

U.S.C.G. Merchant Marine Exam
First Assistant Engineer, Unlimited
Q516 Engineering Safety-Environmental Protection
(Sample Examination)

Choose the best answer to the following Multiple Choice Questions.

1. A low velocity fog applicator is held in an all-purpose nozzle by a bayonet joint. The applicator is prevented from rotating in the joint by _____.
- (A) a keeper screw
 - (B) water pressure
 - (C) a locknut
 - (D) a spring-loaded catch

If choice D is selected set score to 1.

2. After transferring a weight forward on a vessel, the draft at the center of flotation will _____.
- (A) change, depending on the location of the LCG
 - (B) increase
 - (C) decrease
 - (D) remain the constant

If choice D is selected set score to 1.

3. 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.

4. 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.

5. According to the Pollution Prevention Regulations (33 CFR), who makes the final decision of when oil transfer may begin?

- (A) The designated person in charge
- (B) The senior deck officer present
- (C) The captain of the port
- (D) Any local Coast Guard representative

If choice A is selected set score to 1.

6. You are reviewing emergency procedures with new crew members. How would you direct them to proceed if they hear the fire and emergency signal on the ship's general alarm or whistle?

- (A) Report to the bridge and wait further instructions.
- (B) Report to their stateroom and wait further instructions.
- (C) Report to their assigned duty station as posted on the Station Bill, so an accurate muster can be taken.
- (D) Report directly to the scene of the emergency to help.

If choice C is selected set score to 1.

7. 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.

8. Pitching is the rising and falling motion of the bow of a ship oscillating about which axis?

- (A) Longitudinal
- (B) Centerline
- (C) Vertical
- (D) Transverse

If choice D is selected set score to 1.

9. During an inspection of a ship's storeroom, you find sealed containers of chemicals labeled "potassium bicarbonate" and "potassium chloride". These chemicals are most commonly used aboard ship for _____.
- (A) recharging dry chemical fire extinguishers
 - (B) degreasing machinery parts
 - (C) engine jacket water treatment
 - (D) descaling evaporator tubes

If choice A is selected set score to 1.

10. If diesel fuel vapors in a compartment are considered to be within the flammable range _____.
- (A) the vapor air mixture is too rich to burn
 - (B) an explosion may occur if a source of ignition is present
 - (C) the upper explosive limit has been exceeded
 - (D) the vapor air mixture is too lean to burn

If choice B is selected set score to 1.

11. 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 procedures to secure the fire detection system.
 - (D) The release procedures for the low-pressure CO₂ system.

If choice B is selected set score to 1.

12. 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) Send another crew member, without a SCBA on, into the tank to retrieve the unconscious crew member.
 - (B) Send two additional crew members, without a SCBA on, into the tank to retrieve the unconscious crew member.
 - (C) Have additional crew members don a SCBA to enter the tank, to aid in the removal of the unconscious crew member.
 - (D) Call the captain and ask him how you should proceed.

If choice C is selected set score to 1.

13. Fire detecting systems on merchant vessels may be arranged to sense _____.

- (A) ionized particles
- (B) smoke
- (C) rate of temperature rise
- (D) all of the above

If choice D is selected set score to 1.

14. Your vessel is carrying a cargo of Ethane, which has caught fire. Which extinguishing agent(s) should be used?

- (A) Alcohol foam, water fog
- (B) Carbon dioxide, dry chemical
- (C) Carbon dioxide, water fog
- (D) Carbon dioxide, water foam

If choice B is selected set score to 1.

15. Following cargo loading operations, your vessel is experiencing an excessive at-sea hogging bending stress as shown in the illustration. What should you do to reduce the bending moment?
Illustration SF-0047

- (A) Add ballast to the forepeak tank.
- (B) Add ballast to an amidships tank.
- (C) Add ballast to the aft peak tank.
- (D) Remove ballast from an amidships tank.

If choice B is selected set score to 1.

16. By definition, an example of a flammable liquid is _____.

- (A) caustic potash
- (B) gasoline
- (C) kerosene
- (D) animal and vegetable oils

If choice B is selected set score to 1.

17. As an engineer on a tanker of more than 1600 gross tons on an international voyage, how would you direct the fire team to combat a large cargo space fire?

- (A) Use the fixed carbon dioxide system to extinguish the fire.
- (B) Open the ullage caps and lower the level in tanks adjacent to the tank on fire.
- (C) Use the inert gas system to extinguish the fire.
- (D) Use fixed water and foam systems to extinguish the fire.

If choice D is selected set score to 1.

18. The difference between the starboard and port drafts caused by a transverse shift in weight is called _____.

- (A) trim
- (B) squat
- (C) flotation
- (D) list

If choice D is selected set score to 1.

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

If choice B is selected set score to 1.

20. What is the minimum period of time that the air supply for a self-contained breathing apparatus is required to last?

- (A) 10 minutes
- (B) 15 minutes
- (C) 30 minutes
- (D) 45 minutes

If choice C is selected set score to 1.

21. 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"

If choice A is selected set score to 1.

22. As an engineer, you should be familiar with the conditions that will cause a vessel to transversely incline, list, or trim. Which of the following conditions causes a vessel to trim?

- (A) Off-center weight.
- (B) Fore and aft shift of G.
- (C) Combination of off-center weight and a negative GM.
- (D) Negative GM.

If choice B is selected set score to 1.

23. 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.

24. A fire has been reported in the ship's laundry room. As the senior engineer, you direct the team leader of the No.1 emergency squad to secure ventilation to the space. What would your next command be to the emergency team leader, before they can actually start extinguishing the fire?

- (A) Prepare extra fire hoses.
- (B) Have electrical power secured to the laundry room. A lock-out tag should be placed on the breaker or switch stating the circuit has been de-energized, to protect crew members from electrical shock.
- (C) Prepare extra portable fire extinguishers.
- (D) Prepare the lifeboats to abandon ship.

If choice B is selected set score to 1.

25. 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) A cotton filter placed in the end of the sampling tube prevents damaging the instrument when exposed to strongly acidic gases.
- (C) Prolonged exposure to gases such as CO₂ may affect the accuracy of the indicator.
- (D) All of the above.

If choice C is selected set score to 1.

26. 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) Updraft from the fire tends to carry the CO₂ away.
- (C) Carbon dioxide takes a long time to disperse to all portions of a space.
- (D) The fire may warp the CO₂ piping.

If choice B is selected set score to 1.

27. 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.

28. While in the engine control room you smell smoke and see it coming from the vent in the main switchboard panel. Which of the many different types of extinguishers, if any, are required to be in that space and why would it be best suited to extinguish this class of fire?

- (A) A portable dry chemical extinguisher, as it is the most common type of portable extinguisher found onboard ships.
- (B) A portable CO₂ extinguisher as it will smother the fire while limiting the clean up and damage to the area around the fire.
- (C) A fixed CO₂ system as it will smother the fire while limiting the clean up and damage to the area around the fire.
- (D) No portable extinguisher is required in the engine control room.

If choice B is selected set score to 1.

29. 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.

30. If a fire hose is left unattended and under pressure with the nozzle shut off, the fire hose will _____.

- (A) lash about violently
- (B) become elongated by 125%
- (C) remain motionless
- (D) burst under pressure

If choice C is selected set score to 1.

31. In fighting a fire in a fuel tank, the FIRST action you should attempt is to _____.

- (A) secure all sources of fresh air to the tank
- (B) station someone at the fixed CO₂ release controls
- (C) top off the tank to force out all vapors
- (D) begin transferring the fuel to other tanks

If choice A is selected set score to 1.

32. Actuating the fixed CO₂ system should cause the automatic shutdown of the _____.

- (A) fuel supply only
- (B) exhaust ventilation only
- (C) mechanical and natural ventilation
- (D) supply and exhaust ventilation

If choice D is selected set score to 1.

33. 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.

34. A fuel tank on a barge has been certified by a marine chemist as being "Safe for Men" and "Safe for fire." This condition may change if _____.

- (A) the ambient temperature changes
- (B) a product leaks into the certified tank
- (C) muck, sludge, or scale in the tank give off additional vapors
- (D) all of the above

If choice D is selected set score to 1.

35. A vessel's center of gravity is lowered when the _____.

- (A) reserve buoyancy increases
- (B) freeboard is increased
- (C) tanks are ballasted
- (D) trim is increased

If choice C is selected set score to 1.

36. As chief engineer on a vessel of more than 1600 gross tons on an international voyage, 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 review the SOLAS manual 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 complete a hot-work permit prior to starting the job.

If choice D is selected set score to 1.

37. As Chief Engineer your vessel has been damaged and one compartment has partially flooded. You understand that you have lost buoyancy and have added weight. If transverse stability in the flooded condition is poor or negative, every effort should be made to reduce the free surface and to lower the center of gravity. Of main importance is for you to assure which of the following is maintained?

- (A) A no list condition.
- (B) As much reserve buoyancy as possible.
- (C) A GM that is at least neutral - G moved down to be at M.
- (D) Transfer water from ballast tanks to the opposite side of the damage.

If choice B is selected set score to 1.

38. 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.

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

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

If choice A is selected set score to 1.

40. Which of the following conditions represents the appropriate time for setting off distress flares and rockets?

- (A) Only when there is a chance of them being seen by rescue vessels.
- (B) At half-hour intervals.
- (C) At one hour intervals.
- (D) Immediately upon abandoning the vessel.

If choice A is selected set score to 1.

41. 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.

42. The most common cooling agent used for fighting fires on tank vessels is _____.

- (A) steam smothering
- (B) flue gas
- (C) water
- (D) carbon dioxide

If choice C is selected set score to 1.

43. A specific document which identifies a chemical, and lists its physical properties, health hazards, required controls, firefighting procedures, cleanup methods, waste disposal, and the safe handling and storage requirements, is commonly called a _____.

- (A) Material Safety Data Sheet
- (B) Physical/Chemical Characteristics Document
- (C) Hazardous Chemical Information Sheet
- (D) Hazardous Chemical Loading Document

If choice A is selected set score to 1.

44. To prevent oily rags from spontaneously igniting they should be _____.

- (A) discarded as soon as possible
- (B) cleaned thoroughly for reuse
- (C) kept in the paint locker
- (D) kept in nonmetal containers

If choice A is selected set score to 1.

45. 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.

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

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

If choice C is selected set score to 1.

47. By definition, combustible liquids are liquids which _____.

- (A) give off flammable vapors at or below 80°F
- (B) have a flash point of 80°F or higher
- (C) are highly volatile with a flash point of 0°F
- (D) spontaneously ignite

If choice B is selected set score to 1.

48. A vessel's stability is greatly reduced by liquid free surface. Which of the listed conditions would develop the greatest adverse effect?

- (A) Tanks which have been pressed up to full capacity.
- (B) Tanks which are 95% full.
- (C) Tanks which are 40% full.
- (D) Tanks which have been completely emptied.

If choice C is selected set score to 1.

49. 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.

50. 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.

51. 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 "longitudinal" stability?

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

If choice C is selected set score to 1.

52. As Chief Engineer you should understand the concept of loll and its cause. An angle of loll is commonly caused by which of the following conditions?

- (A) A negative GM.
- (B) An off-center weight.
- (C) Free surface with G remaining below M.
- (D) High external force such as wind and current.

If choice A is selected set score to 1.

53. 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.

54. 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.

55. Life jackets should be stowed in _____.

- (A) the forepeaks
- (B) the pump room
- (C) readily accessible spaces
- (D) locked watertight containers

If choice C is selected set score to 1.

56. "Dry Powder" fire extinguishers, which contain a mixture of graphite and sodium chloride as the extinguishing agent, are generally used to fight which type of fire?

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

If choice D is selected set score to 1.

57. 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.

58. In preparation for an extended yard period, you are reviewing your ship's plans. You notice several bulkheads are labeled A60. What is indicated by the label A60?

- (A) Materials meeting construction yard specification A60.
- (B) Damage stability bulkhead, A Class, with bulkhead strength that will limit flooding for 60 minutes.
- (C) Fire division boundary, A Class, with insulation that will limit temperature rise below the allowable level for 60 seconds.
- (D) Fire division boundary, A Class, with insulation that will limit temperature rise below the allowable level for 60 minutes.

If choice D is selected set score to 1.

59. When a rescue vessel approaches a survival craft in heavy seas, the person in charge of the survival craft should _____.

- (A) tie up to the rescue vessel
- (B) transfer only those personnel who are not seasick
- (C) wait for calmer weather before transferring personnel
- (D) transfer all personnel immediately

If choice C is selected set score to 1.

60. 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.

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

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

If choice B is selected set score to 1.

62. 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.

63. 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.

64. 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

If choice B is selected set score to 1.

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

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

If choice D is selected set score to 1.

66. A three inch overboard discharge line, located six feet below the waterline, has ruptured and separated from the hull. What would be the minimum number of strokes per minute required from a 10" x 8" x 12" duplex double acting reciprocating bilge pump, operating at 96% efficiency, to keep the bilge water level from continuing to rise? Illustration SF-0034

- (A) 45 strokes per minute
- (B) 56 strokes per minute
- (C) 87 strokes per minute
- (D) 98 strokes per minute

If choice C is selected set score to 1.

67. 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

If choice A is selected set score to 1.

68. You are the engineer on a vessel of more than 1600 gross tons 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 engine room fire pump from the chief engineer's office.
- (D) Start the emergency fire pump remotely from the bridge or emergency gear locker.

If choice D is selected set score to 1.

69. To prevent the spread of fire by convection you should _____.

- (A) cool the bulkhead around the fire
- (B) shut off electrical power
- (C) close all openings to the area
- (D) remove combustibles from direct exposure

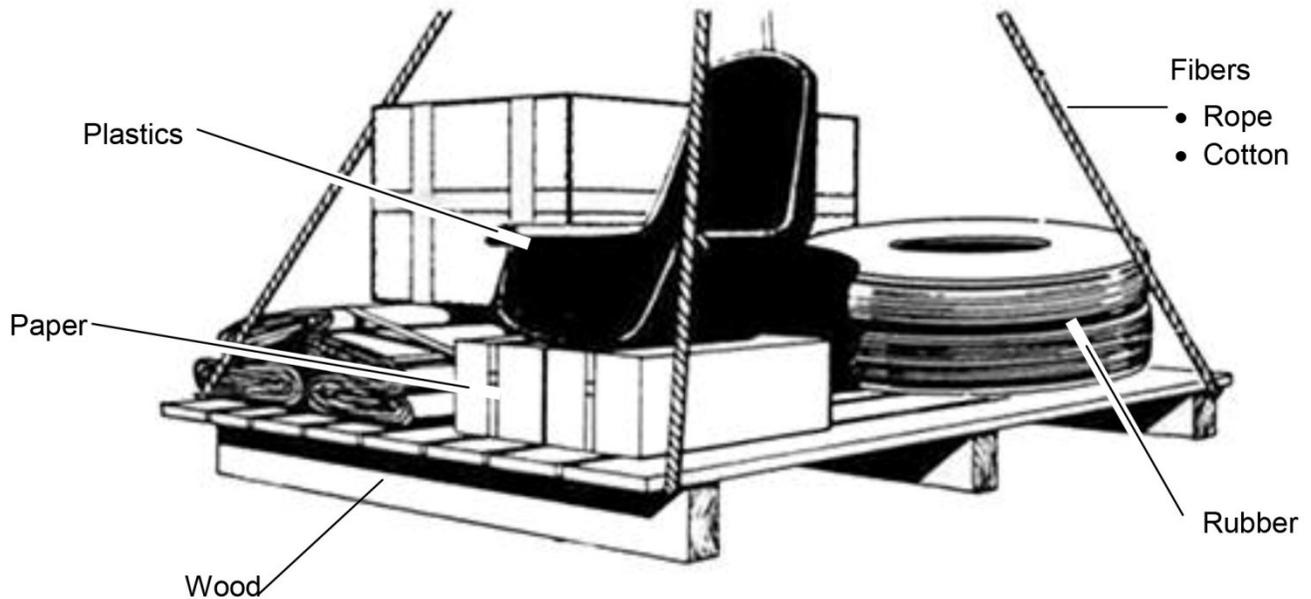
If choice C is selected set score to 1.

70. Which of the listed characteristics applies to a semi-portable CO₂ system?

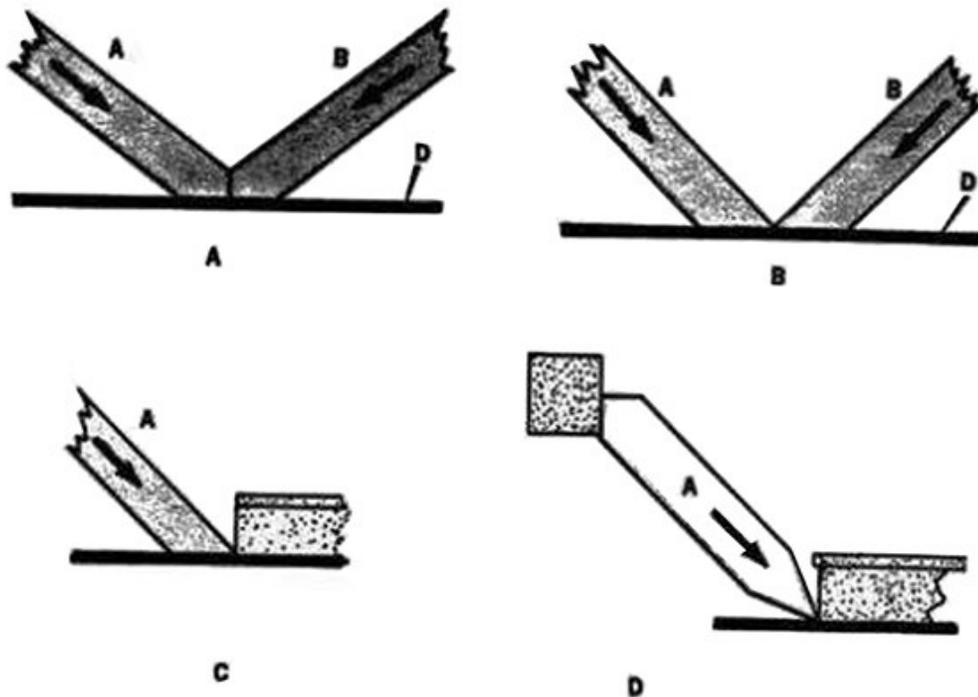
- (A) It has a portable hose and nozzle.
- (B) The cylinders are mounted horizontally.
- (C) It has distribution piping installed permanently.
- (D) Each cylinder must weigh less than 50 pounds.

If choice A is selected set score to 1.

SF-0001



SF-0016



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

SF-0034

Flow of Water Through Holes (Gallons per Minute)

HOLE DIA. IN INCHES	HEAD OF WATER IN FEET												
	2	4	6	8	10	12	14	16	18	20	24	28	32
1	28	40	49	56	63	69	74	79	84	89	97	105	112
2	111	157	192	222	248	272	294	314	333	351	384	415	444
3	250	354	433	500	559	612	661	707	750	790	866	935	1000
4	445	629	770	889	994	1089	1176	1257	1333	1405	1540	1663	1778
5	695	982	1203	1389	1553	1701	1837	1964	2083	2196	2406	2598	2778
6	1000	1414	1732	2000	2236	2449	2646	2828	3000	3162	3464	3741	4000
7	1361	1925	2357	2722	3043	3333	3601	3849	4083	4303	4714	5092	5444
8	1777	2514	3078	3555	3974	4354	4702	5027	5332	5620	6157	6650	7109
9	2249	3181	3896	4499	5030	5510	5951	6362	6748	7113	7792	8416	8997
10	2777	3927	4809	5553	6209	6802	7347	7854	8330	8781	9619	10390	11107
11	3360	4752	5820	6720	7514	8231	8890	9504	10080	10626	11640	12573	13441
12	4000	5655	6926	7997	8941	9795	10579	11310	11996	12645	13852	14961	15995
13	4693	6637	8129	9386	10494	11496	12417	13274	14079	14841	16257	17560	18772
14	5443	7697	9426	10885	12170	13331	14400	15394	16327	17210	18853	20364	21770
15	6246	8834	10820	12494	13969	15302	16528	17667	18740	19754	21640	23374	24988
16	7106	10051	12310	14214	15892	17409	18804	20102	21322	22475	24620	26593	28429
17	8024	11347	13897	16047	17942	19654	21229	22694	24071	25373	27795	30022	32095
18	8996	12722	15582	17992	20116	22035	23802	25445	26988	28448	31164	33660	35985
19	10024	14177	17363	20049	22416	24555	26523	28354	30073	31700	34726	37408	40098
20	11110	15710	19241	22218	24840	27211	29392	31421	33326	35129	38483	41566	44436
21	12244	17316	21208	24488	27379	29992	32396	34632	36732	38719	42416	45814	48977
22	13439	19008	23280	26881	30054	32923	35561	38016	40322	42503	46560	50290	53763
23	14688	20772	25441	29376	32844	35978	38861	41544	44064	46447	50881	54958	58753
24	15995	22622	27707	31993	35769	39183	42323	45245	47989	50585	55414	59853	63986
25	17356	24545	30061	34711	38809	42513	45920	49090	52067	54883	60122	64939	69424
26	18770	26546	32513	37542	41974	45980	49664	53093	56313	59359	65025	70235	75085
27	20242	28627	35061	40485	45264	49584	53557	57254	60727	64012	70122	75740	80971
28	21770	30787	37707	43539	48679	53325	57598	61574	65309	68842	75413	81455	87080
29	23353	33026	40449	46706	52220	57203	61787	66053	70059	73849	80898	87380	93414
30	24992	35345	43289	49985	55885	61219	66125	70690	74977	79033	86577	93514	99971
31	26683	37735	46216	53365	59665	65359	70597	75470	80048	84378	92432	99838	106732
32	28434	40212	49250	56868	63581	69649	75231	80424	85302	89916	98499	106391	113738

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