

## U.S.C.G. Merchant Marine Exam

### Chief Engineer – Limited

### Q603 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. 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 bottom of any bulkhead
  - D. along the top of the bulkhead

Correct answer: C

3. An acceptable method of temporarily sealing a crack formed in the hull of a vessel is to \_\_\_\_\_.
- A. drill holes at each end
  - B. shore up the crack with welded braces
  - C. apply a patch of sheet packing backed by a strongback or shoring
  - D. tack weld a doubler plate over the crack

Correct answer: C

4. The safe and efficient use of the facepiece of a self-contained breathing apparatus is directly influenced by \_\_\_\_\_.
- A. the maintenance of the facepiece
  - B. the donning of the facepiece
  - C. the stowing of the facepiece
  - D. all of the above

Correct answer: D

5. A rigid lifesaving device designed for a group of survivors to hold on to while in the water is defined as a \_\_\_\_\_.
- A. life raft
  - B. life cushion
  - C. life preserver
  - D. buoyant apparatus

Correct answer: D

6. An immersion suit should be equipped with a/an \_\_\_\_\_.

- A. air bottle for breathing
- B. whistle and hand-held flare
- C. whistle, strobe light, and reflective tape
- D. whistle, hand-held flare, and sea dye marker

Correct answer: C

7. You have abandoned ship and are in charge of a life raft. How much water per day should you permit each occupant to drink after the first 24 hours?

- A. 1 can
- B. 1 pint
- C. 1 quart
- D. 1 gallon

Correct answer: B

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

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

Correct answer: B

9. A self-righting survival craft will return to an upright position provided that all personnel \_\_\_\_\_.

- A. are seated with seatbelts on and doors shut
- B. are seated with seatbelts on and doors open
- C. are to shift to one side to right it
- D. escape from the craft

Correct answer: A

10. With the sprinkler system and air system on, and all hatches shut, the survival craft will be protected from \_\_\_\_\_.

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

Correct answer: B

11. The process that occurs when heat is generated by a chemical reaction within a substance and continues to a point of ignition is known as \_\_\_\_\_.

- A. spontaneous combustion
- B. chemical ignition
- C. chemical combustion
- D. radiation ignition

Correct answer: A

**12.** 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

**13.** 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

Correct answer: D

**14.** A fire, occurring in the windings, of an overloaded electrical motor, is considered a \_\_\_\_\_.

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

Correct answer: C

**15.** A class "D" fire would involve the burning of \_\_\_\_\_.

- A. electrical insulation
- B. diesel oil
- C. dunnage
- D. magnesium

Correct answer: D

**16.** Paints and solvents used aboard a vessel should be \_\_\_\_\_.

- A. stowed safely at the work site until work is completed
- B. returned to the paint locker after each use
- C. covered with a fine mesh screen to protect from ignition sources
- D. drained into a common container after each use

Correct answer: B

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

- A. Having a portable CO<sub>2</sub> 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.

Correct answer: D

- 18.** In accordance with 46 CFR Part 109, the Muster List ("Station Bill") shows each crew lifeboat station, their duties during abandonment, basic instructions, and \_\_\_\_\_.
- A. instructions for lowering the survival capsule
  - B. all emergency signals
  - C. the time each weekly drill will be held
  - D. work schedule

Correct answer: B

- 19.** As chief engineer, you are discussing fire safety with a new unlicensed crew member. What would you expect the crew member to know having been onboard the vessel for two days?
- A. The starting procedures for the ship's fire pump.
  - B. The release procedures for the low-pressure CO<sub>2</sub> system.
  - C. Ship's signals for fire and emergency and abandon ship.
  - D. The procedures to secure the fire detection system.

Correct answer: C

- 20.** In a typical automatic fire alarm system, all zone circuits are always connected \_\_\_\_\_.
- A. to the detecting cabinet
  - B. to the trouble alarm supervising resistor
  - C. in parallel
  - D. in series

Correct answer: A

- 21.** During repairs it is necessary to replace an existing vessel bulkhead. Drawings indicate it is a "B" class bulkhead. This indicates which of the following?
- A. "B" class bulkheads must not allow flame or smoke passage for 15 minutes when subjected to a fire test.
  - B. "B" class bulkheads must not allow flame passage for 30 minutes when subjected to a fire test.
  - C. "B" class bulkheads must not allow flame passage for 60 minutes when subjected to a fire test.
  - D. "B" class bulkheads must not allow flame passage for 120 minutes when subjected to a fire test.

Correct answer: B

- 22.** Which extinguishing agent is the best for use on electrical fires?
- A. Dry chemical
  - B. CO<sub>2</sub>
  - C. Foam
  - D. Water fog

Correct answer: B

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

Correct answer: C

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

Correct answer: D

- 25.** Servicing of a cartridge-operated dry chemical fire extinguisher aboard ship would include ensuring that the \_\_\_\_\_.
- A. recharge of weight loss exceeds 10% of the weight of charge
  - B. cartridge weight is not less than 1/4 ounce of weight stamped on cartridge
  - C. powder is not caked and there is a full charge
  - D. pressure gage is within the operating range

Correct answer: C

- 26.** There is always a lower water pressure at the fire hose outlet than is found at the discharge of the pump. Which of the following reasons is the common cause of this loss in pressure?
- A. Friction in the piping and valves
  - B. Wear in the hydrant
  - C. Leaky pilot valve
  - D. Leaky pump suction valve

Correct answer: A

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

Correct answer: D

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

Correct answer: A

- 29.** Why is it essential to introduce CO<sub>2</sub> from a fixed fire extinguishing system, into a large engine room, as quickly as possible?
- A. Updraft from the fire tends to carry the CO<sub>2</sub> away.
  - B. Carbon dioxide takes a long time to disperse to all portions of a space.
  - C. To keep the fire from spreading through the bulkheads.
  - D. The fire may warp the CO<sub>2</sub> piping.

Correct answer: A

- 30.** As the senior engineer of a vessel, you have just activated the CO<sub>2</sub> release handle for the engine room to extinguish a fire. How would you direct the emergency team to re-enter the engine room?
- A. Wait until there are no signs of smoke or heat, then, with the team dressed in firefighting gear and SCBA, approach the engine room door. Crack the door open with a charged fire hose at the ready and advance, if no fire is detected.
  - B. Wait until there are no signs of smoke or heat, have the team dressed in firefighting gear and approach the engine room door. Crack the door open and advance, if no fire is detected.
  - C. Have the team wait two hours and crack the door open with a charged fire hose at the ready and advance, if no fire is detected.
  - D. Have the team wait two hours, then, with the team dressed in firefighting gear and SCBA, approach the engine room door. Crack the door open and advance, if no fire is detected.

Correct answer: A

- 31.** 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 CO<sub>2</sub> extinguisher as it will smother the fire while limiting the clean-up and damage to the area around the fire.
  - C. A fixed CO<sub>2</sub> 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.

Correct answer: B

- 32.** The most important characteristic of a fire extinguishing agent to be used on electrical fires is for the agent to be \_\_\_\_\_.
- A. wet
  - B. flame resistant
  - C. easily removable
  - D. non-conducting

Correct answer: D

- 33.** The longer an oil fire is permitted to burn, the \_\_\_\_\_.
- A. easier it is to extinguish
  - B. easier it is to control
  - C. less chance there is of reignition
  - D. harder it is to extinguish

Correct answer: D

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

Correct answer: B

- 35.** While in port working cargo, a fire is reported on the forward car deck. After the captain sounds the general alarm, the crew musters and starts fighting the fire. As chief engineer you inform the captain that shoreside firefighting assistance needs to be called. How would you then proceed?
- A. Continue fighting the fire and use the ship's SOPEP plan and coordinate with shoreside firefighters to extinguish the fire.
  - B. Continue fighting the fire and use the ship's SOLAS manual and coordinate with shoreside firefighters to extinguish the fire.
  - C. Continue fighting the fire and use the ship's Fire Control Plan and coordinate with shoreside firefighters upon their arrival to extinguish the fire.
  - D. Stop firefighting efforts and wait until the shoreside firefighters arrive.

Correct answer: C

- 36.** You are the chief engineer of a vessel, while in port working cargo a fire is reported in the engine room. Shoreside firefighting assistance has been requested. How would you proceed?
- A. Use the ship's Fire Control Plan and coordinate with shoreside firefighters to extinguish the fire.
  - B. Use the ship's SOPEP plan and coordinate with shoreside firefighters to extinguish the fire.
  - C. Use the ship's SOLAS manual and coordinate with shoreside firefighters to extinguish the fire.
  - D. Evacuate the ship and leave the fighting of the fire to the shoreside firefighters.

Correct answer: A

**37.** By definition, combustible liquids are liquids which \_\_\_\_\_.

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

Correct answer: A

**38.** 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 L.E.L. 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

Correct answer: B

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

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

Correct answer: C

**40.** When preparing to pump flammable liquids with a centrifugal pump, you should \_\_\_\_\_.

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

Correct answer: B

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

- A. Road oils
- B. Light fuel oils
- C. Lubricating oils
- D. Asphalt

Correct answer: B

**42.** 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

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

Correct answer: B

- 44.** A fuel tank is considered to be gas free when the tank is \_\_\_\_\_.
- A. thoroughly ventilated for at least 24 hours
  - B. free of most flammable gas concentrations
  - C. free of all dangerous concentrations of flammable or toxic gases
  - D. inerted with carbon dioxide for 24 hours

Correct answer: C

- 45.** The physical data term on a Safety Data Sheet (SDS) that indicates if the vapor formed by a material is lighter or heavier than air is called \_\_\_\_\_.
- A. vapor pressure
  - B. vapor level
  - C. vapor density
  - D. vapor gravity

Correct answer: C

- 46.** As listed on a Safety Data Sheet (SDS), what is a liquid called that is having a flash point below 199.4°F (93°C)?
- A. viscous liquid
  - B. combustible liquid
  - C. explosive liquid
  - D. flammable liquid

Correct answer: D

- 47.** The Oil Record Book must be maintained onboard the vessel for \_\_\_\_\_.
- A. 6 months and then submitted to the nearest Marine Safety Office for review
  - B. an annual inspection
  - C. the duration of the ship's active employment
  - D. not less than 3 years and be readily available for inspection

Correct answer: D

- 48.** Which ship must maintain Part II (Cargo/Ballast Operations) of the Oil Record Book?
- A. A ship of 200 gross tons or above, other than an oil tanker.
  - B. A ship of 150 gross tons or above, other than an oil tanker.
  - C. A non-tanker that carries more than 200 cubic meters of oil in bulk.
  - D. An oil tanker of 100 gross tons or above.

Correct answer: C

- 49.** During oil transfer operations, who would be responsible to guarantee that the posted transfer procedures are being followed?
- A. The designated person in charge
  - B. The oiler
  - C. The senior able seaman
  - D. The tankerman

Correct answer: A

- 50.** After fuel tanks have been filled and bunkers completed, which of the listed procedures should be followed next?
- A. The tanks should be marked with a bull stamp on the manifold filling valve.
  - B. The pressure-vacuum relief valve should be reset.
  - C. The tanks should be made seaworthy to prevent contamination.
  - D. The tanks should be sounded to verify levels.

Correct answer: D

- 51.** During fueling operations, which of the listed precautions should be taken when topping off fuel tanks?
- A. Reduce the pumping rate and sound tanks frequently.
  - B. Reduce the pumping rate by closing the deck filling valve.
  - C. Close all overflow valves.
  - D. Place 5-gallon containers under all flange connections in the fuel line.

Correct answer: A

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

Correct answer: A

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

Correct answer: A

**54.** Which of the following statements is true concerning the overboard discharge of vessel sewage at sea?

- A. The vessel may discharge sewage into the sea, from an approved system which is not comminuted or disinfected, only if the vessel is more than 12 nautical miles from the nearest land.
- B. The vessel must have an approved sewage plant.
- C. The vessel may discharge disinfected and comminuted sewage into the sea, from an approved system, only if the vessel is more than 3 nautical miles from the nearest land.
- D. All of the above.

Correct answer: D

**55.** 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

Correct answer: B

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

Correct answer: A

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

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

Correct answer: B

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

Correct answer: A

- 59.** 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.

Correct answer: A

- 60.** 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 constant

Correct answer: D

- 61.** A vessel's center of gravity is lowered when the \_\_\_\_\_.
- A. trim is increased
  - B. reserve buoyancy increases
  - C. freeboard is increased
  - D. tanks are ballasted

Correct answer: D

- 62.** 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. buoyancy
  - B. gravity
  - C. effort
  - D. flotation

Correct answer: A

- 63.** The difference between the initial trim of a vessel and the trim after a change in load has occurred is known as \_\_\_\_\_.
- A. change of draft
  - B. trim
  - C. final trim
  - D. change of trim

Correct answer: D

- 64.** Adverse effects due to free surface will result when \_\_\_\_\_.
- A. the vessel is trimmed by the stern
  - B. the vessel's draft is increased, thus increasing the vessel's wetted surface area
  - C. the vessel's draft is decreased exposing more surface area to the wind and current
  - D. a portion of liquid is removed from a full tank

Correct answer: D

- 65.** You can generally improve the vessel's stability in a hazardous situation by \_\_\_\_\_.
- A. pumping double bottoms to the forepeak
  - B. ballasting appropriate port or starboard deep tanks
  - C. deballasting double bottoms
  - D. transferring ballast athwartships

Correct answer: B

- 66.** Yawing is the angular motion of the vessel about what axis?
- A. Centerline
  - B. Transverse
  - C. Vertical
  - D. Longitudinal

Correct answer: C

- 67.** 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

- 68.** As chief engineer on a vessel, you and the first engineer are planning a welding job in the cargo-hold. How would you ensure that all safety precautions are reviewed prior to starting this job?
- A. Have the first engineer complete a hot-work permit prior to starting 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 after completing the job.

Correct answer: A

- 69.** Coast Guard Regulations (46 CFR), require a fixed foam extinguishing system on cargo and miscellaneous vessels to meet which of the following requirements?
- A. The supply of foam producing materials must be sufficient to operate the equipment for at least 3 minutes for spaces other than tanks.
  - B. The foam producing chemicals must be discharged and recharged every year at annual inspection.
  - C. The deck foam system must be completely independent of the fixed foam system.
  - D. The foam producing chemicals must be discharged and recharged every 2 years at the annual inspection.

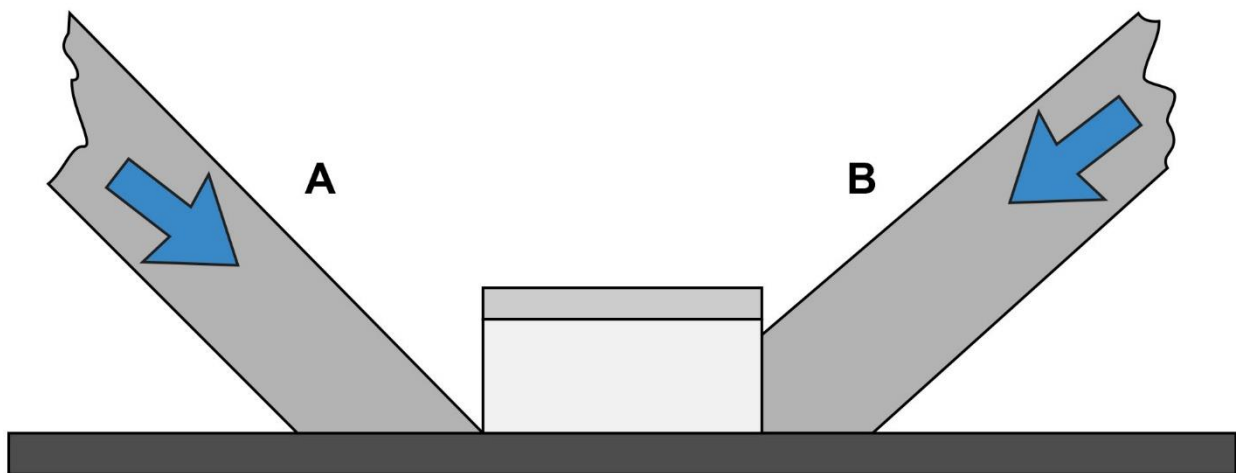
Correct answer: A

- 70.** Your passenger vessel has departed port with 1,235 passengers on board for a 10-day voyage. In accordance with 46 CFR Part 78, what actions must be taken to verify that your vessel was in compliance with stability requirements?
- A. The master shall determine that the vessel complies with all applicable stability requirements in the vessel's trim and stability book, stability letter, Certificate of Inspection, and Load Line Certificate, as the case may be and send a message verifying the condition of the vessel to the vessel's owners. The vessel may not depart until it is in compliance with these requirements.
  - B. The master shall determine that the vessel complies with all applicable stability requirements in the vessel's trim and stability book, stability letter, Certificate of Inspection, and Load Line Certificate, as the case may be, and then enter an attestation statement of the verification in the logbook. The vessel may not depart until it is in compliance with these requirements.
  - C. Ensure that the vessel owners have determined that the vessel complies with all applicable stability requirements in the vessel's trim and stability book, stability letter, Certificate of Inspection, and Load Line Certificate, as the case may be, and then enter an attestation statement of the verification in the logbook. The vessel may not depart until it is in compliance with these requirements.
  - D. The master shall determine that the vessel complies with all applicable stability requirements in the vessel's trim and stability book, stability letter, Certificate of Inspection, and Load Line Certificate, as the case may be, and then enter an attestation statement of the verification in the ship's stability book. The vessel may not depart until it is in compliance with these requirements.

Correct answer: B



**SF-0018**



Adapted for testing purposes only from Damage Controlman  
NAVEDTRA 14057  
Further reproduction prohibited without permission