Topic: Hydrostatic pressure

Question: Find the hydrostatic pressure at the bottom of the tank.

The tank is filled with water to a depth of 5 m. Assume the density of water is $\rho = 1{,}000$ kg/m^3.

Answer choices:

A $49{,}000$ Pa

B $98{,}000$ Pa

C $2{,}000$ Pa

D $1{,}000$ Pa

Solution: A

The formula we use to calculate hydrostatic pressure is

$$P = \rho g d$$

where ρ is fluid pressure, g is gravity and d is depth. If we're dealing with water, and not some other liquid, we can simplify the formula, knowing that the density of water is $\rho = 1{,}000$ kg/m^3.

Plugging in water's given density, the gravitational constant, and the depth of the water, we get

$$P = \left(1{,}000 \ \frac{\text{kg}}{\text{m}^3}\right)\left(9.8 \ \frac{\text{m}}{\text{s}^2}\right)(5 \text{ m})$$

$$P = 49{,}000 \ \frac{\text{kg}}{\text{ms}^2}$$

$$P = 49{,}000 \text{ Pa}$$

Topic: Hydrostatic pressure

Question: Find the hydrostatic pressure at the bottom of the tank.

The tank is 4 m deep, and completely filled to the top with water. Assume the density of water is $\rho = 1{,}000$ kg/m^3.

Answer choices:

A $P = 36{,}800$ Pa

B $P = 39{,}200$ Pa

C $P = 78{,}400$ Pa

D $P = 92{,}200$ Pa

Solution: B

The formula we use to calculate hydrostatic pressure is

$$P = \rho g d$$

where ρ is fluid pressure, g is gravity and d is depth. If we're dealing with water, and not some other liquid, we can simplify the formula, knowing that the density of water is $\rho = 1{,}000$ kg/m^3.

Plugging in water's given density, the gravitational constant, and the depth of the water, we get

$$P = \left(1{,}000 \ \frac{\text{kg}}{\text{m}^3}\right)\left(9.8 \ \frac{\text{m}}{\text{s}^2}\right)(4 \text{ m})$$

$$P = 39{,}200 \ \frac{\text{kg}}{\text{ms}^2}$$

$$P = 39{,}200 \text{ Pa}$$

Topic: Hydrostatic pressure

Question: Find the hydrostatic pressure per square foot on the bottom of this tank that's 6 m deep and filled half way to the top with water. Assume the density of water is $\rho = 1{,}000$ kg/m^3.

Answer choices:

A $P = 16{,}200$ Pa

B $P = 29{,}400$ Pa

C $P = 58{,}800$ Pa

D $P = 78{,}800$ Pa

Solution: B

The formula we use to calculate hydrostatic pressure is

$$P = \rho g d$$

where ρ is fluid pressure, g is gravity and d is depth. If we're dealing with water, and not some other liquid, we can simplify the formula, knowing that the density of water is $\rho = 1{,}000$ kg/m^3.

Plugging in water's given density, the gravitational constant, and the depth of the water, we get

$$P = \left(1{,}000 \ \frac{\text{kg}}{\text{m}^3}\right)\left(9.8 \ \frac{\text{m}}{\text{s}^2}\right)(3 \text{ m})$$

$$P = 29{,}400 \ \frac{\text{kg}}{\text{ms}^2}$$

$$P = 29{,}400 \text{ Pa}$$