Question #36954

The pressure at a point in water is 10N /m square .the depth below this point where the pressure becomes double is (given density of water =10 raise to power three kg/m cube; g=10m/ s square)

Solution:

Let

$P_1 = 10 \ N/m^2$???

$\rho = 10^3 \ Kg/m^3$

$g = 10 \ m/s^2$

$P_2 = 2P_1$

$h = ?$

The pressure of water at the given point defined as

$P_1 = \rho g H$

Were H is the water column height over the point

According to this

$P_2 = \rho g(H + h)$

$P_2 = 2P_1$

$\rho g(H + h) = 2 \ P_1$

$$H + h = \frac{2 \ P_1}{\rho g}$$

$$h = \frac{2 \ P_1}{\rho g} - H$$

$$h = \frac{2 \ P_1}{\rho g} - \frac{P_1}{\rho g}$$

$$h = \frac{P_1}{\rho g}$$

$$h = \frac{10}{1000 * 10} = 0.001 \ m$$

Answer: 0.001 m.

The current numerical result is quite strange. It is possible that the pressure at a point is 10 N/cm^2. In this case:

$P_1 = 10 \ N/cm^2 = 1 * 10^5 \ N/m^2$

$$h = \frac{1 * 10^5}{1000 * 10} = 10 \ m$$

Answer: 10 m.