CLASS X PHYSICS
CHAPTER 1. FORCE
ANSWER KEY

A 1. COMPLETE THE FOLLOWING SENTENCES:

a) **N-m.**
b) **Zero.**
c) **Static equilibrium.**
d) **Perpendicular distance between the line if action of the force and the axis of rotation.**
e) **Radius.**

A 2. a) ii) speed, b) iii) a fictitious force, c) iv) the body will have both rotational and translational.

A 3. Moment of force is a vector quantity.

A 4. Factors affecting turning effect of force:

(i) **The magnitude of the force applied**
(ii) **The distance of the line of action of the force from the axis of rotation.**

A 5. It is easier to open a door by applying the force at the free end of it because larger the perpendicular distance, less is the force needed to turn the body.

A 6. Reduce the force applied or decrease the distance between the line of action and axis of rotation.

A 7. a) Triangular lamina – the intersection of the three medians, Centroid b) a circular lamina – its geometric centre c) a ring – centre of the circle of which it is made up of, it is outside the body.

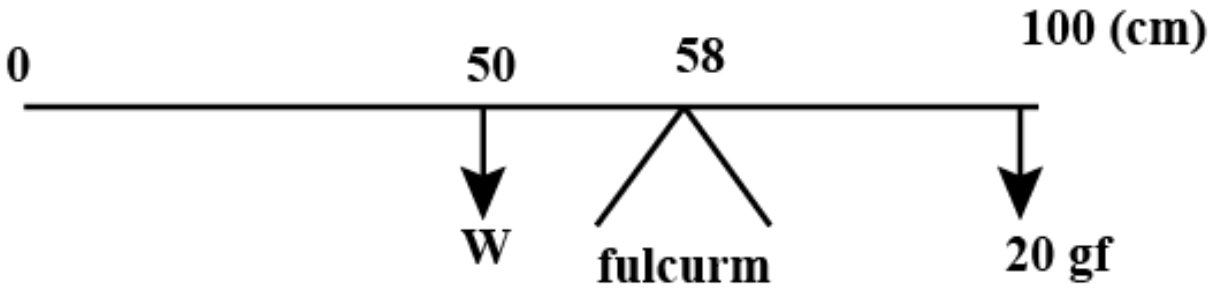
A 8.

> Uniform Linear Motion: Velocity is constant & thus it is a uniform motion. Acceleration is zero. Uniform Circular Motion: Velocity is not constant due to continuous change in Direction & thus it is not a uniform motion. Acceleration is called Centripetal acceleration.

A 9. Equilibrium is the state of balance. When a body or a system is in equilibrium, there is no net tendency to change. A body in equilibrium at rest is said to be in static equilibrium. However, a state of equilibrium does not

mean that no forces are act on the body, but only that the forces are balanced.

A 10. A uniform metre rule balances horizontally on a knife edge placed at the 58 cm mark when a weight of 20 gf is suspended from one end.



8 × W = (100 - 58) × 20, where W is the weight of the meter ruler.

W = (42 × 20)/8 = 105 gf.

A 11. Let the length of the handle be x m.

The moment of 150 N force = r × F = 0.4 m × 150 N = 60 N-m.

The moment of 60 N force = r × F = x m × 60 N = 60x N-m

Applying the principal of moments 60x = 60; x = 1

So, the length of the handle required is 1.0 m to open the nut by applying the force of 60 N.

A 12. Let the man weighing 50 kg sit at a distance x from the fulcrum, so as to balance the sea- saw.

Taking moment of force about the fulcrum, moment produced by the children = 30 × 1.5 + 40 × 2.5 kgf -m = 145 kgf -m

Moment produced by the man = 50 × x kgf-m

Applying principle of moments, 50 × x = 145; x = 2.9 m.

Therefore, the man weighing 50 kgf will sit at a distance of 2.9 m from the fulcrum on opposite side of the children, so as to balance the sea-saw.
