1. A block has mass 600 g and volume 200 cm^3. What is its density, in $\frac{\text{g}}{\text{cm}^3}$?

   _____ g/cm^3

2. A force of 200 N presses on an area of 0.5 m^2. What is the pressure, in Pa?

   _____ Pa

3. A block of volume 0.002 m^3 is submerged in water ($\rho = 1000\ \frac{\text{kg}}{\text{m}^3}$, $g = 10\ \frac{\text{m}}{\text{s}^2}$). What is the buoyant force, in N?

   _____ N

4. Water at 2 $\frac{\text{m}}{\text{s}}$ flows from a pipe of area 6 cm^2 into one of area 2 cm^2. What is the new speed, in $\frac{\text{m}}{\text{s}}$?

   _____ m/s

5. Density is defined as:

   ☐ mass per unit volume

   ☐ weight per unit area

   ☐ volume per unit mass

   ☐ mass times volume

6. Find the gauge pressure due to water at depth 2 m below an open surface, where density is 1000 kg per cubic metre and g = 10 m/s squared. Answer in Pa.

   _____ Pa

7. Archimedes' principle says the buoyant force equals:

   ☐ the weight of the fluid displaced

   ☐ the weight of the object

   ☐ the density of the object

   ☐ the volume of the object

8. The continuity equation $A_1 v_1 = A_2 v_2$ is a statement of the conservation of:

   ☐ mass

   ☐ charge

   ☐ momentum

   ☐ energy

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☐ True ☐ False

10. The same force on a **smaller** area produces:

    ☐ less pressure

    ☐ zero pressure

    ☐ the same pressure

    ☐ more pressure

1. **3 g/cm^3**

   $\rho = m/V = 600/200 = 3\ \frac{\text{g}}{\text{cm}^3}$.

2. **400 Pa**

   $P = F/A = 200/0.5 = 400$ Pa.

3. **20 N**

   $F_b = \rho V g = 1000 \times 0.002 \times 10 = 20$ N.

4. **6 m/s**

   $A_1 v_1 = A_2 v_2 \Rightarrow 6 \times 2 = 2 v_2 \Rightarrow v_2 = 6\ \frac{\text{m}}{\text{s}}$.

5. **mass per unit volume**

   $\rho = m/V$ – mass per unit volume.

6. **20000 Pa**

   $P = \rho g h = 1000 \times 10 \times 2 = 20\,000$ Pa.

7. **the weight of the fluid displaced**

   $F_b = \rho_{\text{fluid}} V g$ – the weight of the fluid the object pushes aside.

8. **mass**

   No fluid piles up or disappears – it is conservation of mass.

9. **False**

   Density is mass **per volume**. A large object can be low-density if its mass is spread over a big volume.

10. **more pressure**

    $P = F/A$: a smaller area gives a larger pressure – why knives and needles are sharp.

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