1. Gravitational field strength is the force per unit:

   ☐ charge

   ☐ mass

   ☐ volume

   ☐ area

2. Newton's law of gravitation gives the force between two masses as:

   ☐ $Gm_1m_2r^2$

   ☐ $\dfrac{Gm_1m_2}{r^2}$

   ☐ $\dfrac{m_1m_2}{Gr^2}$

   ☐ $\dfrac{Gm_1m_2}{r}$

3. The gravitational field strength at distance r from a point mass M is:

   ☐ $\dfrac{GM}{r^2}$

   ☐ $\dfrac{GMm}{r^2}$

   ☐ GMr^2

   ☐ $\dfrac{GM}{r}$

4. Gravitational potential is:

   ☐ negative everywhere (zero at infinity)

   ☐ positive everywhere

   ☐ zero everywhere

   ☐ always increasing with depth

5. A 2.0 kg mass feels a gravitational force of 20 N. What is g there?

   _____ N/kg

6. Gravity is always attractive.

   ☐ True ☐ False

7. Climbing a tall building changes the value of g by a large amount.

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8. Gravitational potential is taken to be zero at _____.

   _____

9. The unit $\dfrac{\mathrm{N}}{\mathrm{kg}}$ is the same as $\dfrac{\mathrm{m}}{\mathrm{s}^2}$.

   ☐ True ☐ False

10. Two masses attract with 40 N at separation r. What is the force at separation $2r$?

    _____ N

1. **mass**

   $g = \dfrac{F}{m}$ – the gravitational force on each kilogram of a small test mass.

2. $\dfrac{Gm_1m_2}{r^2}$

   The pull is proportional to each mass and inversely proportional to the distance squared.

3. $\dfrac{GM}{r^2}$

   From $g = \dfrac{F}{m}$ with $F = \dfrac{GMm}{r^2}$, the test mass cancels: $g = \dfrac{GM}{r^2}$.

4. **negative everywhere (zero at infinity)**

   Gravity does the work as a mass falls in, so $\phi = -\dfrac{GM}{r}$ is negative, reaching zero only at infinity.

5. **10 N/kg**

   $g = \dfrac{F}{m} = \dfrac{20}{2.0} = 10\ \dfrac{\text{N}}{\text{kg}}$.

6. **True**

   Yes – masses only ever pull together; there is no gravitational repulsion.

7. **False**

   Earth's radius is ~6400 km, so a few metres of height barely changes r – g is effectively constant.

8. **infinity**

   That choice makes the potential negative everywhere a mass actually is.

9. **True**

   Yes – g is also the acceleration of free fall, so its units are equivalent.

10. **10 N**

    Inverse-square: $\dfrac{40}{2^2} = \dfrac{40}{4} = 10$ N.

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