

MATH 22 PRACTICE EXAM ON HYDROSTATIC FORCE

Name:

Section:

Instructions:

- (1) Books, notes, and calculators are not permitted.
- (2) Simplify as instructed.
- (3) Show your work as instructed. On some problems, correct answers without justification will not receive full credit.

(1)

(2)

(3)

(4)

(5)

Total

Problem 1. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

A thin plate is submerged horizontally in liquid. Which of the following correctly describes the hydrostatic force exerted by the liquid on one side of the plate?

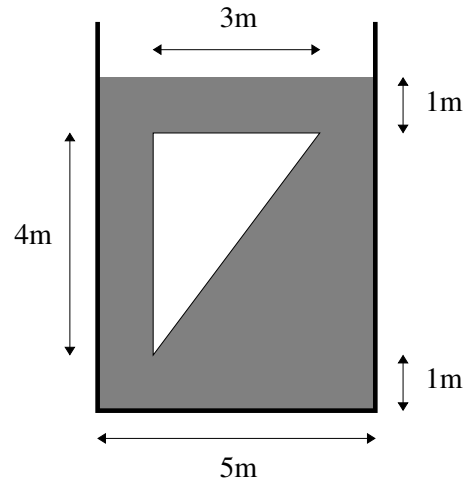
- A. It depends on whether the side faces up or down.
- B. It depends on how deep the plate is placed in the liquid.
- C. It depends on the density of the liquid.
- D. All of these.
- E. Answers (b) and (c) only.

Problem 2. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Which of the following is an appropriate measure of liquid density for hydrostatic force problems?

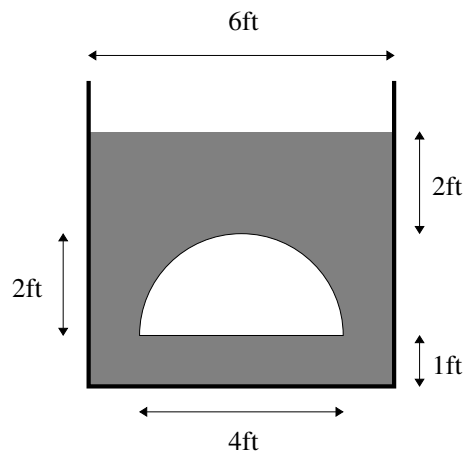
- A. Pounds per cubic foot.
- B. Kilograms per cubic meter.
- C. Newtons per cubic meter.
- D. All of these.
- E. None of these.

Problem 3. (15 pts.) A triangular plate is submerged vertically in water as shown in the figure.



Compute the hydrostatic force exerted against one side of the plate, assuming water has a density of 1000 kg/m^3 , and that gravitational acceleration is 9.8 m/sec^2 . Show your work.

Problem 4. (15 pts.) A semicircular plate having radius 2 ft. is submerged vertically in water as shown in the figure.



Compute the hydrostatic force exerted against one side of the plate, assuming water weighs 62.43 lbs./ft^3 . Show your work.

Problem 5. (15 pts.) (a) Two rectangular plates of width x and very small height Δy are submerged at depth $m + k$ and $m - k$ in a liquid. Show that the combined hydrostatic force exerted on the two plates is equal to that which is exerted on the same two plates when both are submerged at depth m in the liquid.

(b) A plate which has mirror symmetry above and below a horizontal line is submerged vertically in a liquid so that this line lies at depth m . Show that the hydrostatic force exerted on the plate is equal to the weight of the liquid which lies directly above the same plate when it is submerged horizontally at depth m .