

Quiz 1

Paper A

30 minutes; 10 points

- Fill your name, roll no., and section no. above.
- Circle the correct answer among the four choices given.
- 2.5 marks for a correct answer. *Negative marking*: One point will be deducted per wrong answer.
- Use $g = 9.8m/s^2$.

1. For the manometer shown in figure 1, if the absolute pressure at point A is $1.013 \times 10^5 Pa$, the absolute pressure at point B is ($\rho_{water} = 10^3 kg/m^3$, $\rho_{Hg} = 13.56 \times 10^3 kg/m^3$, $\rho_{oil} = 800 kg/m^3$):

- (a) 107.34 kPa (b) 5570 Pa (c) 106.87 kPa (d) 106.87 MPa.

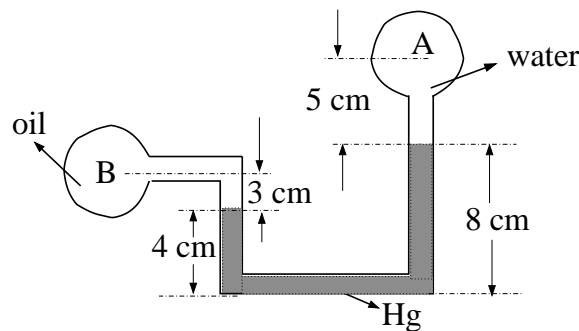


Figure 1: Problem 1

2. A solid sphere (of diameter 1m) floats at the interface between water and air such that 40% of the sphere is submerged in water. The density of the sphere is:
 (a) $400 kg/m^3$ (b) $2500 kg/m^3$ (c) $250 kg/m^3$ (d) $600 kg/m^3$.
3. Consider the geometry of a dam shown in figure 2 (see next page; each step is 0.3m high, 0.3m deep and 3m wide [into the paper]). The vertical force exerted by the fluid on the steps of the dam is
 (a) 26.46 kN (b) 264.6 kN (c) 3.9114 kN (d) 391.14 kN
4. A 2-D velocity field is given (in arbitrary units) by

$$\mathbf{v} = x\mathbf{i} - y\mathbf{j}$$

The acceleration at $(x = 1, y = 1)$ is

- (a) $\mathbf{i} + \mathbf{j}$ (b) 0 (c) $\mathbf{i} - \mathbf{j}$ (d) $-\mathbf{i} + \mathbf{j}$

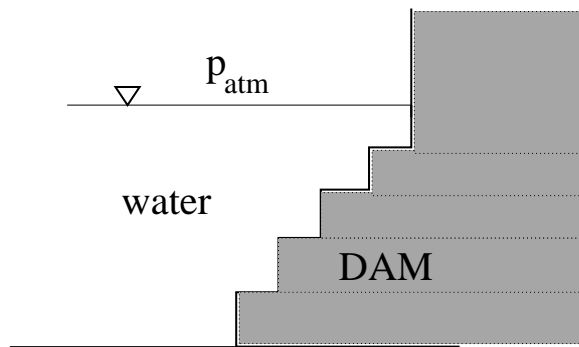


Figure 2: **Problem 4**