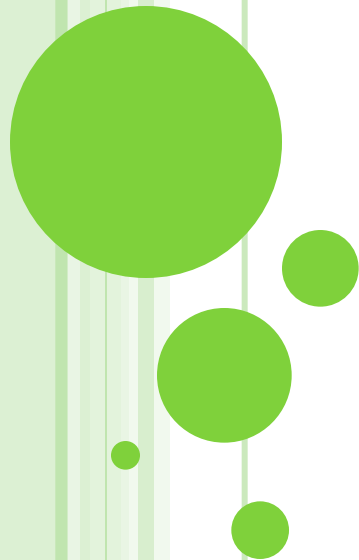


MOTION AND MOVEMENT



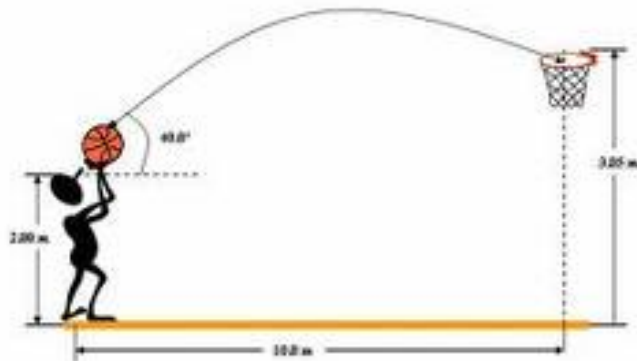
WHAT IS THE MOVEMENT?

- **Movement** is the change of position of an object in relation to a fixed point in space.
- In physics, **motion** is the change of location or position of an object with respect to time.

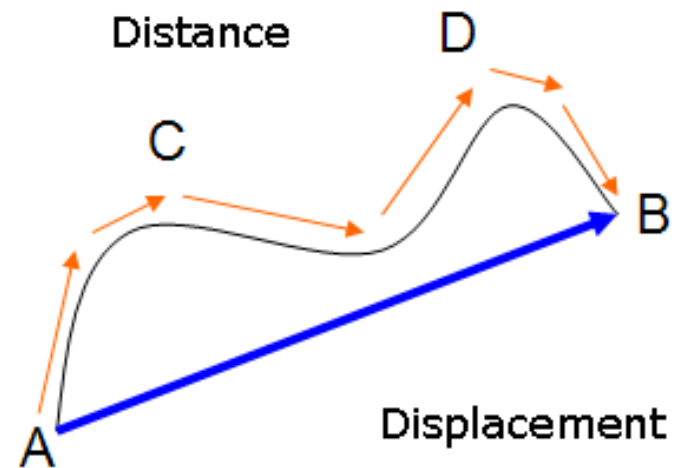


MOTION CHARACTERISTICS

- The main characteristics are the following ones: **position, trajectory, distance travelled, displacement, time taken, speed and acceleration.**
- **Position X** is precisely where an object is located.
- **Trajectory** is the path that a moving object follows through space. It can be **rectilinear, circular, parabolic** etc . Ex: a ball thrown into a basket is parabolic or the hands of a watch is circular.



- The **distance travelled (E)** is the length of the trajectory made by the moving object from the initial position to the final position.
- The **displacement (D)** is the distance, measured in straight line, between the initial position(X_i) and the final position (X_f). **$D=X_f-X_i$**



- **Speed** is the distance travelled per unit of time.
 - **Average speed** (V_m) is calculated dividing the distance travelled by the time spent.

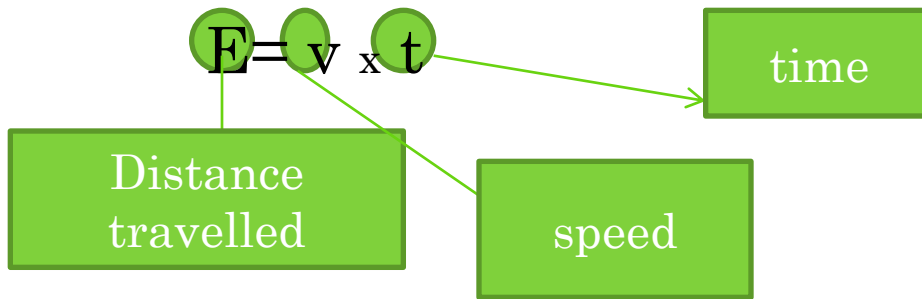
$$V_m = \frac{\text{distance travelled (e)}}{\text{time spent}}$$

The unit used to measure the speed in the SI is **metres per second. (m/s)**

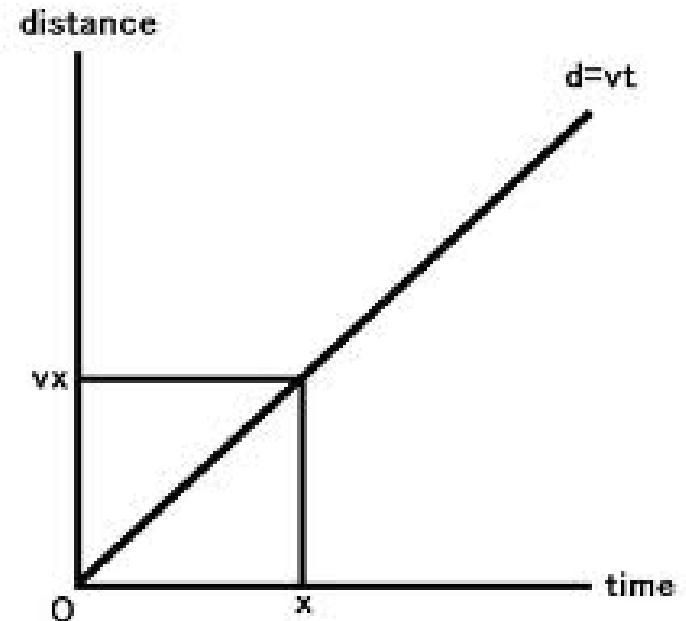


UNIFORM LINEAR MOTION

A body has a **uniform linear motion** if the trajectory is a straight line and the speed is constant.



Distance-time graph



Speed-time graph

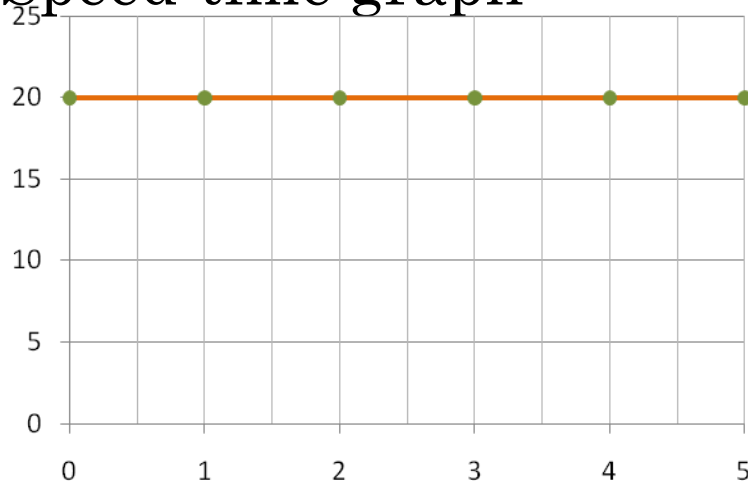
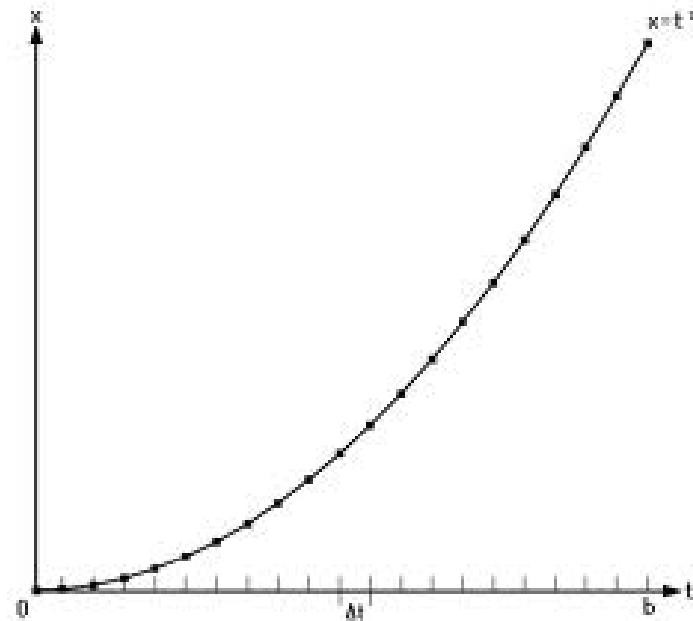


Figure 2

UNIFORMLY VARIED MOTION

- The speed varies in a uniform way. Ex: A train starting off or stopping.



ACTIVITY 1

An athlete can run long distances at 4 metres per second. How far can she run in?

- a) 50 seconds
- b) 3 minutes
- c) 1 hour
- d) 2 hours and a half

Remember that in the uniform motion:

$$\text{Distance travelled} = \text{speed} \times \text{time}$$



ACTIVITY 2

Andrew rows at an average speed of 2 metres per second.

a) How long does it take him to row:

- 70 m
- 800 m
- 1 km and a half

b) How far can Andrew row in:

- 12 seconds
- 3 minutes and a half
- 4 hours

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$



ACTIVITY 3

A snail moves 5 m in 2 hours. If it moves at the same speed all the time, calculate:

- a) The time it takes to move 20 m
- b) The distance it would move in 3 hours and a half
- c) The time it takes to move 1 m
- d) The distance it moves in 15 minutes



ACTIVITY 4

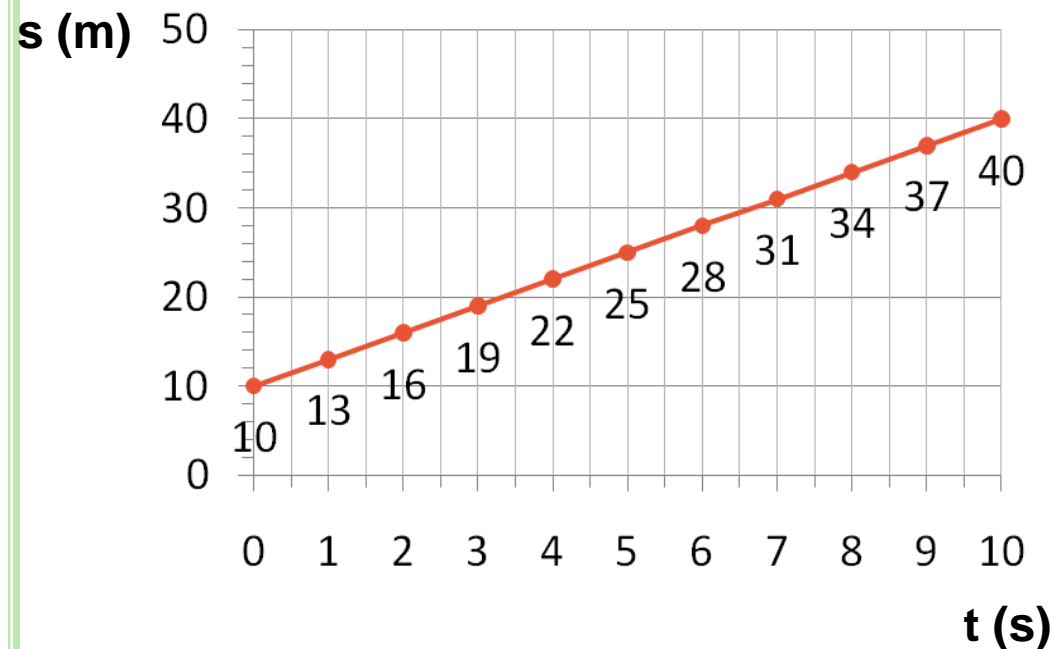
John can type 960 words in 20 minutes.
Calculate his typing speed in:

- a) Words per minute
- b) Words per hour



ACTIVITY 6

The graph represents data of positions and times of the movement of an object.



- Is it an uniform motion or an accelerated motion? Justify your answer.
- The position of the object at 2 seconds from when the movement started. The position of the object at 6 seconds.
- Speed at the interval 2-6 seconds.
- The position of the object at 4 seconds from when the movement started. The position of the object at 10 seconds.
- Speed at the interval 4-10 seconds.
- How has the trajectory been?

ACTIVITY 7

Given the following values tables, answer the following questions.

Values table A

s (m)	t (s)
2	0
4,5	1
7	2
9,5	3
12	4
14,5	5
17	6
19,5	7
22	8
24,5	9
27	10

Values table B

s (m)	t (s)
0	0
2	1
5	2
9	3
14	4
20	5
27	6
35	7
44	8
54	9
65	10

- Draw the graph s/t of each movement.
- Calculate the average speed in the first five seconds for each values table.
- Calculate the average speed in the time elapsed from the second five to the second ten for each values table.
- Indicate the type of movement represented in each graph.