

U.S.C.G. Merchant Marine Exam

Third Assistant Engineer

Q534 Engineering Safety & Environmental Protection

(Sample Examination)

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

1. The wooden shoring shown in the illustration is bearing against the hatch coaming and is supporting a load in the direction indicated by the arrows. Which of the following statements is correct for this condition?
Illustration SF-0018
- A. Shore "A" will support the greatest load
 - B. Shore "A" will not slip under load
 - C. Shore "B" will support the load without it cracking
 - D. Shore "B" will crack at the pointed end

Correct answer: C

2. After measuring the length to which a section of shoring should be cut, you should cut the shoring _____.
- A. approximately 1/2 inch longer than the measured length to allow for trimming
 - B. approximately 1/2 inch shorter than the measured length to allow for the use of wedges
 - C. approximately 1/2 inch shorter per foot of the measured length to allow for wet expansion
 - D. to the same length as the measured length

Correct answer: B

3. 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 top of the bulkhead
 - C. along the bottom of any bulkhead
 - D. at the vertical center of the bulkhead

Correct answer: C

4. The wooden plug fitted tightly in the vent of a damaged tank may prevent the tank from _____.
- A. developing free surfaces
 - B. collapsing
 - C. filling completely
 - D. developing free surface moments

Correct answer: C

5. Which of the components listed are interchangeable between different backpack self-contained breathing apparatus produced by various manufacturers?
- A. The facepiece
 - B. The regulator
 - C. The air cylinder
 - D. All of the above

Correct answer: C

6. Which of the following conditions represents a particular advantage of using a positive pressure type self-contained breathing apparatus in an atmosphere that is immediately dangerous to life or health?
- A. The positive pressure in the facepiece prevents contaminated air from entering the facepiece.
 - B. The average operating time for most air cylinders is over an hour.
 - C. The equipment is compact and the wearer can work in confined spaces without difficulty.
 - D. The equipment used is lightweight and easy to wear by reducing physical strain on the wearer.

Correct answer: A

7. In accordance with 46 CFR, life jackets should be stowed in _____.
- A. The forepeaks
 - B. The pumproom
 - C. Readily accessible spaces
 - D. Locked watertight containers

Correct answer: C

8. 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

Correct answer: B

9. The hand brake of a lifeboat winch is _____.
- A. manually disengaged when hoisting a boat
 - B. applied by dropping the counterweighted lever
 - C. controlled by the centrifugal brake mechanism
 - D. automatically engaged if lowering speed is excessive

Correct answer: B

10. 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

Correct answer: C

11. 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

Correct answer: B

12. Who is responsible for lowering the survival craft?

- A. Roustabout
- B. First man aboard
- C. Last man aboard
- D. Helmsman

Correct answer: D

13. The canopy of your life raft should _____.

- A. go into place as the raft is inflated
- B. be put up after everyone is aboard
- C. be put up only in severe weather
- D. be used as a sail if the wind is blowing

Correct answer: A

14. When personnel are lifted by a helicopter from an inflatable life raft, the personnel on the raft should _____.

- A. Deflate the floor of the raft to reduce the danger of capsizing
- B. Inflate the floor of the raft to provide for additional stability
- C. Remove their life jackets to prepare for the transfer
- D. Take in the sea anchor to prevent fouling of the rescue sling

Correct answer: A

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

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

Correct answer: D

16. 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

Correct answer: A

17. 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

Correct answer: B

18. 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

Correct answer: D

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

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

Correct answer: D

20. The class of fire on which a blanketing effect is essential to extinguish the fire is _____.

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

Correct answer: B

21. 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"

Correct answer: A

22. A burning mattress is considered as which of the following classes of fire?

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

Correct answer: A

23. A fire in a pile of dunnage would be classified as a _____.

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

Correct answer: A

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. 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. high carbon steel
- C. non-ferrous
- D. fixed with a ferrous cover

Correct answer: C

26. 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. Combined fixed temperature and rate-of-rise
- D. Rate-of-rise

Correct answer: B

27. The advantage of using a dry chemical fire extinguishing agent is _____.

- A. permanent extinguishment regardless of the reignition sources
- B. its good stability and non-toxicity
- C. its excellent cooling ability
- D. all of the above

Correct answer: B

28. 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

Correct answer: B

29. A hand portable CO₂ fire extinguisher is effective on burning oil only _____.

- A. To prevent rekindling
- B. If applied promptly
- C. If applied in connection with foam
- D. If attempts to extinguish the fire with low velocity fog have failed

Correct answer: B

30. Annual servicing of a hand portable CO₂ fire extinguisher includes _____.

- A. Weighing the cylinder and recharging if weight loss exceeds 10% of the weight of the charge
- B. Inspecting the pressure gauge to ensure the needle is within operating range
- C. Hydrostatic testing of the cylinder
- D. Discharging, cleaning inside, and recharging

Correct answer: A

31. Fire hoses located at protected fire stations must always be _____.

- A. capped on the ends for protection
- B. supplied with a smooth bore nozzle
- C. connected to the fire hydrant
- D. open to the air to prevent rot

Correct answer: C

32. A high velocity fog nozzle will produce the most effective spray pattern when the water pressure is not less than _____.

- A. 35 psi (241.3 kPa)
- B. 60 psi (413.6 kPa)
- C. 75 psi (517.0 kPa)
- D. 100 psi (689.4 kPa)

Correct answer: D

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

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

Correct answer: B

34. When fighting a shipboard fire, crew members securing doorways, hatches, and applying cooling water to adjacent decks and bulkheads, while monitoring the spread of heat and smoke, are setting a _____.

- A. fire boundary
- B. buffer zone
- C. cooling zone
- D. safety perimeter

Correct answer: A

35. The most effective method of extinguishing a class "A" fire is by _____.

- A. blanketing and smothering
- B. using a sodium based dry chemical
- C. quenching and cooling
- D. using non-conducting extinguishers

Correct answer: C

36. 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. Each cylinder must weigh less than 50 pounds.
- D. It has distribution piping installed permanently.

Correct answer: A

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

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

Correct answer: D

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. shut off the fuel oil supply
- C. find a soda acid extinguisher
- D. secure the generator

Correct answer: B

39. One of the main concerns when fighting a galley fire is _____.

- A. contaminating food with extinguishing agent
- B. the loss of stability
- C. spreading of fire through the engineering space
- D. the igniting of a grease fire in the range hood ventilation system

Correct answer: D

40. 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

41. 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

Correct answer: C

42. Combustible gas indicators incorporate the use of a/an _____.

- A. Inflatable bag
- B. Vapor-detecting carbon compound
- C. Wheatstone bridge
- D. Sensitive liquid chemical

Correct answer: C

43. 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. Conditions are perfect for combustion.
- C. The vapor is about to explode.
- D. The mixture is too rich to burn.

Correct answer: D

44. The vapors given off by heated fuel oil are flammable, explosive, and _____.

- A. non-toxic
- B. heavier than air
- C. lighter than air
- D. odorless

Correct answer: B

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

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

Correct answer: A

46. An LNG carrier has an approved type of gas detecting system to detect methane leaks. What area(s) would this be NOT used in?

- A. Barrier spaces
- B. Boiler burner supply piping
- C. Cargo handling rooms
- D. Habitability Spaces

Correct answer: D

47. High concentrations of hydrogen sulfide gas are most dangerous to personnel because they can _____.

- A. cause involuntary skeletal muscle contractions
- B. paralyze your breathing system
- C. cause eye inflammation
- D. cause dizziness

Correct answer: B

48. 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

Correct answer: D

49. If the chemical material is a mixture, what must the Safety Data Sheet (SDS) identify?

- A. Other similar mixtures of liquids, solids or gases.
- B. Paints or coatings that are safe to use with it.
- C. The name of each hazardous ingredient.
- D. None of the above.

Correct answer: C

50. According to 33 CFR Subchapter O (Pollution), an oceangoing ship of over 400 gross tons must be fitted with a standard discharge shore connection. What size bolt circle diameter is required for this shore connection to transfer oily ballast to a shoreside reception facility?

- A. 125 mm
- B. 183 mm
- C. 215 mm
- D. 250 mm

Correct answer: B

51. As its temperature rises, the volume of fuel oil stored in a tank will _____.

- A. increase
- B. remain the same
- C. decrease
- D. none of the above

Correct answer: A

- 52.** In accordance with 33 CFR Subchapter O (Pollution), which of the following is NOT required to be provided as part of the appendixes of the Shipboard Oil Pollution Emergency Plan?
- A. A list of personnel duty assignments.
 - B. A list which specifies who will be responsible for informing the parties listed and the priority in which they must be notified.
 - C. A list of agencies or officials in regularly visited ports.
 - D. A list of agencies or officials of Coastal State administrations responsible for receiving and processing incident reports.

Correct answer: A

- 53.** When amendments are made to the shipboard oil pollution emergency plan, all revisions must be submitted to the Coast Guard _____.
- A. And can be implemented without immediate approval as long as final approval is received within six months of submittal
 - B. Six months prior to the end of the approval period
 - C. And cannot be implemented without approval
 - D. One month prior to the anniversary date of the plan

Correct answer: C

- 54.** Which of the precautions listed should be observed when taking on diesel fuel?
- A. Prohibit smoking in the area.
 - B. Secure all lighting to the main deck.
 - C. Display a black triangle during daylight hours.
 - D. Provide a portable fan to blow away fumes.

Correct answer: A

- 55.** In accordance with 33 CFR Subchapter O (Pollution), the overall responsibility in maintaining the Oil Record Book is given to the _____.
- A. Chief mate
 - B. Cargo engineer
 - C. Master
 - D. Chief engineer

Correct answer: C

- 56.** In accordance with 33 CFR Subchapter O (Pollution), the Oil Record Book for all U.S. ships _____.
- A. Is the property of the U.S. government
 - B. Is required to have entries recorded within 48 hours of completion of the particular operation
 - C. Should not be used to record the accidental discharge of oil or oily mixtures
 - D. Is to be kept in the personal possession of the master

Correct answer: A

57. The term "load on top" is the name of a method used on many crude oil carriers for the purpose of _____.

- A. calculating the ullage in the cargo tanks
- B. the loading of new cargo into a decanted slop tank as a procedure to minimize pollution
- C. calculating the ratio of cargo expansion in a cargo tank
- D. loading ballast by gravity

Correct answer: B

58. Stability is determined principally by the relationship of the center of gravity and the _____.

- A. aft perpendicular
- B. center of buoyancy
- C. keel
- D. center of flotation

Correct answer: B

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

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

Correct answer: A

60. What is the definition of the stability symbol "CL"?

- A. Center of longitudinal force
- B. A vertical plane through centerline
- C. Center of load
- D. Center of load displacement

Correct answer: B

61. The distance between the bottom of the hull and the waterline is called _____.

- A. freeboard
- B. tonnage
- C. reserve buoyancy
- D. draft

Correct answer: D

62. The important stability parameter "KG" is defined as the _____.

- A. Height of the center of gravity above the keel
- B. Height of the metacenter above the keel
- C. Height of the center of buoyancy above the keel
- D. Metacentric height

Correct answer: A

63. 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. gravity
- B. effort
- C. flotation
- D. buoyancy

Correct answer: D

64. In the absence of external forces, adding weight to one side of a floating vessel, will cause the vessel to _____.

- A. trim to the side opposite TCG until all moments are equal
- B. list until the center of buoyancy is aligned vertically with the center of gravity
- C. heel until the angle of loll is reached
- D. decrease draft at the center of flotation

Correct answer: B

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

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

Correct answer: B

66. A vessel having a concentration of weight toward the top of the vessel is said to be _____.

- A. stiff
- B. buoyant
- C. tender
- D. neutral

Correct answer: C

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

- A. yaw
- B. heave
- C. surge
- D. sway

Correct answer: C

68. The Exclusive Economic Zone extends from the baseline of territorial sea of the United States seaward _____.

- A. 53 miles
- B. 100 miles
- C. 200 miles
- D. 300 miles

Correct answer: C

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

- A. Petroleum oil of any kind
- B. Fuel oil only
- C. Liquefied petroleum gas
- D. Crude oil only

Correct answer: A

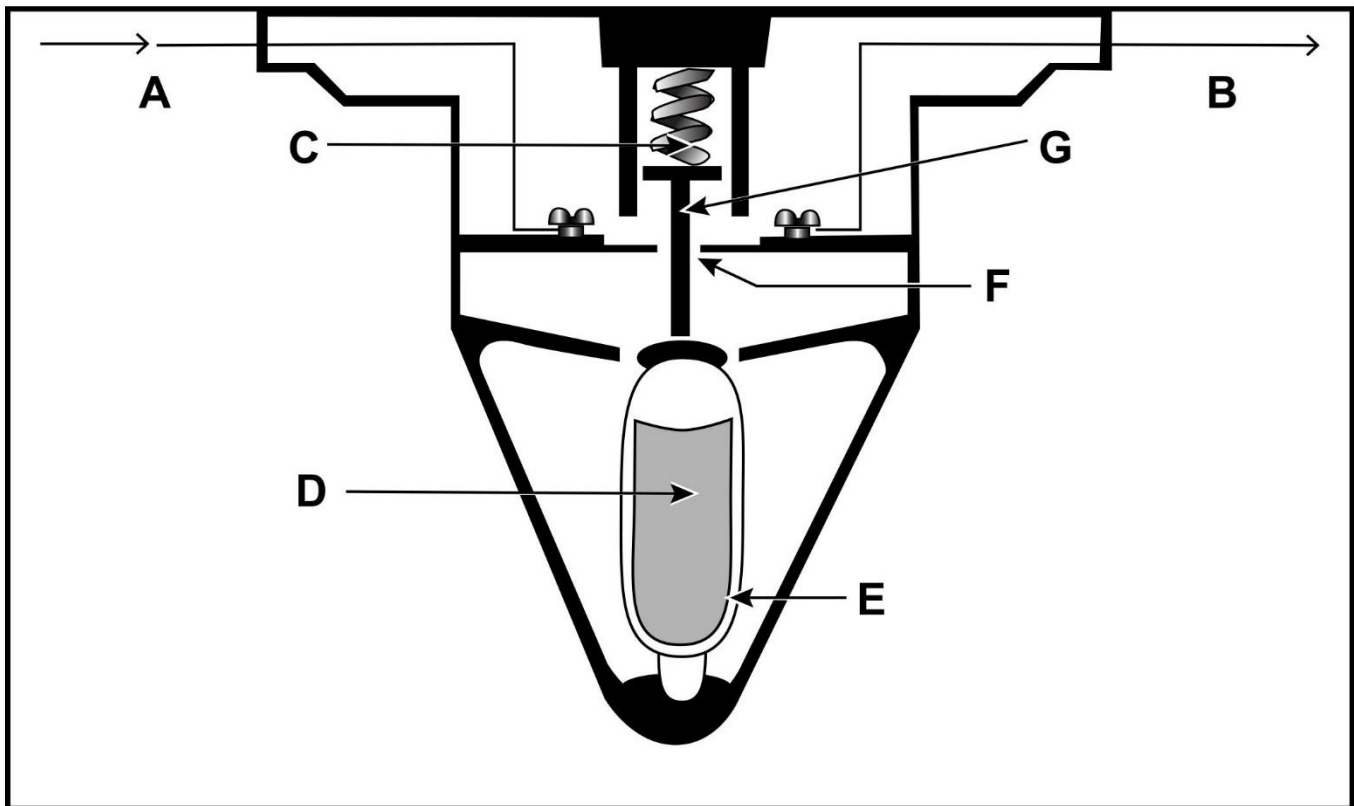
70. In accordance with 33 CFR Subchapter O (Pollution), the definition of graywater includes drainage from which of the following?

- A. Dishwashers
- B. Toilets
- C. Hospital sinks
- D. Cargo spaces

Correct answer: A



SF-0004



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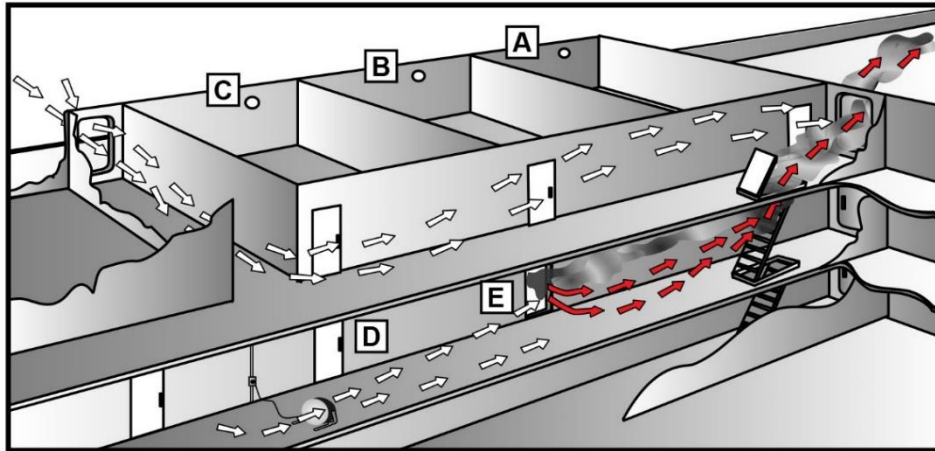


Figure 1

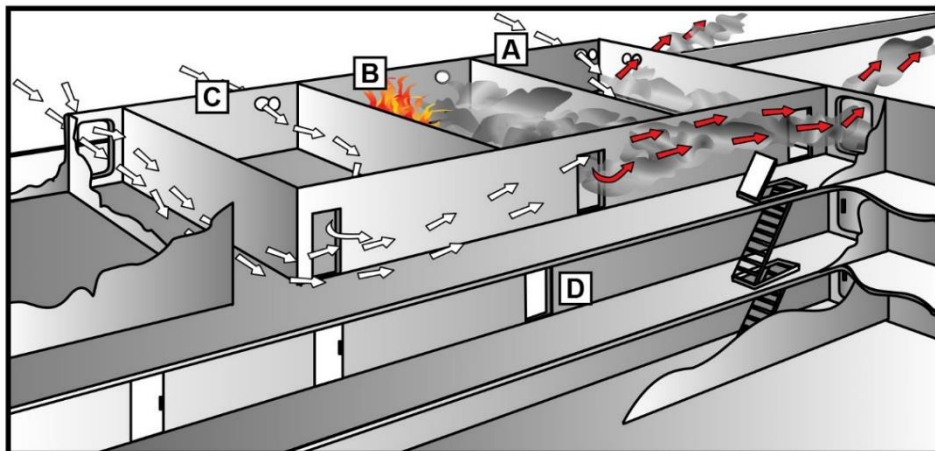


Figure 2

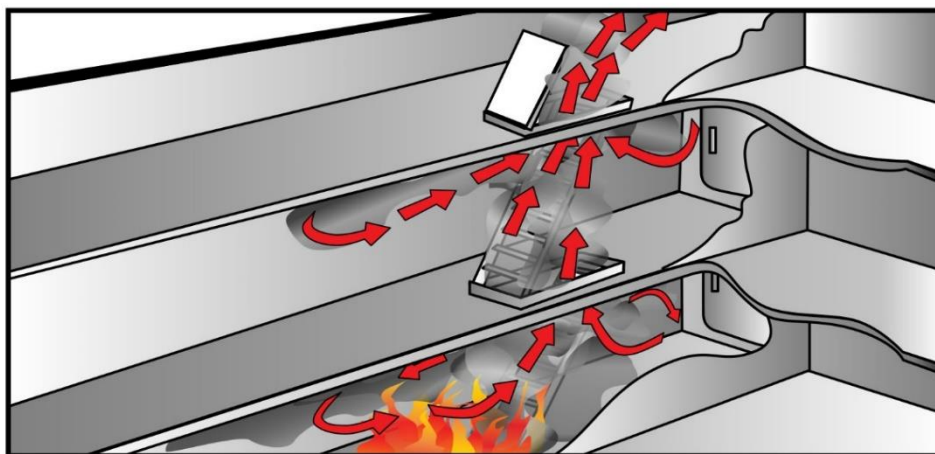
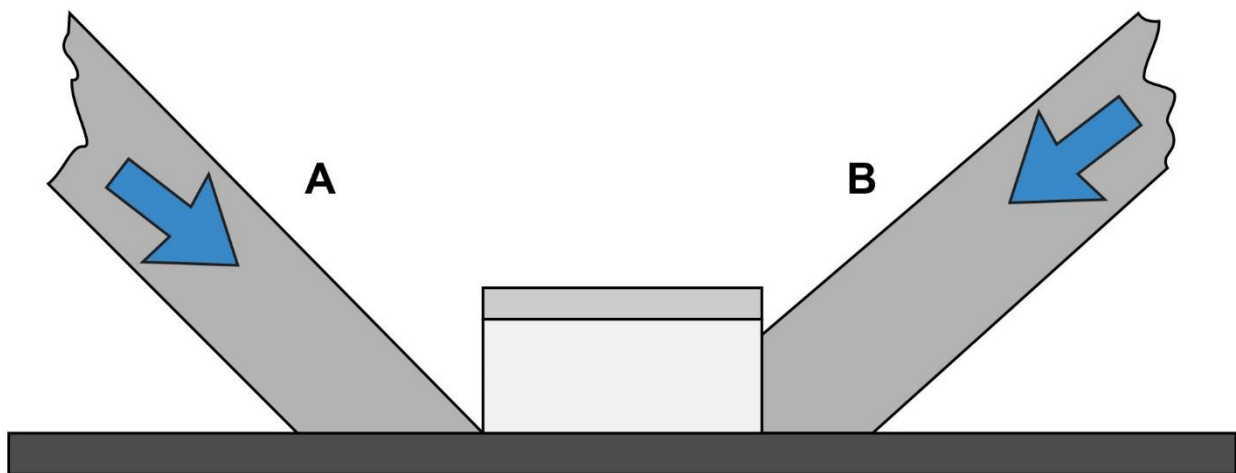


Figure 3

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