1. A force of 20 N acts at a perpendicular distance of 0.50 m from a pivot. What is the moment?

   _____ N · m

2. Select **both** conditions a body must meet to be in equilibrium.

   ☐ The resultant force is zero

   ☐ The object is at its centre of gravity

   ☐ The object is not moving at all

   ☐ The resultant moment is zero

   Tick every correct option.

3. A block has mass 5.0 kg and volume 0.0020 m^3. What is its density?

   _____ kg/m^3

4. Why is a door handle placed far from the hinges?

   ☐ It has no effect on the turning

   ☐ A larger distance gives a larger moment for the same push

   ☐ It makes the door heavier

   ☐ It uses a larger force

5. A body with zero resultant force must be in equilibrium.

   ☐ True ☐ False

6. Pressure is the force per unit _____ (acting at right angles to the surface).

   _____

7. Only the part of a force perpendicular to the arm contributes to the turning.

   ☐ True ☐ False

8. At balance, the total clockwise moment equals the total _____ moment.

   _____

9. The extra pressure at a depth in a liquid depends on:

   ☐ the total volume of liquid

   ☐ the area of the surface at the top

   ☐ the density of the liquid and the depth

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10. Select **all** the features of a couple.

    ☐ The resultant force is zero

    ☐ They point in opposite directions

    ☐ They point in the same direction

    ☐ The two forces are equal in size

    ☐ Their lines of action are a distance apart

    Tick every correct option.

1. **10 N · m**

   $M = F \times d = 20 \times 0.50 = 10$ N · m.

2. **The resultant force is zero; The resultant moment is zero**

   Equilibrium = zero resultant force **and** zero resultant moment. A body can be in equilibrium while moving at constant velocity.

3. **2500 kg/m^3**

   $\rho = \dfrac{m}{V} = \dfrac{5.0}{0.0020} = 2500\ \dfrac{\text{kg}}{\text{m}^3}$.

4. **A larger distance gives a larger moment for the same push**

   Moment $= F \times d$. A bigger d means a bigger turning effect for the same force, so the door opens more easily.

5. **False**

   Not necessarily – a couple gives zero resultant force but still turns the body. You also need zero resultant moment.

6. **area**

   $p = \dfrac{F}{A}$, measured in Pa $= \dfrac{\text{N}}{\text{m}^2}$.

7. **True**

   Yes – that is why $M = Fr\sin\theta$: $\sin\theta$ picks out the perpendicular part of the force.

8. **anticlockwise**

   That is the principle of moments – the two turning effects cancel about any chosen point.

9. **the density of the liquid and the depth**

   $\Delta p = \rho g \Delta h$ – only density and depth matter; the container shape does not.

10. **The resultant force is zero; They point in opposite directions; The two forces are equal in size; Their lines of action are a distance apart**

    A couple is equal, opposite forces a distance apart, giving zero resultant force but a pure turning effect. Same-direction forces are not a couple.

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