

U.S.C.G. Merchant Marine Exam

Chief Engineer-UFIV

Q696 Engineering Safety-Environmental Protection

(Sample Examination)

Choose the best answer to the following Multiple Choice Questions.

1. (3.6.8.7-4) In the event of a vessel fire in port, shore side firefighters can find details on vessel's fire control plans in which of the following locations?

- (A) A watertight enclosure located on the bridge wing.
- (B) A watertight enclosure located at the lifeboats.
- (C) A watertight enclosure located outside the accommodations.
- (D) With the vessel agent.

If choice C is selected set score to 1.

2. The primary function of an automatic sprinkler system is to _____.

- (A) instantaneously extinguish the fire which triggered it
- (B) protect people in the areas which have had sprinkler heads installed
- (C) limit the spread of the fire and control the amount of heat produced
- (D) alert the crew to the fire

If choice C is selected set score to 1.

3. A fire in the paint locker would probably be _____.

- (A) Class A
- (B) Class B
- (C) Class C
- (D) Class D

If choice B is selected set score to 1.

4. One of the disadvantages of using carbon dioxide to extinguish a fire in an enclosed space is _____.

- (A) the CO₂ gas is lighter than air and a large amount is required to extinguish a fire near the deck
- (B) rapid dissipation of the CO₂ vapor
- (C) the "snow" which is sometimes discharged along with the gas is toxic
- (D) prolonged exposure to high concentrations of CO₂ gas causes suffocation

If choice D is selected set score to 1.

5. According to 33 CFR's, the approval period for a shipboard oil pollution emergency plan expires after _____.

- (A) one year
- (B) two years
- (C) four years
- (D) five years

If choice D is selected set score to 1.

6. Victual waste is _____.

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

If choice B is selected set score to 1.

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

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

If choice B is selected set score to 1.

8. Good housekeeping on a vessel prevents fires by _____.

- (A) allowing better access in an emergency
- (B) eliminating potential fuel sources
- (C) eliminating trip hazards
- (D) improving personnel qualifications

If choice B is selected set score to 1.

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

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

If choice D is selected set score to 1.

10. When preparing to pump flammable liquids with a centrifugal pump, you should _____.

- (A) lift the relief valve by hand to check its operation
- (B) have a standby pump running with the discharge valve closed
- (C) check for gland leakage and any fire hazard
- (D) draw a small quantity of liquid to prime the pump

If choice C is selected set score to 1.

11. Which of the following conditions is true concerning flammable liquid vapors with a concentration above the upper explosive limit?

- (A) The mixture is too lean to burn.
- (B) The mixture is too rich to burn.
- (C) The vapor is about to explode.
- (D) Conditions are perfect for combustion.

If choice B is selected set score to 1.

12. 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.

If choice B is selected set score to 1.

13. As team leader of the ship's No.2 emergency squad, you have just informed the bridge that the fire in the galley has been extinguished. What would you instruct your squad to do next?

- (A) Set a reflash watch in the galley.
- (B) Send them to coffee.
- (C) Refill any SCBA bottles used during the fire.
- (D) Restock the emergency locker; replacing any equipment used during the fire.

If choice A is selected set score to 1.

14. An oxygen indicator will detect _____.

- (A) the presence of harmful amounts of carbon monoxide
- (B) an oxygen deficiency in a space
- (C) concentrations of explosive gas
- (D) all of the above

If choice B is selected set score to 1.

15. 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 warmed charge of CO₂ would not be effective in extinguishing a fire.
- (B) Excessive condensation inside the tank would freeze causing a restriction in the discharge piping.
- (C) Liquid CO₂ would overflow from the tank through the drain line as the temperature is increased.
- (D) The entire charge may eventually be lost due to CO₂ boil-off venting through the relief valve.

If choice D is selected set score to 1.

16. 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

If choice C is selected set score to 1.

17. 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 gravity
- (D) vapor level

If choice A is selected set score to 1.

18. As chief engineer or first assistant engineer you should be familiar with the six motions of a vessel. Which of these motions affects the governing "transverse" stability?

- (A) Roll
- (B) Pitch
- (C) Sway
- (D) Surge

If choice A is selected set score to 1.

19. 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.

20. 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

If choice C is selected set score to 1.

21. 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) Charge the ship's fire main.
- (B) Start boundary cooling the area.
- (C) Secure power and ventilation to the laundry room and inform the bridge once this is done.
- (D) Help dress out other crew members in fireman's outfit.

If choice C is selected set score to 1.

22. A fire can be extinguished by removing _____.

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

If choice D is selected set score to 1.

23. Which of the following precautions are necessary when using any electrical equipment in a hazardous location, such as a cargo pump room?

- (A) Each compartment where flammable gas is expected to accumulate is to be closed and secured.
- (B) The adjacent compartments are to be gas free.
- (C) The pump room is to be gas free.
- (D) All of the above.

If choice D is selected set score to 1.

24. The most important characteristic of a fire extinguishing agent to be used on electrical fires is for the agent to be _____.

- (A) non-conducting
- (B) wet
- (C) flame resistant
- (D) easily removable

If choice A is selected set score to 1.

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

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

If choice B is selected set score to 1.

26. While donning the positive pressure self-contained breathing apparatus, you discover that the air cylinder pressure gage and the regulator pressure gage differ from each other by 500 psi. Which of the listed actions should you consider as appropriate?

- (A) Replace the defective gages with a new pair from the spare parts inventory.
- (B) Replace the air cylinder.
- (C) Take the average of the two gages as the correct pressure.
- (D) Assume that the lower gage reading is correct.

If choice D is selected set score to 1.

27. When taking samples of a tank atmosphere with an explosimeter, you should _____.

- (A) avoid sampling in the vicinity of deep webs to prevent false readings
- (B) sample as much of the tank as possible, especially at the bottom
- (C) only sample around the deck longitudinals as gases are lighter than air
- (D) sample only near the ullage openings as all vapors accumulate there

If choice B is selected set score to 1.

28. As chief engineer or first assistant engineer you should be familiar with the six motions of a vessel. Which of these motions affects the governing "lateral motion" stability?

- (A) Surge
- (B) Heave
- (C) Yaw
- (D) Sway

If choice D is selected set score to 1.

29. It is necessary to cool the bulkheads and decks surrounding a compartment where there is a fire in order to _____.

- (A) cool the metal below its ignition temperature
- (B) form a dense coating of smothering steam
- (C) prevent oxygen from reaching the flames
- (D) prevent the fire from spreading by the conduction of heat

If choice D is selected set score to 1.

30. Tankers carrying cryogenic cargoes, such as LNG, are fitted with gas detector systems alarmed at 30% of the lower explosive limit. If the gas detector alarm sounds, this means _____.

- (A) a flammable vapor concentration exists at the sample point, but it is too lean to burn
- (B) an explosion is about to take place
- (C) the detector sensor is sampling a space where the cargo vapor concentration is 30 percent by volume
- (D) the detector is sampling a space in which 30 percent of the atmosphere is explosive

If choice A is selected set score to 1.

31. 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

If choice C is selected set score to 1.

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

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

If choice B is selected set score to 1.

33. By what method is the final light ship weight, longitudinal and vertical centers of gravity of a vessel, and final assignment of the load lines determined?

- (A) By relying on calculations based on ballasting a light vessel to full load displacement.
- (B) By relying on naval architectural design calculations.
- (C) By relying on resultant calculations from an inclining experiment.
- (D) By actually shifting ballast horizontally and longitudinally and relying on resultant calculations.

If choice C is selected set score to 1.

34. The principle personnel hazard unique to Halon fire extinguishers is _____.

- (A) skin irritation
- (B) displacement of oxygen
- (C) eye irritation produced immediately after discharge from cylinder
- (D) inhaling toxic vapors produced when exposed directly to a flame for extended periods

If choice D is selected set score to 1.

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

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

If choice D is selected set score to 1.

36. In order to retrieve an inflatable life raft and place it on deck, you should heave on the _____.

- (A) lifelines
- (B) righting strap
- (C) sea anchor
- (D) towing bridle

If choice D is selected set score to 1.

37. Servicing of a cartridge-operated dry chemical fire extinguisher aboard ship would include ensuring that the _____.

- (A) pressure gage is within the operating range
- (B) recharge of weight loss exceeds 10% of the weight of charge
- (C) cartridge weight is not less than 1/4 ounce of weight stamped on cartridge
- (D) powder is not caked and there is a full charge

If choice D is selected set score to 1.

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

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

If choice B is selected set score to 1.

39. As chief engineer sailing aboard chemical tankers you frequently review the best practices regarding firefighting during safety meetings. Which of the following would align with industry best practice regarding the use of water in extinguishing chemical fires?

- (A) Water is best used for cooling of the chemical itself as well as surrounding areas.
- (B) Water is best applied from opposing directions to ensure maximum effectiveness.
- (C) Water is best applied to the chemical fire in a solid stream in order to maximize effectiveness.
- (D) Water is best applied in spray form to smother the chemical fire.

If choice A is selected set score to 1.

40. You are involved in an emergency landing of a helicopter on the water. You should inflate your life jacket _____.

- (A) upon entering the helicopter
- (B) prior to reaching the water
- (C) after reaching the water, but prior to exiting the helicopter
- (D) after exiting clear of the helicopter

If choice D is selected set score to 1.

41. 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

If choice B is selected set score to 1.

42. Which of the following methods will reduce the possibility of producing an electrical spark?

- (A) Using a cargo hose with a built-in electrical bonding wire.
- (B) Connecting a bonding wire between the shore side piping and the vessel.
- (C) Placing an insulating flange or a section of non-conducting hose in the hose setup.
- (D) All of the above.

If choice D is selected set score to 1.

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

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

If choice C is selected set score to 1.

44. If a fire broke out in an automation console, you would first secure the power and then proceed to use which of the listed hand portable fire extinguishers?

- (A) CO₂
- (B) Foam
- (C) Dry chemical
- (D) Soda acid

If choice A is selected set score to 1.

45. 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

If choice C is selected set score to 1.

46. 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.

47. If flammable vapors have penetrated a gas free space, which of the following actions would be the most hazardous to perform?

- (A) Opening switches in the space to de-energize circuits.
- (B) Closing switches adjacent to the space to operate vent fans.
- (C) Leaving electrical circuits energized in the space.
- (D) Securing all power to the space from a remote location.

If choice A is selected set score to 1.

48. The fire extinguishing equipment shown in the illustration is a large _____. Illustration SF-0009

- (A) Halon 1301 hose reel system
- (B) CO₂ hose reel system
- (C) light water hose reel system
- (D) dry chemical hose reel system

If choice D is selected set score to 1.

49. While maneuvering up the East River your vessel runs aground. As the chief engineer of the vessel how would you proceed?

- (A) Sound all fuel oil tanks and inspect the engine room bilges and void spaces.
- (B) Switch the salt water cooling suction to the low sea suction.
- (C) Wait until the vessel docks to sound the fuel oil tanks.
- (D) Call your port engineer.

If choice A is selected set score to 1.

50. Your vessel, of more than 1000 gross tons on an international voyage is crossing the Atlantic Ocean. The second engineer injures his hand while working on a pump. The injury requires more than basic first aid. As the senior officer onboard how would you proceed?

- (A) Read an outdated copy of the Ships Medicine Chest reference book found onboard to help treat the injury.
- (B) Seek help from fellow crew members who have no medical training.
- (C) Contact the medical advisory service contracted by your company to speak with a shore side doctor and address the injury as directed by the doctor.
- (D) Call your company port engineer and ask for help.

If choice C is selected set score to 1.

51. You are on a vessel with a 30' mean draft. While maneuvering away from the dock at slow-speed the vessel grounds near the bow area on hard sand. In order to achieve an additional three foot of trim by the stern, you need to shift ballast from the forepeak, which is full, to the after peak, which is empty. Your ballast pump for this operation has a capacity of 85 tons per hour. How much tonnage needs to be shifted and how long should it take?

- (A) 9 tons shifted from the forepeak to the after peak in 0h 7m.
- (B) 143 tons shifted from the forepeak to the after peak in 1h 41m.
- (C) 1333 tons shifted from the forepeak to the after peak in 15h 41m.
- (D) The tons to shift for a 36" trim exceeds the tank capacity.

If choice D is selected set score to 1.

52. Your chemical tanker was built to the IBC Code and has foam as the main firefighting medium. During one of your safety meetings you review the properties of foam as an extinguishing agent. Which of the following is a correct statement that would be appropriate to share during the meeting?

- (A) Foam will blanket the fire and cut off the supply of oxygen but it does not provide the best cooling protection for the firefighters.
- (B) Foam will blanket the fire and cut off the supply of oxygen and it also provides excellent cooling protection for the firefighters.
- (C) Foam will blanket the fire and cut off the supply of oxygen and is therefore perfectly suited to A, B and C class fires.
- (D) Foam will blanket the fire and cut off the supply of oxygen but it does generate toxic vapors that may harm the firefighters.

If choice A is selected set score to 1.

53. (3.6.6.3-1) The component shown in the illustration would be installed in which of the following types of fire detection systems? Illustration SF-0004

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

If choice A is selected set score to 1.

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

If choice B is selected set score to 1.

55. Which of the gases listed is the poisonous gas most likely to be found in a closed compartment involved in a fire?

- (A) Nitrogen
- (B) Hydrogen
- (C) Carbon dioxide
- (D) Carbon monoxide

If choice D is selected set score to 1.

56. You are the chief engineer of a vessel of more than 1600 gross tons on an international voyage. While bunkering lube oil in port, the hose fails and oil is spilled into the harbor. After securing the transfer, how would you proceed?

- (A) Perform post incident drug and alcohol testing on engine crew members not involved in the transfer operation.
- (B) Set out a boom around the ship to control the spread of the oil.
- (C) Call the local news outlets and report the oil spill.
- (D) Fill out a Declaration of Inspection for the transfer operation.

If choice B is selected set score to 1.

57. Which of the following must be carried out in order to manually launch an inflatable life raft not designed for float-free operation?

- (A) Cutting the container securing straps.
- (B) Attach the weak link to the vessel.
- (C) Simply breaking the weak link.
- (D) Depress the hydrostatic release button.

If choice D is selected set score to 1.

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

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

If choice A is selected set score to 1.

59. To activate a foam type portable fire extinguisher, you must _____.

- (A) turn the extinguisher upside down
- (B) pull the pin and squeeze the grips
- (C) pump the hand lever for pressure
- (D) strike the bottom of the extinguisher against the deck

If choice A is selected set score to 1.

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

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

If choice C is selected set score to 1.

61. Which of the following is required to be included in the fireman's (emergency) outfit?

- (A) Chemical protection face shield
- (B) Approved work vest
- (C) Self-contained breathing apparatus
- (D) 5 cell approved flashlight

If choice C is selected set score to 1.

62. The explosive range of a mixture of flammable vapors and air lies between the lower and upper explosive limits. These limits are specified as a percentage of _____.

- (A) the lower limit of explosibility of the mixture
- (B) the temperature of the flash point
- (C) oxygen present to support combustion
- (D) flammable vapor by volume in air

If choice D is selected set score to 1.

63. 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

If choice A is selected set score to 1.

64. 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

If choice A is selected set score to 1.

65. Your vessel has just been struck by another vessel. After meeting with the captain and chief mate, you have immediately ordered the vessel specific damage control procedures in the vessel's approved stability booklet to be enacted. Which of the following statements is true?

- (A) The Certificate of Documentation issued to the vessel will be the primary reference document in order to calculate free surface corrections.
- (B) The universal station billet assigning crew member responsibilities will provide adequate reference information to determine the adequate damage control response.
- (C) The Safety Management System will provide an IMO standard response for all collision response procedures, including damage control.
- (D) The vessel general arrangement plan would be a critical reference document for your response providing accurate data showing watertight compartments, closures, vents and down flooding angles.

If choice D is selected set score to 1.

66. 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.

If choice D is selected set score to 1.

67. 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.

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

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

If choice B is selected set score to 1.

69. You are conducting training on fire fighting procedures. What type of fire is characterized by the burning of flammable liquids, greases, etc., where a blanketing effect is essential?

- (A) Type A
- (B) Type B
- (C) Type C
- (D) Type D

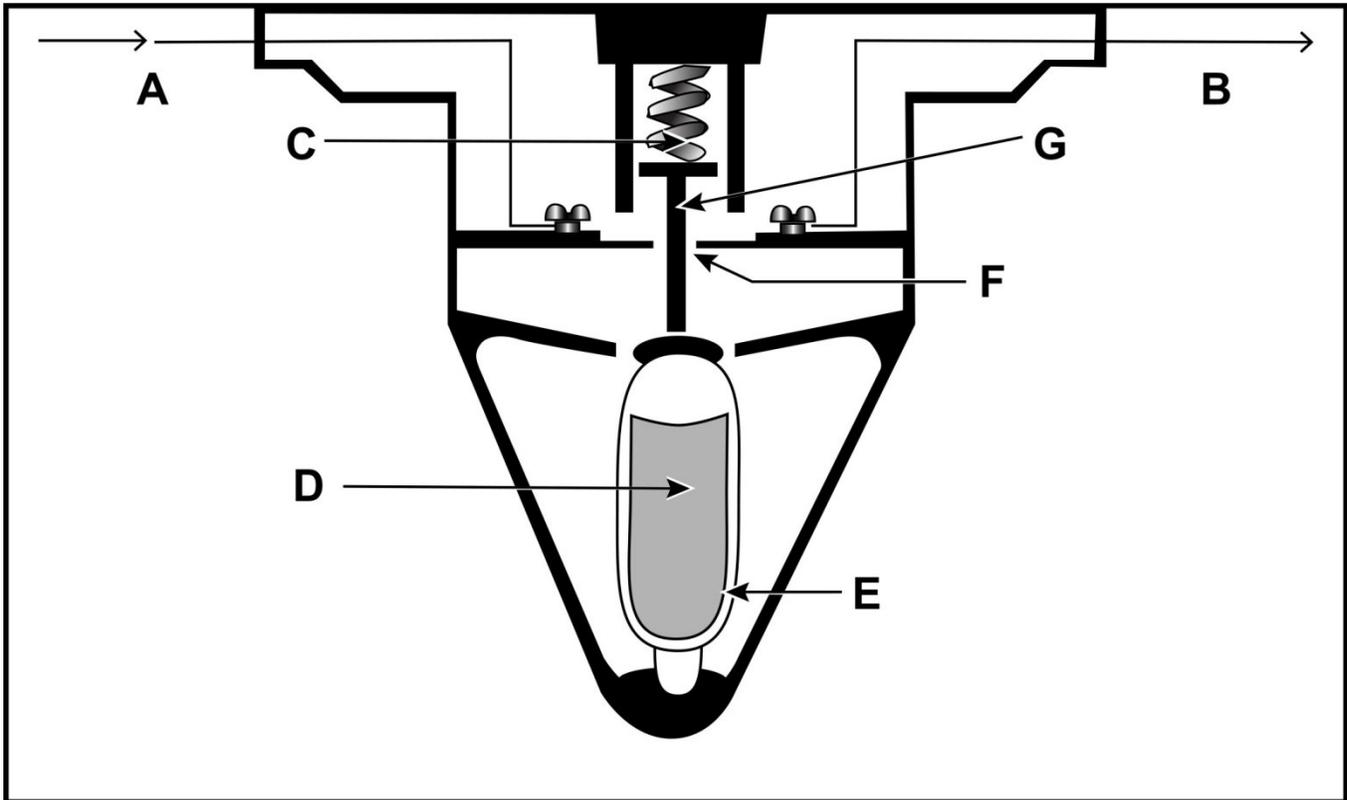
If choice B is selected set score to 1.

70. A fuel tank is considered to be gas free when the tank is _____.

- (A) inerted with carbon dioxide for 24 hours
- (B) free of all dangerous concentrations of flammable or toxic gases
- (C) thoroughly ventilated for at least 24 hours
- (D) free of most flammable gas concentrations

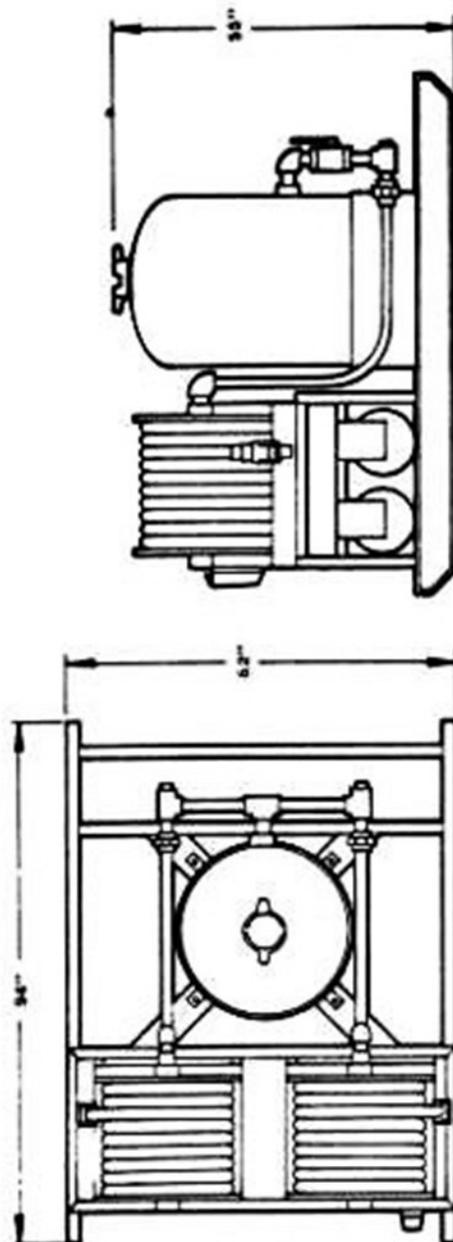
If choice B is selected set score to 1.

SF-0004



Adapted for testing purposes only from Marine Fire Prevention, Firefighting and Fire Safety
U.S. Department of Transportation Maritime Administration

SF-0009



SF-0013

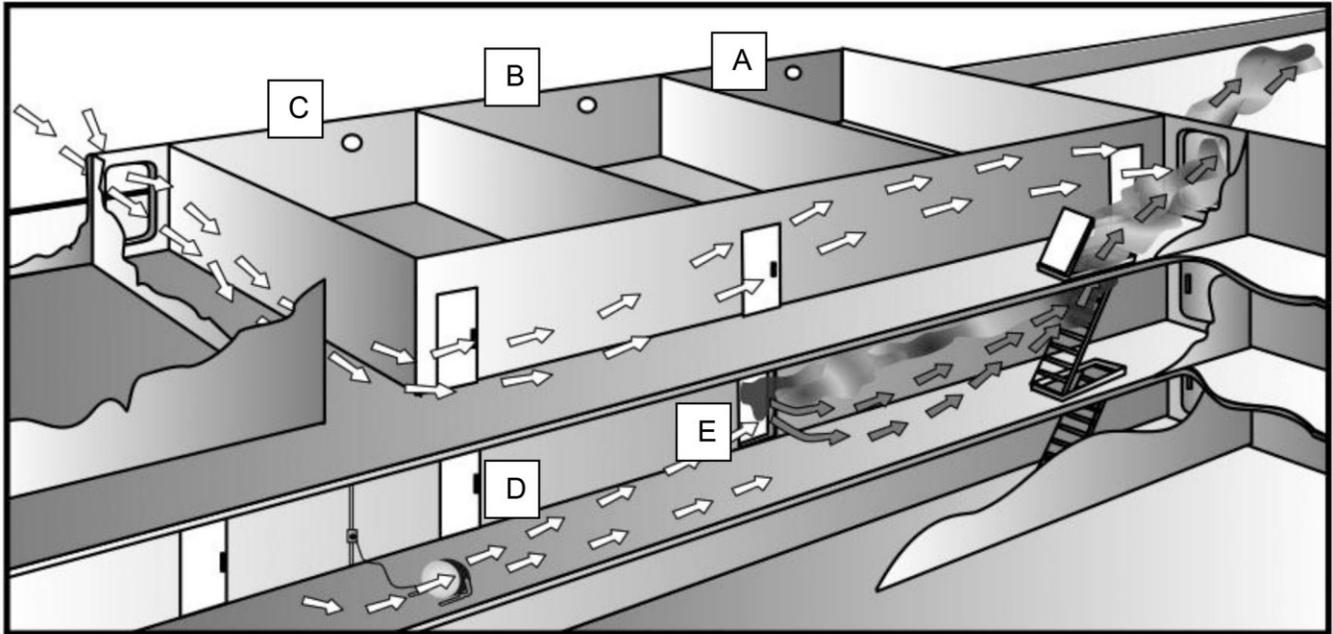


Figure 1

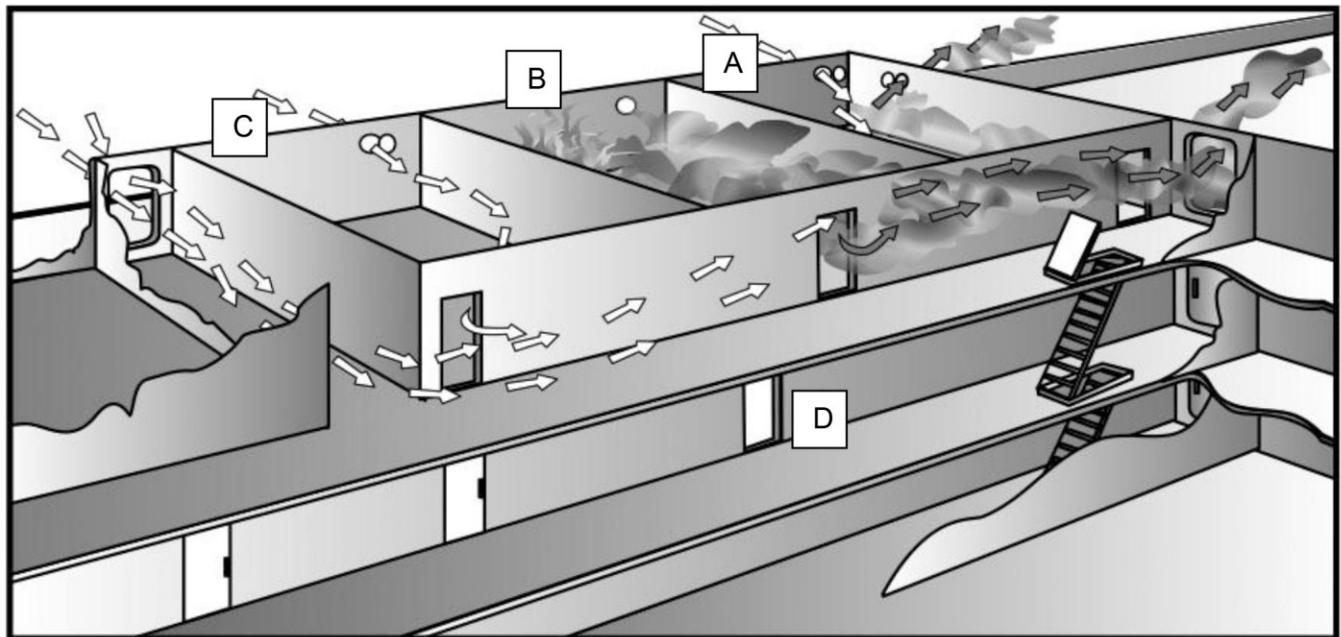
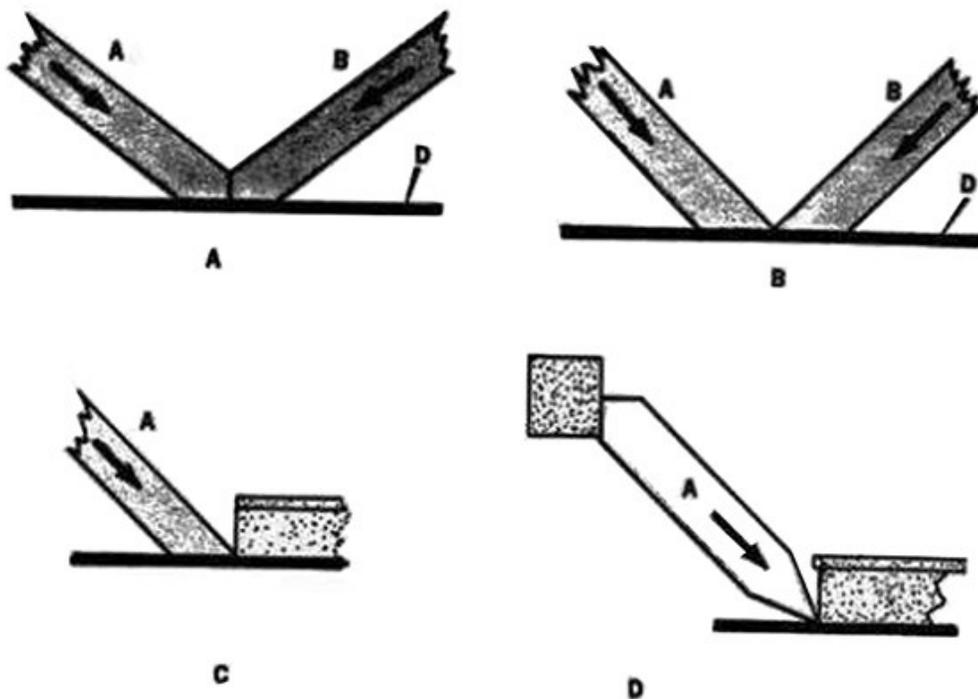


Figure 2

Adapted for testing purposes only from Marine Fire Prevention, Firefighting and Fire Safety
U.S. Department of Transportation Maritime Administration

Further reproduction prohibited without permission

SF-0016



Adapted for testing purposes only from Handbook of Damage Control
NAVEDTRA 16191