

SCIENCE FORM 2

CHAPTER 7 DYNAMICS

Forces

- a push or a pull
- we unable to see a force, but we can see and feel the effects of a force

Force can :

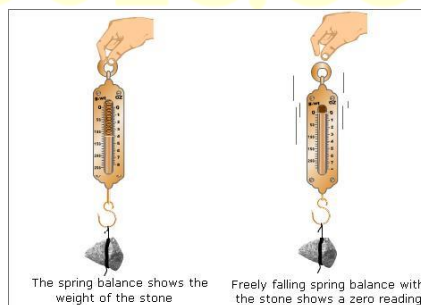
- changes object's position
- changes object's direction
- change object's shape
- change object's speed (increase/ decrease/ stop it)

Types of forces

- gravitational force
 - the force that makes things fall to the ground
- magnetic force
 - force which acts on iron, steel and other magnetic materials
- electrostatic force
 - force due to electrical charge
- frictional force
 - force acting on the surface of an object when it moves against the surface of another object

Measurement of force

- SI unit : newton (N)
- measured by using spring balance or newton balance



Application of frictional force

- friction opposes the movement of objects which rub against one another
- stop pedalling : bicycle slow down and stop
- without friction the climber would not be able to hang onto the cliff

Advantage of friction

- it is a resistance force that slows down to prevent motion
- friction hold our shoes to the ground, allowing us to walk
- friction between our hand and surface of glass helps to keep the glass on place and not fall

- friction holds the nail in the wood or wall
- friction between bow and violin strings produce sound
- friction of tyres against the road to stop a bicycle
- friction used by a pencil erasers to rub off

Disadvantage of friction

- waste of energy, wear down parts and cause things to heat up
- friction cause movement more difficult
- waste of energy or fuel, excess friction uses extra fuel or energy to keep the vehicle from moving
- rubbing parts together produce heat and noises
- friction wears things out

Application of

a) increasing friction

- rubber pads are fixed to the bases of many household appliances to keep them in place
- tyres are designed with raised tread to grip the road tightly and disperse water when the road is wet
- rubber mat in a bathroom prevents us from slipping
- dancers score the soles of their shoes to increase the friction between the floor and the shoe, so they do not slip

b) decreasing friction

- ball bearing is used to reduce friction between surfaces of wheel and axle (in order to rotate faster)
- heavy objects have wheels fixed on them , enables us to move the objects more easily
- conveyor moves objects from one point to another with rollers
- lubricants used to reduce friction
- cars are streamlined to reduce friction

Application of work

- Work is done when a force that is applied to an object moves the object
- if a force is exerted but the object does not move, then no work is done
- when work is done, energy is transferred from one place to another
- SI unit: Joule
- the amount of work done depends on
 - a. the force on the object
 - b. the distance the object moves

$$\text{Work done (J)} = \text{Force (N)} \times \text{Distance (m)}$$

$$w = F \times d$$

Application of power

- power is the rate at which work is done

$$- \text{Power} = \frac{\text{work done (J)}}{\text{time taken (s)}}$$

- unit : J s⁻¹ or watt

$$\text{J s}^{-1} = 1 \text{ watt}$$

Exercise

1. A horizontal force of 50 N is applied to push an object a distance 2.0m on a table. What is the work done by the force?
2. A man does 1500 J of work to lift a box to a height of 2m. What is the weight of the box?
3. A motor can lift an object weighing 200N to a height of 5m in 10s. What is the power delivered by the motor?
4. A lift can carry 4 people to the top of a 50m building in 2 minutes. What is the power delivered by the motor of the lift? The average mass of one person is 72kg.[Assume 1kg = 10N]



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