Ch 12, 13

What is the pressure due to water 50.7 m beneath the surface of a lake?

a. I’ve got my answer

2 min

What is the pressure due to water 50.7 m beneath the surface of a lake?

$P = \rho g h$

ρ of water = 1 g/cm^3 = 1000 kg/m^3

$P = (1000\ kg/m^3) * (9.8\ m/s^2) * 50.7\ m$

$P = 496{,}860\ Pa\ \ (N/m^2)$

What is the total pressure measured 50.7 m beneath the surface of a lake?

a. I’ve got my answer

1.5 min

What is the total pressure measured 50.7 m beneath the surface of a lake?

$P = (\rho g h)_{water} + P_{atm}$

1 atm pressure = 101,325 Pa

$P = 496{,}860$ Pa (N/m^2) + 101,325 Pa

$P = 598{,}185$ Pa

What is the total force and pressure due to water on the bottom of a 12.0 m by 8.5 m swimming pool whose uniform depth is 2.5 m?

a. I’ve got my answer

2 min

What is the total force and pressure due to water on the bottom of a 12.0 m by 8.5 m swimming pool whose uniform depth is 2.5 m?

$P = \rho g h$

$P = (1000\ kg/m^3) * (9.8\ m/s^2) * 2.5\ m$

$P = 24{,}500\ Pa$

$P = F/A$, so $F = P * A$

$F = 24{,}500\ Pa * (12.0 * 8.5\ m^2)$

$F = 2{,}499{,}000\ N$

A block of wood weighs 13.0 N in air but has an apparent weight of 5.5 N when submerged in water. What is the buoyant force on the wood?

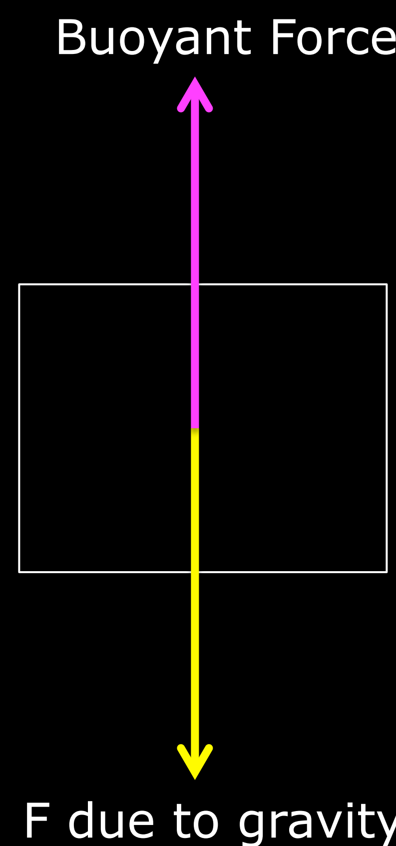
a. I’ve got my answer

2 min

A block of wood weighs 13.0 N in air but has an apparent weight of 5.5 N when submerged in water. What is the buoyant force on the wood?

$F_{\text{when submerged}} = F_{\text{in air}} - F_{\text{buoyant}}$

Think of the diagrams we draw:



$F_{\text{buoyant}} = 13.0\text{ N} - 5.5\text{ N, or } 7.5\text{ N}$

A solid spherical object, radius 3 cm, is suspended in a container of oil ($\rho = 0.90$ g/ cm^3). What is the buoyant force on this object?

a. I’ve got my answer

2.5 min

A solid spherical object, radius 3 cm, is suspended in a container of oil ($\rho = 0.90\ g/cm^3$). What is the buoyant force on this object?

$F = \rho V g$, where ρ is for the oil, and V is the volume of oil displaced by the sphere.

$\rho = (0.90\ g/cm^3)(1\ kg/1000\ g)(100\ cm/1m)^3$

$\rho = 900\ kg/m^3$

$F = (900\ kg/m^3) \times ((4/3)\ pi\ (3\ cm * 1\ m/100\ cm)^3) \times (9.8\ m/s^2)$

$F = 0.9975\ N$

A 10 kg log submerged in a lake will immediately move to the surface and float on the surface of the lake. What is the buoyant force acting on the log?

a. I've got my answer

2 min

A 10 kg log submerged in a lake will immediately move to the surface and float on the surface of the lake. What is the buoyant force acting on the log?

To float on the surface, the weight of an object in air = the buoyant force.

$F_{buoyant} = F_{in\ air}$

$F_{buoyant} = 10\ kg * 9.8\ m/s^2$

$F = 98\ N$

A gas fills a volume of 7.5 m^3 under pressure of 1 atm at 15 °C. Assuming the pressure stays constant, what volume will the gas occupy when heated to 25 °C?

a. I've got my answer

2 min

A gas fills a volume of 7.5 m^3 under pressure of 1 atm at 15 °C. Assuming the pressure stays constant, what volume will the gas occupy when heated to 25 °C?

$PV = NkT$

N and k are constants. If P is constant, you can rearrange this equation to put all constants on the same side, and get V/T = constant.

Then, $(V/T)_{initial} = (V/T)_{final} = (V/T)_{banana}$, because every (V/T) is equal to the same constant

$(V/T)_{initial} = (V/T)_{final}$

$V_{final} = (T_{final}/T_{initial}) \times V_{initial}$

$V_{final} = 1.67 \times V_{initial}$, or 12.53 m^3