

OGUN DIGICLASS

**CLASS: JUNIOR SECONDARY
SCHOOL**

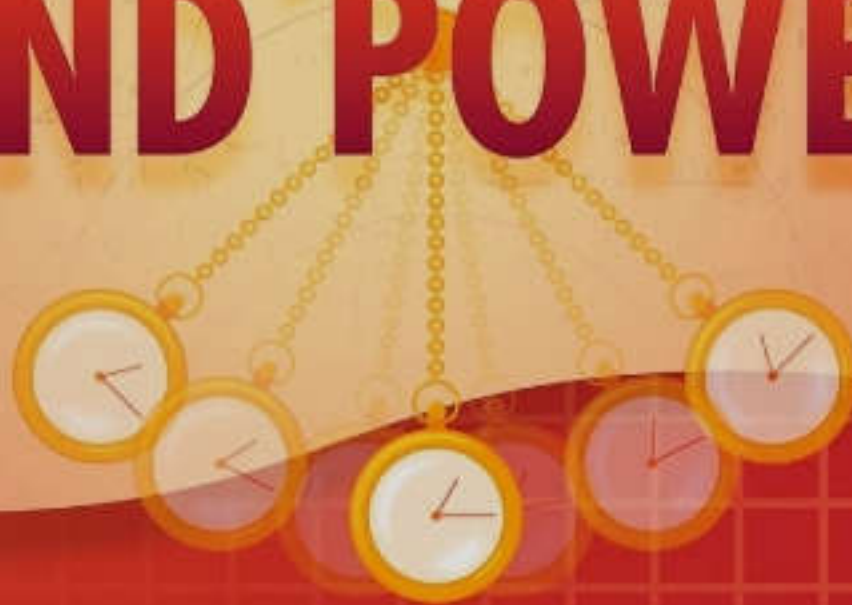
SUBJECT: BASIC SCIENCE

TOPIC:



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WORK, ENERGY, AND POWER



Learning Objectives

explain the concept of work energy and power

explain the meaning of Potential and kinetic energy

solve simple numerical problems on work, energy and power

CONCEPT OF WORK

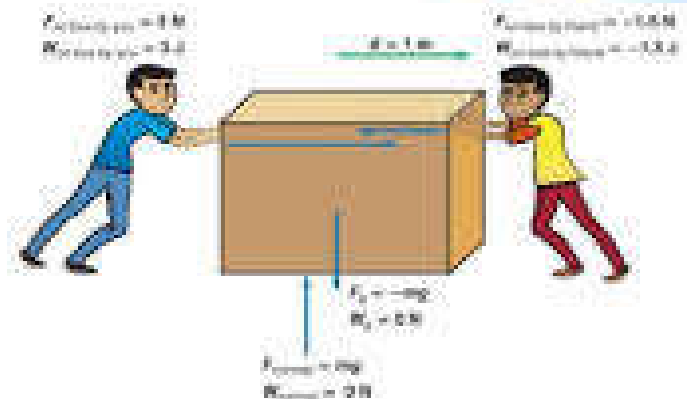
Work is the product of force and the distance moved in the direction of the applied force.

Note: before work is done, there must be force applied & distance covered

Work=Force X Distance Moved

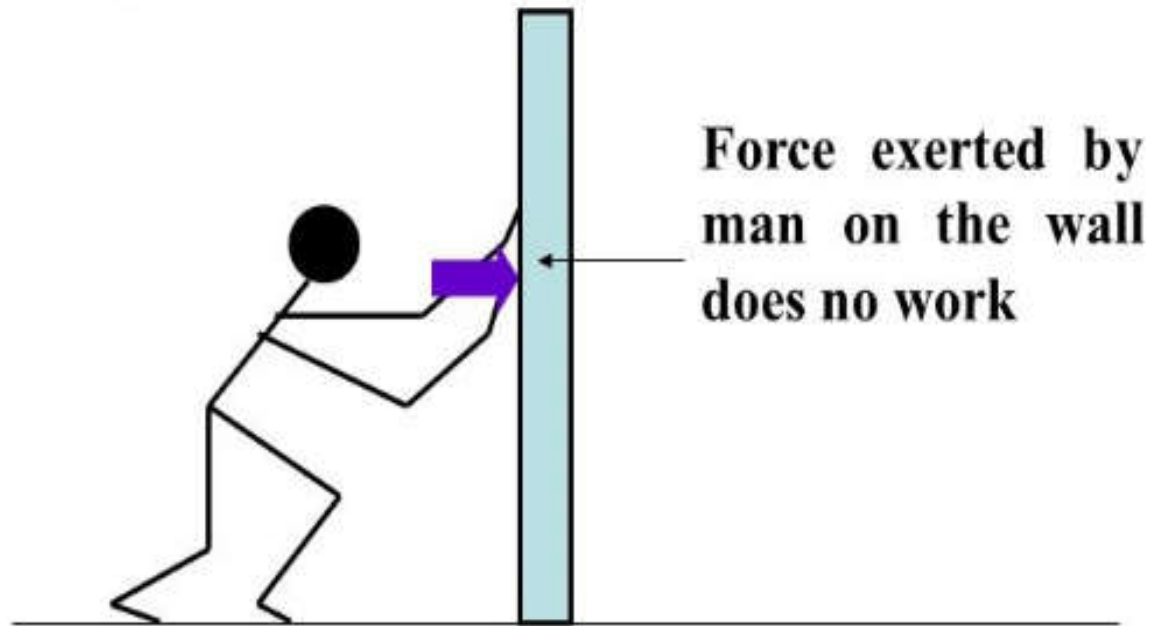
Therefore: $W=f \times d$

Work done by many forces



Work Done

Examples 1:



A person pushing on a wall does no work because the wall does not move.

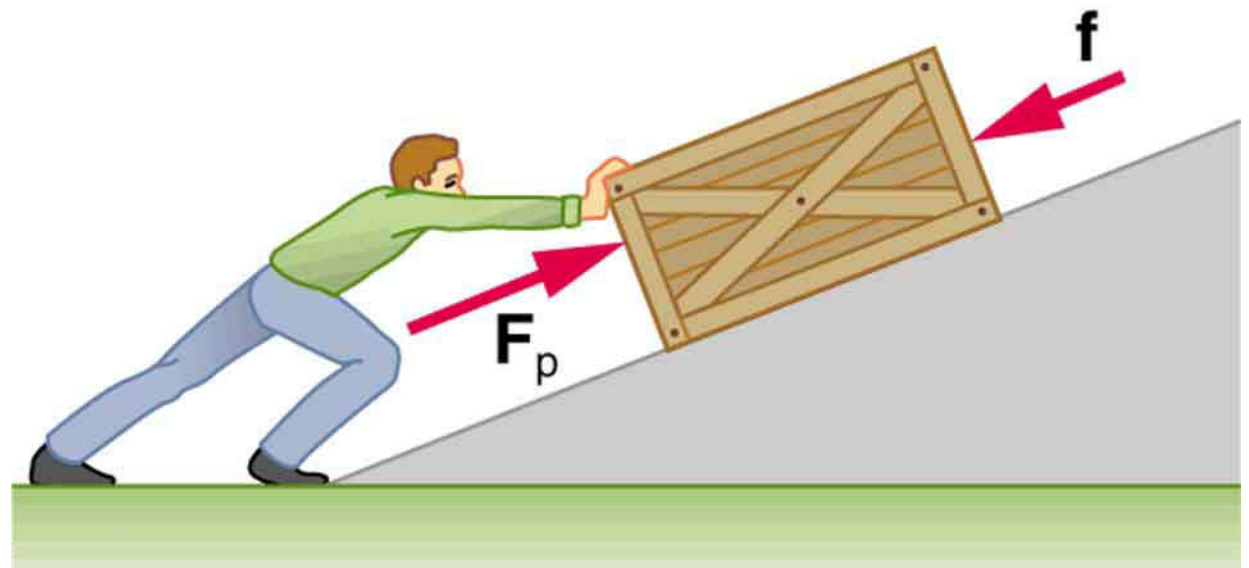
Work is measured in joules. (J) ($1\text{Nm}=1\text{J}$)

Force (f)=mass x acceleration

$$F = m \times a$$

$$F = ma$$

N kg m/s^2



ACTIVITY:

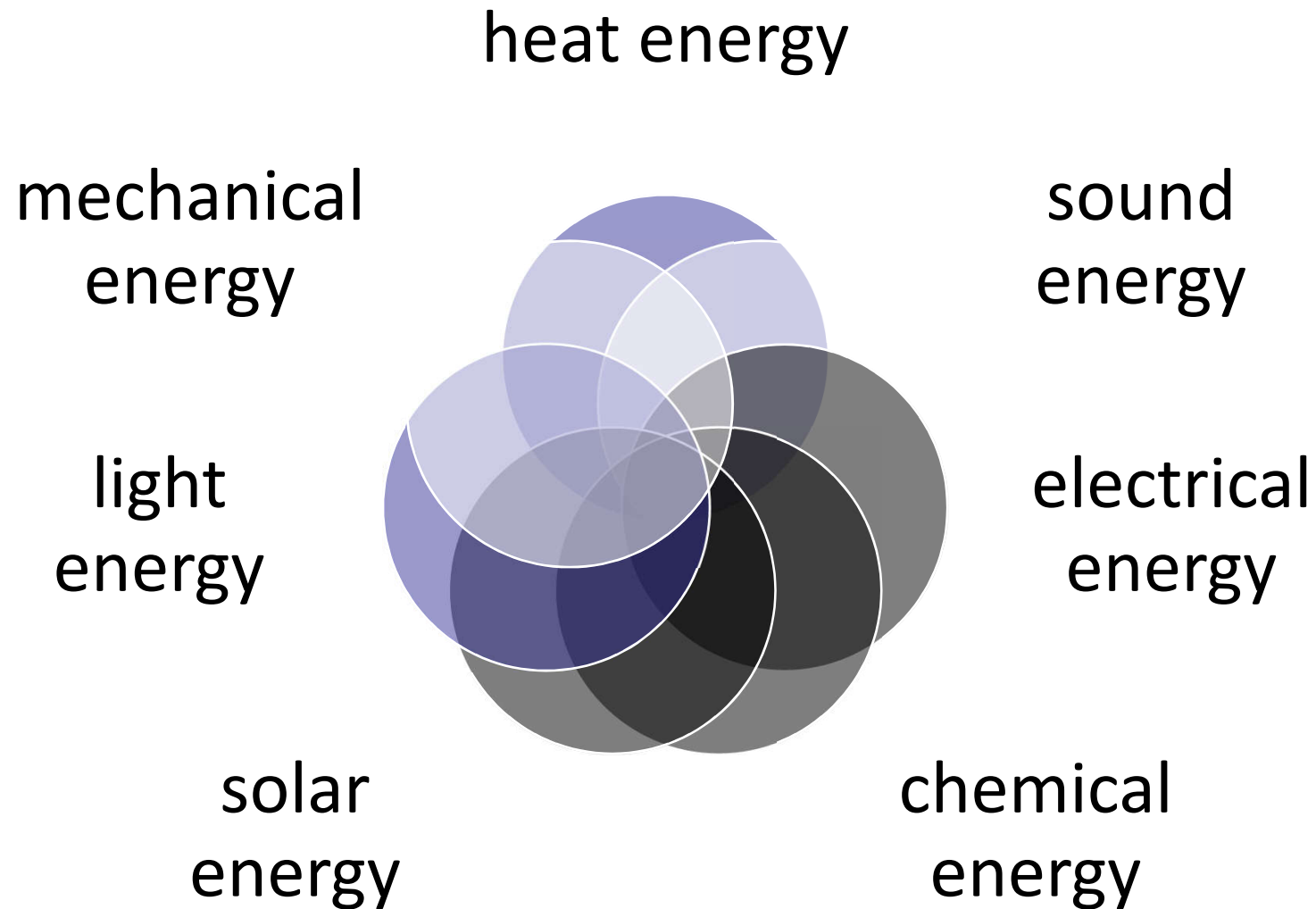
- Okon pulls a piece of wooden block on the surface of a table with a force of 20N , such that the wooden block moves a distance of 2m towards him. What is the work done by Okon?

Energy
is
the
ability
to do
work.



Energy is the ability to do work. SI unit of energy is joules (J)

There are various forms of energy.



Potential energy and kinetic energy.

Potential energy (PE) and kinetic energy (KE) are the two forms of Mechanical energy.

Potential Energy: This is the energy which a body use when it is at rest. Or energy due to position.

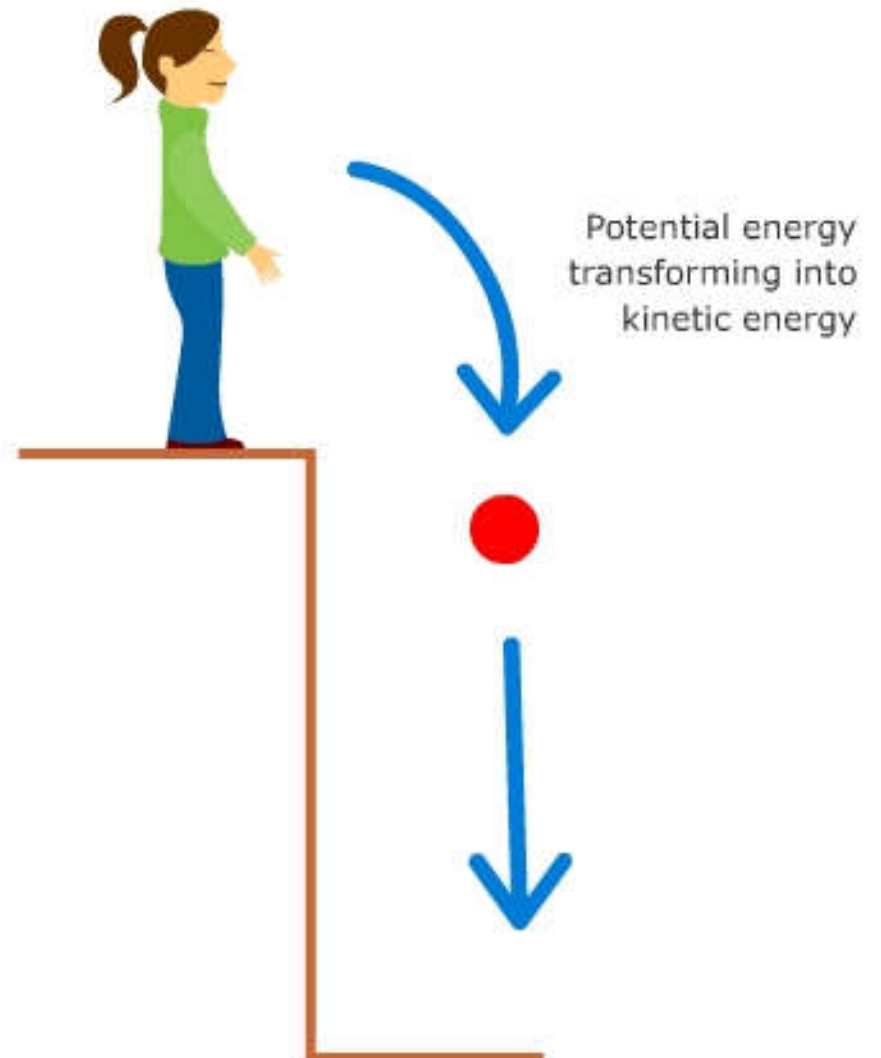
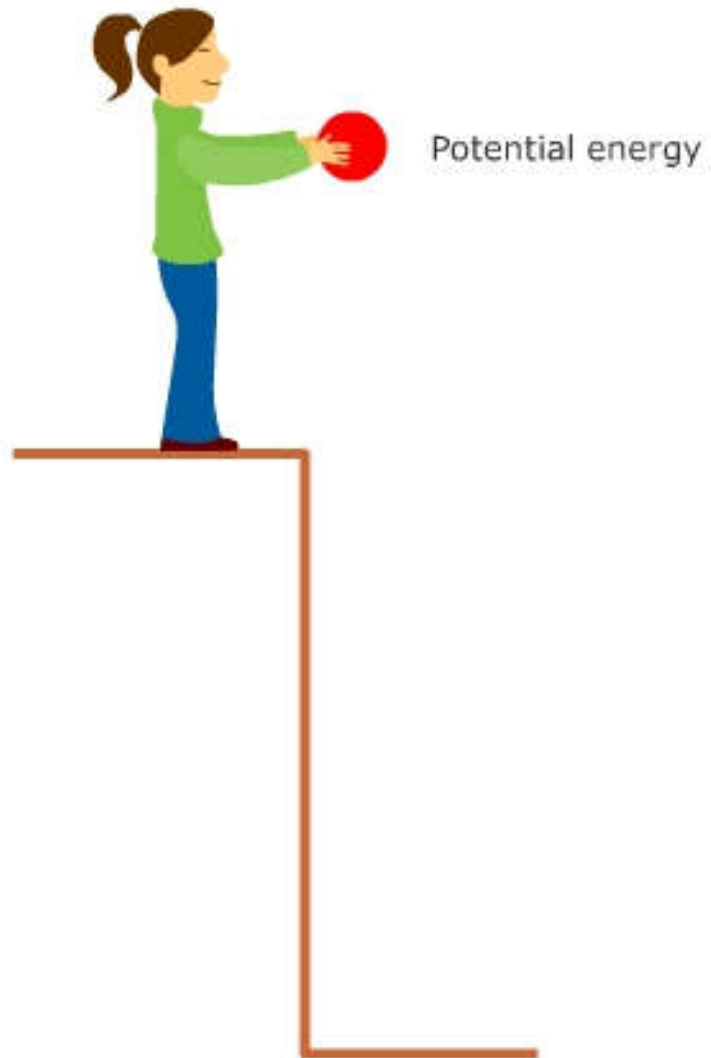
Mathematical expression of P.E is

$$P.E = mgh$$

where m =mass, g =gravity, & h =height .

Potential energy are of two types:

gravitational potential energy and elastic potential energy..



Activity

An orange fruit of mass 40kg falls from a height of 7m to the ground. Calculate the potential energy possessed by the fruit. ($g=10\text{m/s}^2$).

Kinetic Energy

This is the energy of a moving mass.

It is the energy due to motion or movement. A moving body uses kinetic energy(.K.E)

It has the formula

$$KE = \frac{1}{2}mv^2$$

There are two types of namely:

Translational and Rotational kinetic energy.

Activity

A body of mass 50kg ran with a velocity of 5m/s.
Calculate the kinetic energy of the body.

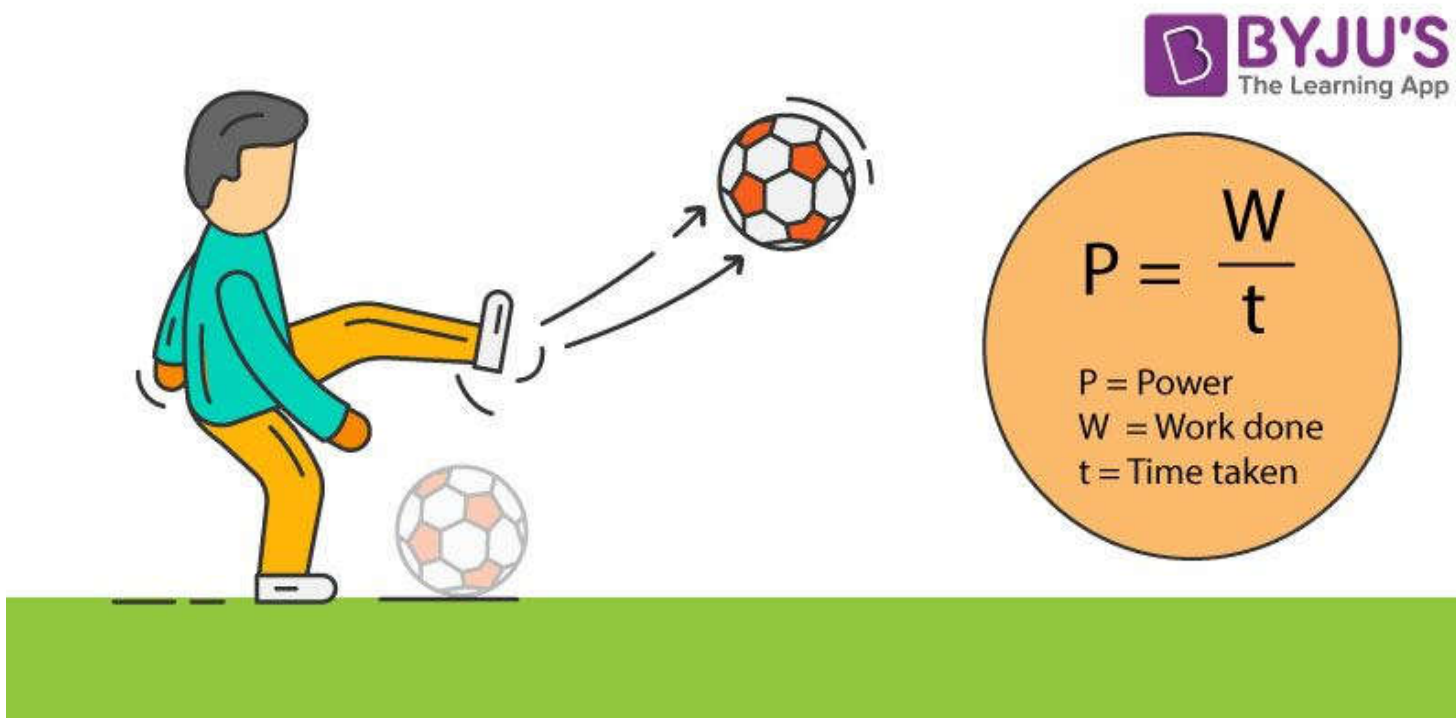
CONCEPT OF POWER

Power is the rate of doing work. It can also be defined as the rate of energy transfer.

Power $P = \frac{\text{work done (J)}}{\text{Time taken (s)}}$

Time taken (s)

The SI unit of power is watt(W) Hence 1 Js =1 watt.



$$\text{POWER} = \frac{\text{FORCE} \times \text{DISTANCE}}{\text{TIME}}$$

Activity

A force of 20N acts on a body to move it through a distance of 20m for a time of 20seconds. Calculate

- Workdone of the body
- Power expended

Assignment

1. A car of mass 2000kg travels at a velocity of 10m/s along a straight road. Calculate the kinetic energy.

2. A girl throws a ball through a height of 15m. If the mass of the ball is 20kg. Calculate the W done. ($g=10\text{m/s}^2$)