

12. I put a rock into a beaker with 150 ml of water and the water goes up to 190 ml. If the rock has a mass of 110g, what is the density of the rock? Show your work

$$190\text{ml} - 150\text{ml} = 40\text{ml} \quad \text{or} \quad 40\text{cm}^3$$

$$\frac{2.75\text{g}}{\text{cm}^3}$$

$$D = \frac{m}{V} = \frac{110\text{g}}{40\text{cm}^3} = \boxed{2.75\frac{\text{g}}{\text{cm}^3}}$$

13. I have a boat that just barely floats in the ocean when fully loaded. I take the boat to the river and notice a difference in the way that it floats. Tell me what the difference is and why it is different.

a. Floats Deeper, or sinks

b. Fresh water is less dense and provides less buoyant force

14. When you have an item made from two different metals bonded together, and they curve when heated, what is that material called? bi-metallic

15. How does a bi-metallic strip work? Two different metals bonded together (like copper + steel) one metal expands more than the other. This causes it to curve.

16. What are the units for liquid volume? ml What are the units for solid volume? cm³

17. What is the volume of the cylinder? diameter is 8 cm and the height is 12 cm

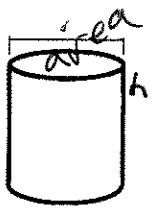
$$\text{Area} = \pi r^2 = \pi (4\text{cm})^2$$

$$\text{height} = 12\text{cm}$$

$$\text{Volume} = \pi (4\text{cm})^2 \times 12\text{cm}$$

$$= 603.19\text{cm}^3 \quad (\pi)$$

$$= 602.88\text{cm}^3 \quad (3.14)$$



18. Heron of Alexandria hired Archimedes to find out if he had been cheated by the goldsmith.

19. A 200 g rock (hanging on a gram scale) is placed into an overflow can and 70 ml of water comes out. What would the scale read now that the rock is in the water? 130g

water $70\text{ml} = 70\text{g}$ it will read 70g less $200\text{g} - 70\text{g} = 130\text{g}$

The waterproof box shown has a mass of 200 g.

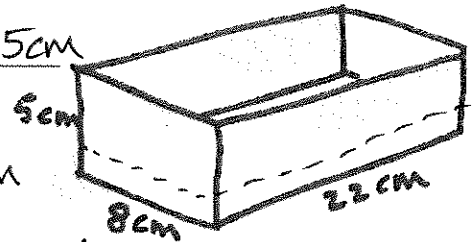
20. While floating, how many cm will be under water while empty? 1.15cm

$$\text{Capacity} = 5\text{cm} \times 8\text{cm} \times 22\text{cm} = 880\text{cm}^3$$

880g can be supported.

$$\frac{200\text{g}}{880\text{g}} = .23$$

$$.23 \times 5\text{cm} = 1.15\text{cm}$$



21. How much more can it hold before it sinks? 680 g

$$880\text{g} - 200\text{g} = 680\text{g}$$

22. What is the buoyant force? Definition

The upward force on an object because it is surrounded by other material that has its own density, it equals the weight of what is displaced

23. How can we know what the buoyant force will be without using a scale? in water, the amount of water displaced in ml equals buoyant "force" in grams

24. Describe Positive, Negative, and Neutral buoyancy.

Positive Floats
 Negative sinks
 Neutral hovers