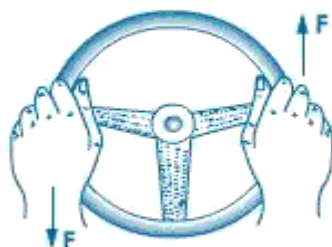


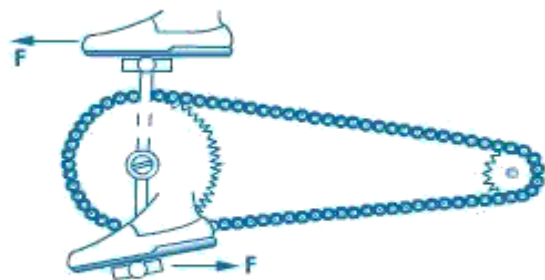
CLASS X PHYSICS
CHAPTER 1. FORCE
SUMMARY

1. A force acting on a rigid body can cause two type of motion in it: Translational motion and Rotational motion.
2. When the body moves in a straight path along the direction of the force applied the motion is called Translational motion.
3. If the body is pivoted at a point and the force applied at a suitable point, rotates the body the motion is called Rotational motion.
4. The turning effect on the body about an axis is due to the moment of force or Torque applied on the body.
5. The turning of the body hence depends on the magnitude of the force and the distance of line of action of the force from the axis of rotation.
6. Moment of force = Force \times Perpendicular distance of force from point of pivoting.
7. Common examples:

Rotating forces : couples

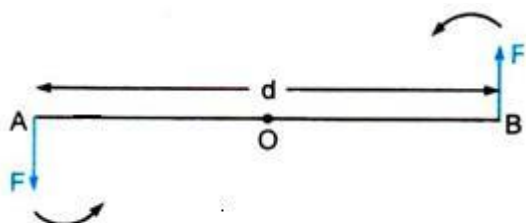


(a)



(b)

8. Two equal and opposite parallel forces, not acting along the same line, forms a couple. A couple is always needed to produce a rotation.



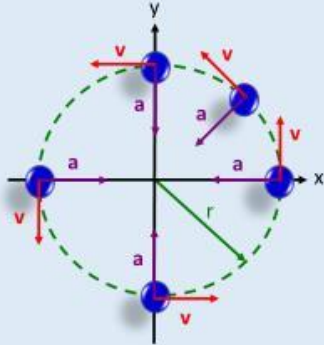
Couple Action

9. Equilibrium of bodies: When a number of forces acting on a body produce no change in its state of rest or of linear or rotational motion the body is said to be in equilibrium.

10.

Uniform circular motion – Another specific example of 2D motion

An object that is traveling in a circular path is moving in two Cartesian directions (x and y for example) simultaneously.



What do you know about an object that is moving along a circular path?
The radius is constant and the speed is constant.

Is the object accelerating?
Yes! – the direction of the velocity changes.

What is the direction of the acceleration?
The acceleration is directed towards the center of the circular path. This is called **centripetal acceleration**.

The centripetal acceleration is what keeps the object moving in a circular path.

What would happen to the object moving in a circular path if the centripetal acceleration was instantaneously reduced to zero?
The object would move in the direction of the velocity at the instant the acceleration was reduced to zero. This would result in a straight line path that is tangent to the circular path at that instant.

WORKSHEET

VERY SHORT ANSWER TYPE QUESTION

1. COMPLETE THE FOLLOWING SENTENCES:

- The S.I unit of moment of force is -----.
- In equilibrium algebraic sum of moments of all forces about the point of rotation is ----
- In a beam balance when the beam is balanced in a horizontal position, it is in -----equilibrium.
- Torque = magnitude of force × -----
- The centripetal force acts along the ----- of the circular path.

2. MULTIPLE CHOICE TYPE

- Which of the following quantity remains constant in a uniform circular motion:
 - Velocity
 - speed
 - acceleration
 - both velocity and speed.

b) The centrifugal force is:

i) a real force ii) the force of reaction of centripetal force iii) a fictitious force iv) directed towards the centre of circular path.

c) A body is acted upon by two unequal forces in opposite directions, but not in same line. The effect is that:

i) the body will have only the rotational motion

ii) the body will have only translational motion

iii) the body will have neither rotational nor translational

iv) the body will have both rotational and translational

SHORT ANSWER TYPE QUESTION

3. State whether the moment of force is a scalar quantity or vector quantity.
4. State the factors affecting the turning effect of a force.
5. Why is it easier to open a door by applying a force at the free end of it?
6. State one way to reduce the moment of a given force about a given axis of rotation.
7. At which point is the centre of gravity situated in:
a) Triangular lamina b) a circular lamina c) a ring

LONG ANSWER TYPE QUESTION

8. Differentiate between uniform linear motion and uniform circular motion.
9. What do you mean by equilibrium of a body?
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.
Draw the diagram of the arrangement. What is the weight of the rule?
11. A man can open a nut by applying a force of 150 N by using a lever handle of 0.4 m. What should be the length of the handle if he is able to open it by applying a force of 60 N?
12. A sea-saw 6 m long is balanced in the middle. Two children of weight 30 kgf and 40 kgf are sitting on the same side of fulcrum at a distance of 1.5 m and 2.5 m from fulcrum, respectively. Where should be a man weighing 50 kgf sit from the fulcrum, so as to balance the sea-saw?