

U.S.C.G. Merchant Marine Exam  
Master/Chief Mate of Unlimited Tonnage  
Q104 Deck Safety – Stability Problems  
(Sample Examination)

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

1. Your vessel's drafts are: FWD 27'-06", AFT 28'-02"; and the KG is 23.1 feet. Use the selected stability curves in the blue pages of the Stability Data Reference Book to determine the remaining righting arm at 60° inclination if the center of gravity is 2.4 feet off the centerline.
  - A. 2.4 feet
  - B. 0.5 foot
  - C. 0.2 foot
  - D. 1.8 feet

Correct answer: B

2. Use the floodable length curve in Section 1, the blue pages, of the Stability Data Reference Book. If the curve represents 45 percent permeability, and holds 1 and 2 flood, the vessel will sink if the permeability exceeds what percent?
  - A. 19
  - B. 24
  - C. 32
  - D. 39

Correct answer: C

3. The result of two forces acting in opposite directions and along parallel lines, is an example of what type of stress?
  - A. Strain
  - B. Compression
  - C. Tensile
  - D. Shear

Correct answer: D

4. The SS AMERICAN MARINER has the liquid load shown in table ST-0098 below. Use the white pages of The Stability Data Reference Book to determine the LCG-FP of the liquid load.

**ST-0098**

DB 2 P	71.2	DB 5 P	178.0
DB 2 S	71.2	DB 5 S	180.0
DB 3 CL	220.0	DB 6 CL	242.3
DB 3 P	55.6	DB 6 P	87.0
DB 3 S	55.6	DB 6 S	87.0
DB 4 CL	224.1	DB 7 P	94.6
DB 4 P	128.1	DB 7 S	94.6
DB 4 S	128.1	DT 4 P/S	110.0
DB 5 CL	196.2	DT 5 P/S	108.4

- A. 262.3 ft
- B. 264.9 ft
- C. 268.1 ft
- D. 270.3 ft

Correct answer: C

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5. Your vessel's drafts are: FWD 13'-11", AFT 16'-05". How much more cargo can be loaded to have the vessel down to the freeboard draft? (Use the information in Section 1, the blue pages, of the Stability Data Reference Book)
- A. 7109 tons
  - B. 7316 tons
  - C. 7432 tons
  - D. 7779 tons

Correct answer: D

6. The SS AMERICAN MARINER arrived in port with drafts of: FWD 18'-06", AFT 21'-10". Cargo was loaded and discharged as indicated in table ST-0123 below. Use sheet 2 in the white pages of the Stability Data Reference Book to determine the final drafts.

**ST-0123**

Load	140 tons	170 feet fwd of amidships
Discharge	320 tons	60 feet fwd of amidships
Load	270 tons	132 feet aft of amidships
Discharge	230 tons	190 feet aft of amidships

- A. FWD 19'-00", AFT 21'-00"
- B. FWD 18'-06", AFT 21'-06"
- C. FWD 18'-10", AFT 21'-02"
- D. FWD 18'-08", AFT 21'-04"

Correct answer: D

7. The SS AMERICAN MARINER is ready to bunker with drafts of FWD 11'-01", AFT 15'-01". After all bunkers are on board, soundings indicate the tonnages shown in table ST-0091 below. Use the white pages of The Stability Data Reference Book to determine the free surface correction.

**ST-0091**

DB 1 CL	48.2	DB 7 P	94.6
DB 1A CL	81.9	DB 7 S	94.6
DB 2 P	71.2	DT 1 CL	125.3
DB 2 S	71.2	DT 1A CL	257.6
DB 3 CL	227.6	DT 2 P	78.5
DB 3 P	55.6	DT 2 S	78.5
DB 3 S	55.6	DT 6 P	201.2
DB 4 CL	224.1	DT 6 S	201.2
DB 4 P	128.1	DT 7 P	128.8
DB 4 S	128.1	DT 7 S	128.8
DB 6 CL	242.3	DT 8 P	50.5
		DT 8 S	50.5

- A. 0.92 foot
- B. 0.61 foot
- C. 0.73 foot
- D. 1.20 feet

Correct answer: C

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8. Your sailing drafts are: FWD 21'-08", AFT 22'-04" and the GM is 3.2 feet. What will be the angle of list if the #6 port deep tank (capacity 201 tons, VCG 11.4 feet, and 25.5 feet off the centerline) is filled? (Use the data in Section 1, the blue pages, of the Stability Data Reference Book)
- A. 2°
  - B. 4°
  - C. 6°
  - D. 8°

Correct answer: D

9. Your sailing drafts are: FWD 22'-04", AFT 23'-06" and the GM is 3.2 feet. What will be the angle of list if #3 starboard double bottom (capacity 97 tons, VCG 2.5 feet and 23 feet off the centerline) is filled with saltwater? (Use the data in Section 1, the blue pages, of the Stability Data Reference Book)
- A. Less than 1°
  - B. 3°
  - C. 7°
  - D. 11°

Correct answer: B

10. Your drafts are: FWD 24'-09", AFT 27'-02". Use the blue pages of the Stability Data Reference Book to determine the vessels displacement if you are in salt water.
- A. 13,175 tons
  - B. 13,350 tons
  - C. 13,490 tons
  - D. 13,620 tons

Correct answer: D

11. Your vessel measures 125 feet long by 17 feet in beam. If the natural rolling period at a draft of 7'-09" is 6 seconds, what is the GM?
- A. 0.95 foot
  - B. 1.25 feet
  - C. 1.55 feet
  - D. 1.78 feet

Correct answer: C

12. Use the material in Section 1, the blue pages, of the Stability Data Reference Book. If the KG is 25.2 feet, and the drafts are: FWD 27'-11", AFT 28'-09"; at what angle will the vessel lose positive stability?
- A. 54°
  - B. 59°
  - C. 65°
  - D. 71°

Correct answer: A

13. You are loading in a port subject to the winter load line mark and bound for a port subject to the tropical load line mark. You will enter the summer zone after steaming four days, and you will enter the tropical zone after a total of twelve days. You will consume 39 tons of fuel, water, and stores per day. The hydrometer reading at the loading pier is 1.025, and the average TPI is 49. What is the minimum freeboard required at the start of the voyage? Reference Table BL-0010 below.

**BL-0010**

FREEBOARD FROM DECK LINE		LOAD LINE	
Tropical	76 inches	(T)	7 inches above (S)
Summer	83 inches	(S)	*
Winter	90 inches	(W)	7 inches below (S)
Fresh water allowance	10 inches		

- A. 90 inches
- B. 87 inches
- C. 80 inches
- D. 77 inches

Correct answer: A

14. Your vessel has a beam of 40 feet, and you observe a still water rolling period of 20 seconds. What is the vessel's metacentric height?
- A. 0.3 ft.
  - B. 0.5 ft.
  - C. 0.8 ft.
  - D. 1.1 ft.

Correct answer: C

15. Using the information in Section 1, the blue pages, of the Stability Data Reference Book, determine the danger angle for permanent list if the KG is 22.2 feet and the drafts are: FWD 23'-06", AFT 24'-03".
- A. 26°
  - B. 30°
  - C. 34°
  - D. 53°

Correct answer: A