Answer on Question #48543 – Physics – Other

1. a wooden cube floating in water supports a mass m=0.2 kg on its top. when the mass is removed the cube rises by 2cm. the side of the cube is (density of water= 10^3 kg/m^3):
a) 6 cm; b)12 cm; c) 8 cm; d)10 cm.

$m = 0.2\,kg$ $h = 0.02\,m$ $\rho = 10^3\,\frac{kg}{m^3}$	*Solution.*
$a - ?$	We must use Archimedes' principle: buoyant force that is exerted on a body immersed in a fluid (fully or partially submerged) is equal to the weight of the fluid that the body displaces. So, we can write for two cases: $(m_0 + m)g = \rho g a^2 l$, $m_0 g = \rho g a^2 (l - h)$, where l is the initial height of the cube submerged in water, m_0 is the cube mass.

Substructing on of these equations from another one, we can obtain: $mg = \rho g a^2 h$, $\boxed{a = \sqrt{\frac{m}{\rho h}}}$.

Let check the dimension: $[a] = \sqrt{\frac{kg}{\frac{kg}{m^3} \cdot m}} = m$.

Let evaluate the quantity: $a = \sqrt{\frac{0.2}{10^3 \cdot 0.02}} = 0.1(m)$.

Answer: d)