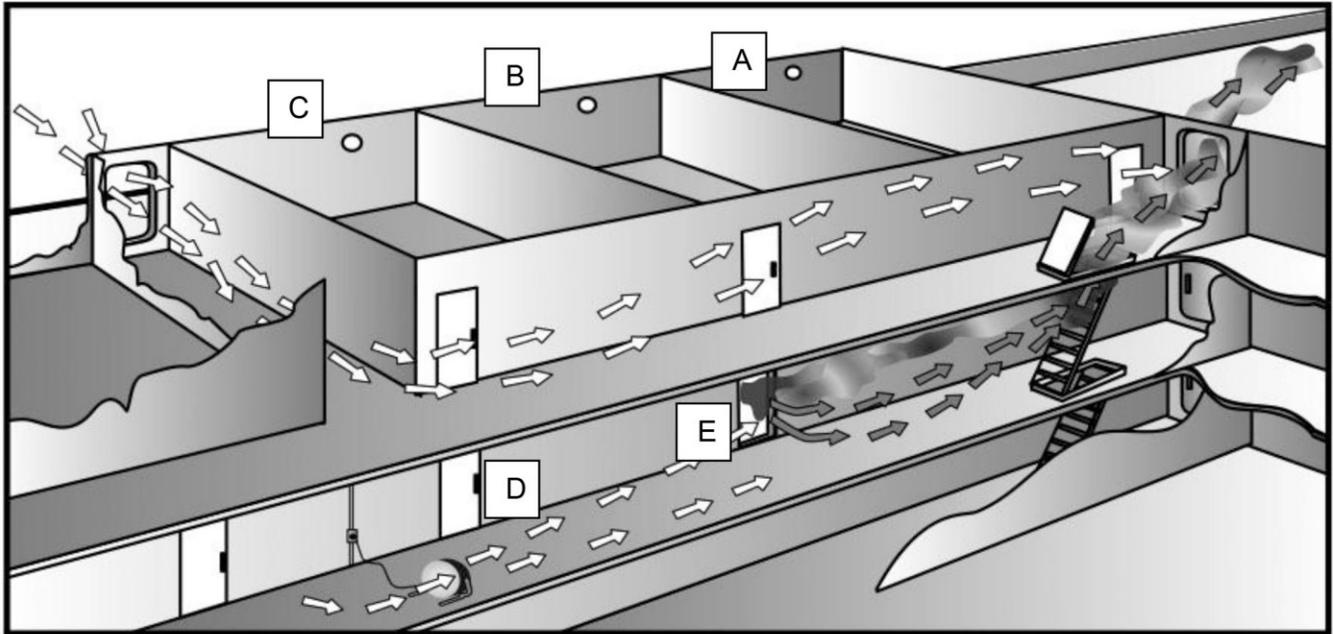


Figure 1

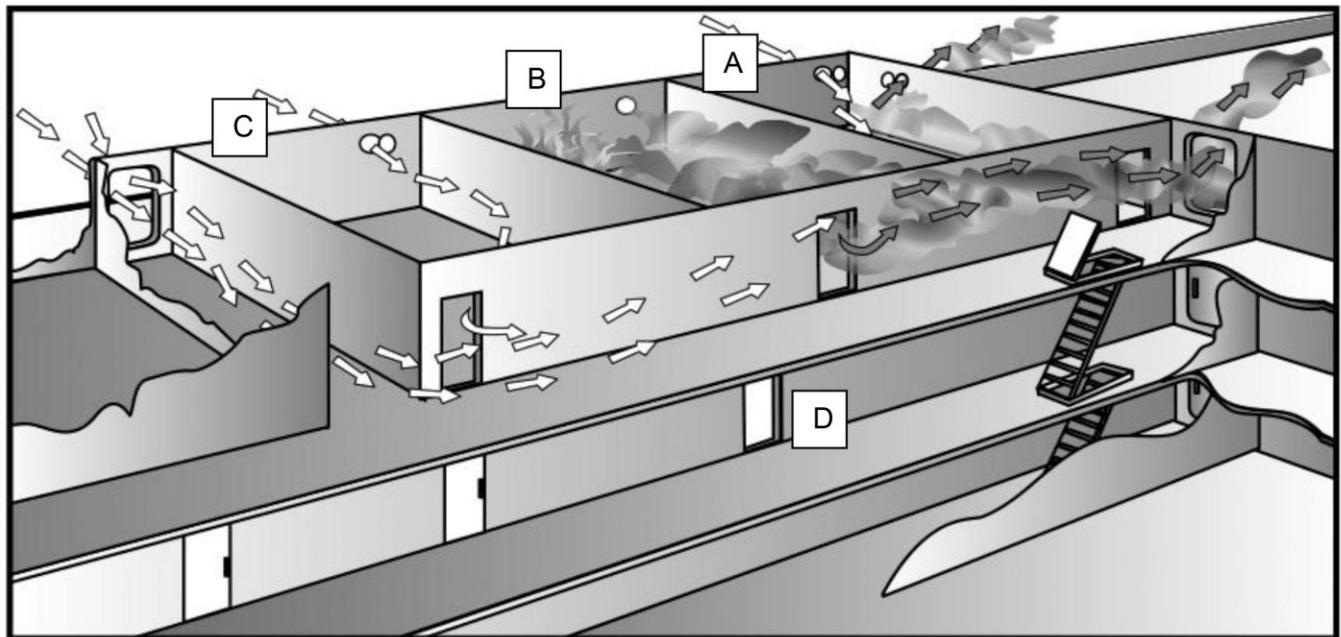


Figure 2

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SF-0022



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