

## Answer on Question #66478 –Physics – Classical Mechanics

If the density of wood is  $\rho_{block} = 0.5$  grams per cubic centimeter and the density of water is  $\rho_w = 1.0$  grams per cubic centimeter, consider the following and solve. A block of wood shaped as a cube is 10 centimeters per side – total volume  $V_{block} = 1000$  cubic centimeters. How much of the wood will NOT be in the water when it floats?

### Solution

To the block applied two forces: gravity and buoyancy force. If the block floats, the net force is equal to zero. So

$$mg = g\rho_w V_{disp}.$$

Here  $V_{disp}$  is the volume of the displaced body of liquid.

The mass of block

$$m = \rho_{block} V_{block}.$$

Therefore

$$V_{disp} = \frac{\rho_{block} V_{block}}{\rho_w} = \frac{0.5}{1} 1000 = 500 \text{ cm}^3.$$

Finally, the volume of wood that not be in the water

$$\Delta V = V_{block} - V_{disp} = 1000 - 500 = 500 \text{ cm}^3.$$

**Answers:** 500 cm<sup>3</sup>.

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