ODM EDUCATIONAL GROUP
Changing your Tomorrow

ENERGY

CHAPTER NO.4

SUB: PHYSICS

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LEARNING OUTCOMES

Students will be able to

- Define work
- Express work in proper unit
- Calculate work done in simple case
- Define kinetic energy.
- Express kinetic energy in proper units.
- Solve simple problems based on kinetic energy.
- Define potential energy.
- Define gravitational potential energy.
- Solve problems based on gravitational potential energy.
- Describe energy transformation in daily life situation .
- Distinguish between energy and power.

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POINTS TO BE COVERED

- Work
- Factors affecting the amount of work done.
- Units of work done.

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INTRODUCTION

https://youtu.be/xGc9f0SUq2w

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WORK

Work (W)

Work is defined as a force acting upon an object to cause a displacement

It is expressed as the product of force and displacement in the direction of force.

$$W = F \times s$$

Here, W= work done on an object

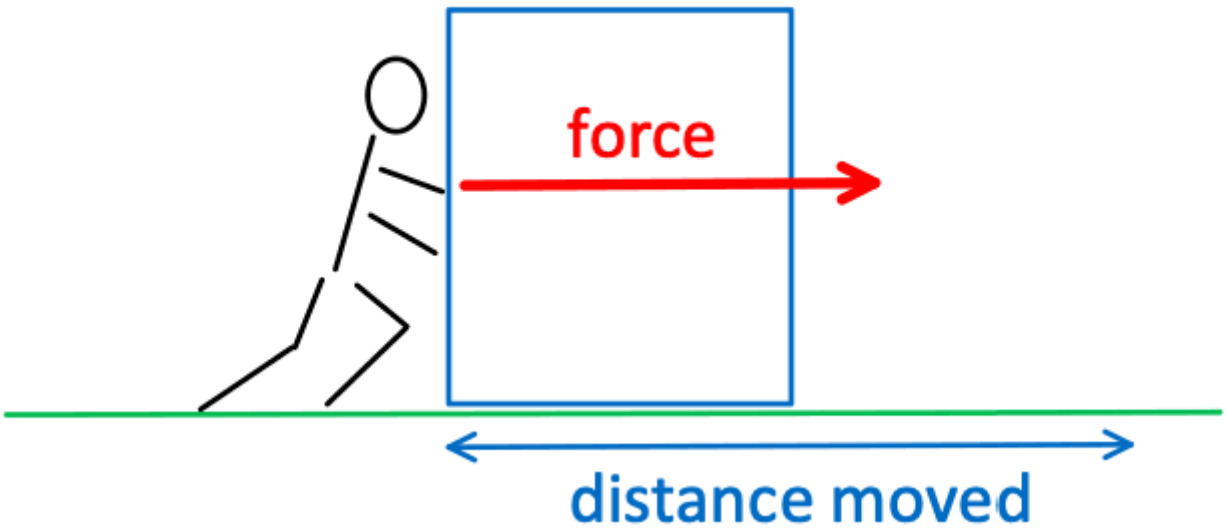
F = Force on the object

s = Displacement of the object

The unit of Work is Newton metre (Nm) or joule (J).

1 Joule is defined as the amount of work done by force of 1 N when displacement is 1 m.

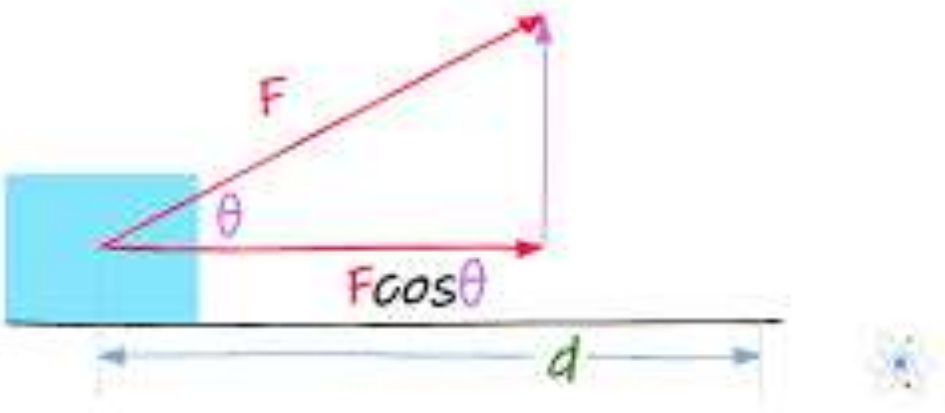
WORK



EXAMPLE OF WORK DONE

WORK DONE

$$W = Fd\cos\theta$$



- **Sign Conventions for Work Done**
- when both the force and the displacement are in the same direction, positive work is done.

  $W = F \times s$
- when force acts in a direction opposite to the direction of displacement, the work done is negative.

  $W = -F \times s$
- Angle between force and displacement is 180^{o}.
- If force and displacement are inclined at an angle less than 180^{o}, then work done is given as:
- $W = Fs\cos\theta$
- If force and displacement act at an angle of 90° then work done is zero.

Necessary Conditions for Work to be done

- Two conditions need to be satisfied for work to be done:
- Force should act on the object.
- Object must be displaced.

JOULE

- Definition of joule:
- 1 joule = 1newton x 1 metre
- One joule of work is said to be done if one newton force when acting on a body moves it by 1 metre in the direction of force.
- Bigger unit of force:
- 1 kJ = 1000 J
- 1 MJ =1000000 joule.

HOME ASSIGNMENT

- Exercise: B: 1,2,3,4

THANKING YOU

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