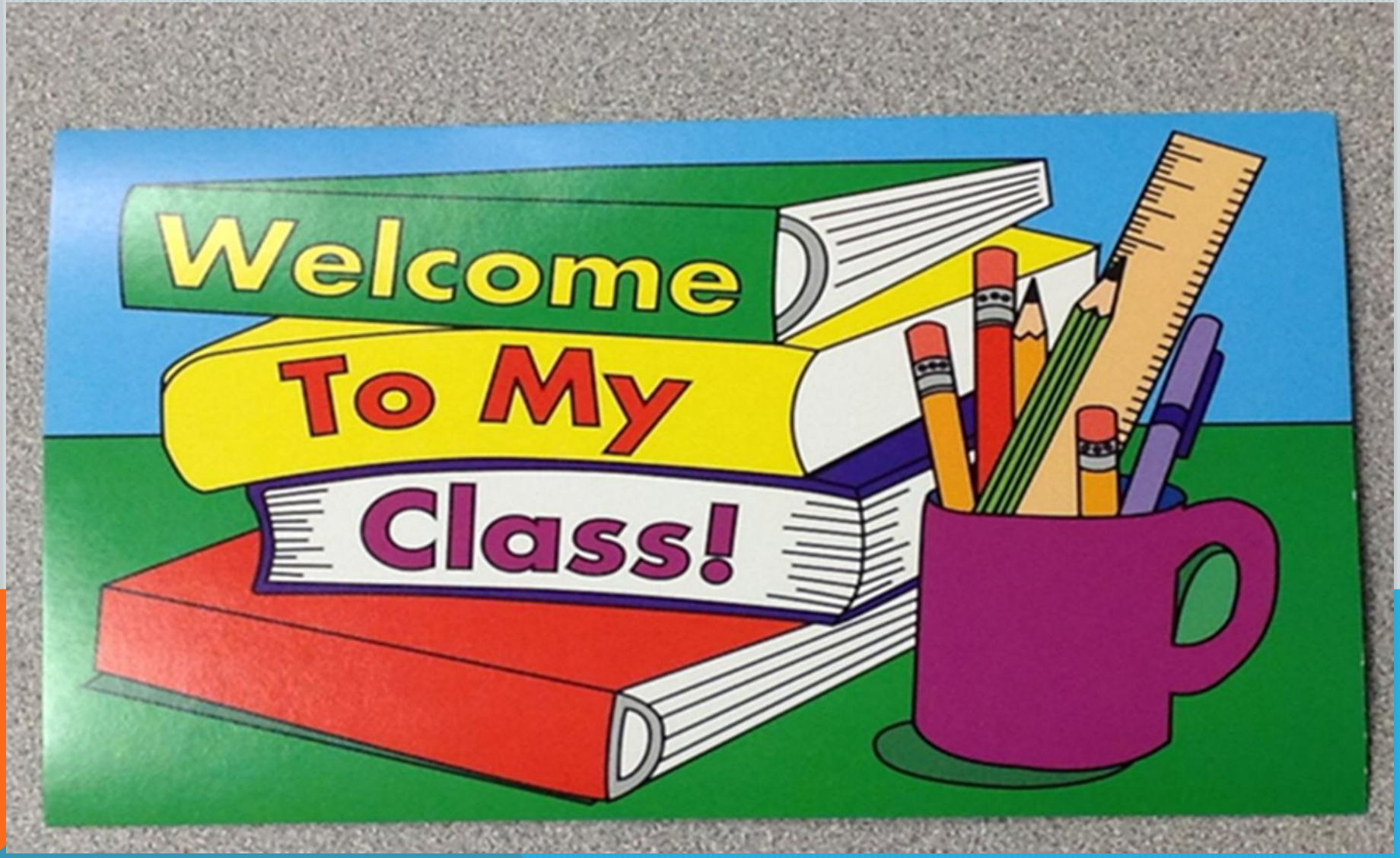
Pakistan School
Kingdom of Bahrain

CLASS : 9

SUBJECT : PHYSICS



ENGAGING STARTER

Can you help Ali to spread prayer mat so he can offers his prayer?

TOPIC

Scalar and vectors

Terms associated with motion

OBJECTIVE

At the end of this lesson students will be able to :

Differentiate between scalar and vectors.

Describe different terms associated with motion.

DIFFERENCE BETWEEN SCALARS AND VECTORS

SCALARS

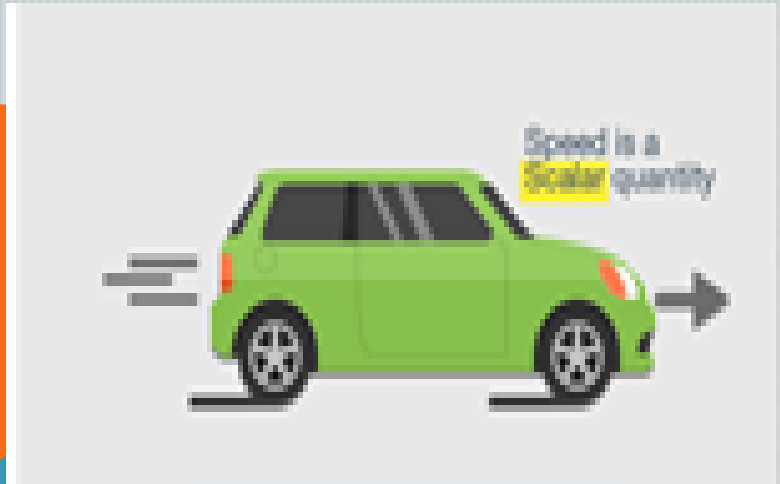
Definition: “A scalar quantity is described completely by its magnitude only”.

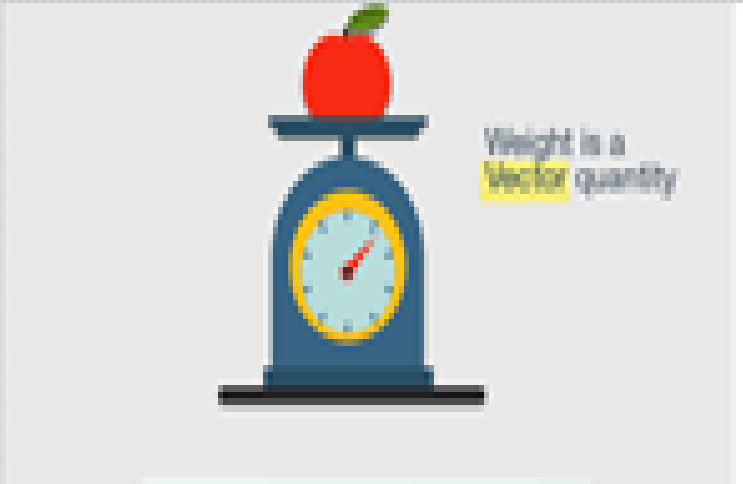
Example:: mass, length, time, speed, volume, work and energy etc

VECTORS

Definition: “A vector quantity is described completely by magnitude and direction”.

Example : velocity, displacement , force, momentum and torques.

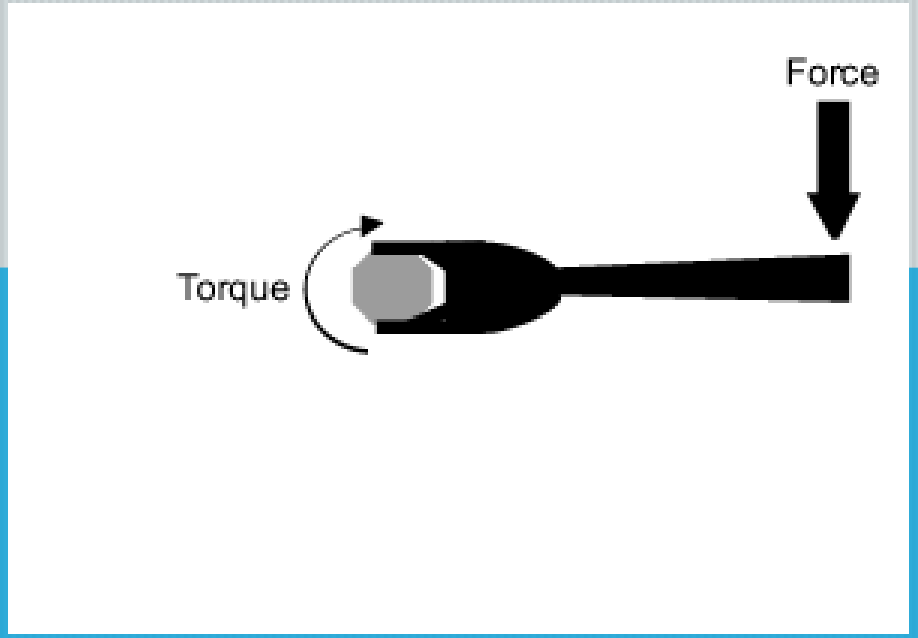




EXAMPLES

Scalar quantities

Vector quantities



REPRESENTATION OF VECTORS

Symbolically:

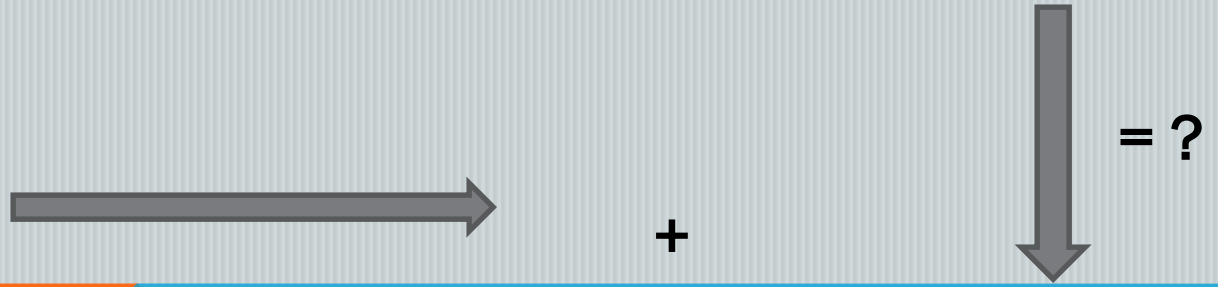
To differentiate a vector from a scalar quantity, we generally use bold letters to represent vector quantities such as F, a, d .

Graphical Representation of Vectors:

Graphically, a vector can be represented by a line segment with an arrow head.

Why vector quantities cannot be added and subtracted like scalar quantities?

Ans: Vector quantities cannot be added or subtracted like scalars because vector has magnitude as well direction, there for vectors are not added or subtracted by ordinary arithmetical rules. When vectors are added or subtracted we get a resultant vector. One of the methods of vectors addition is called head to tail rule.



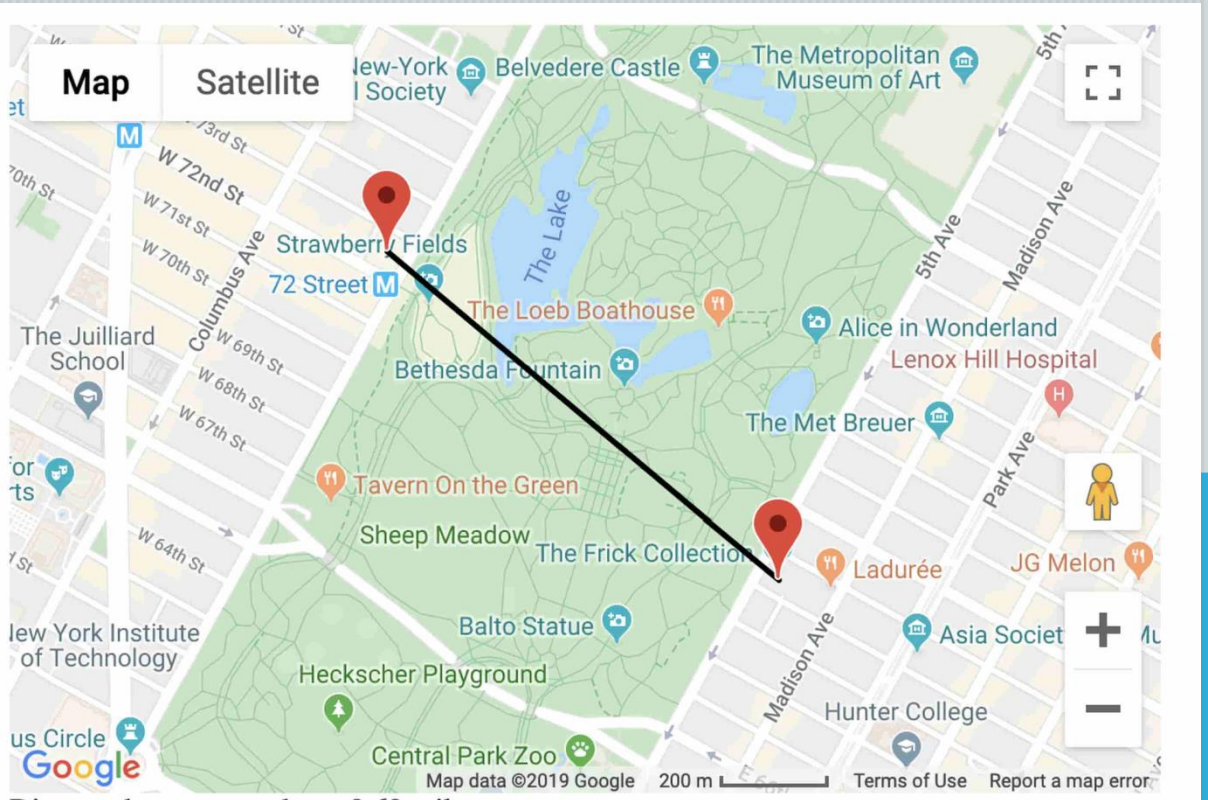
TERMS ASSOCIATED WITH MOTION:

When dealing with motion, we come across various terms such as

- Position
- Distance
- Displacement
- Speed
- Velocity
- Acceleration

POSITION:

"The term position describes the location of a place or a point with respect to some reference point called origin".



Distance between markers: 0.60 miles

DISTANCE:

- "Length of a path between two points is called the distance between those points".

Quantity: Distance is a scalar quantity.

Unit: its unit is meter (m).

Representation: It is represented by S.

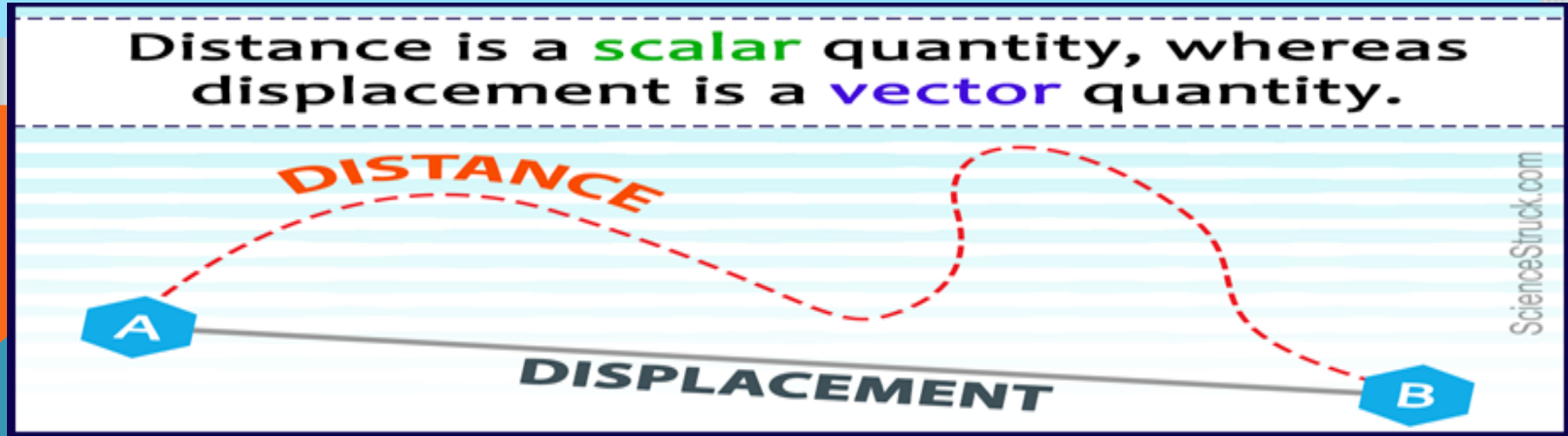
DISPLACEMENT:

"Displacement is the shortest distance between two points which has magnitude and direction".

Quantity: It is a vector quantity.

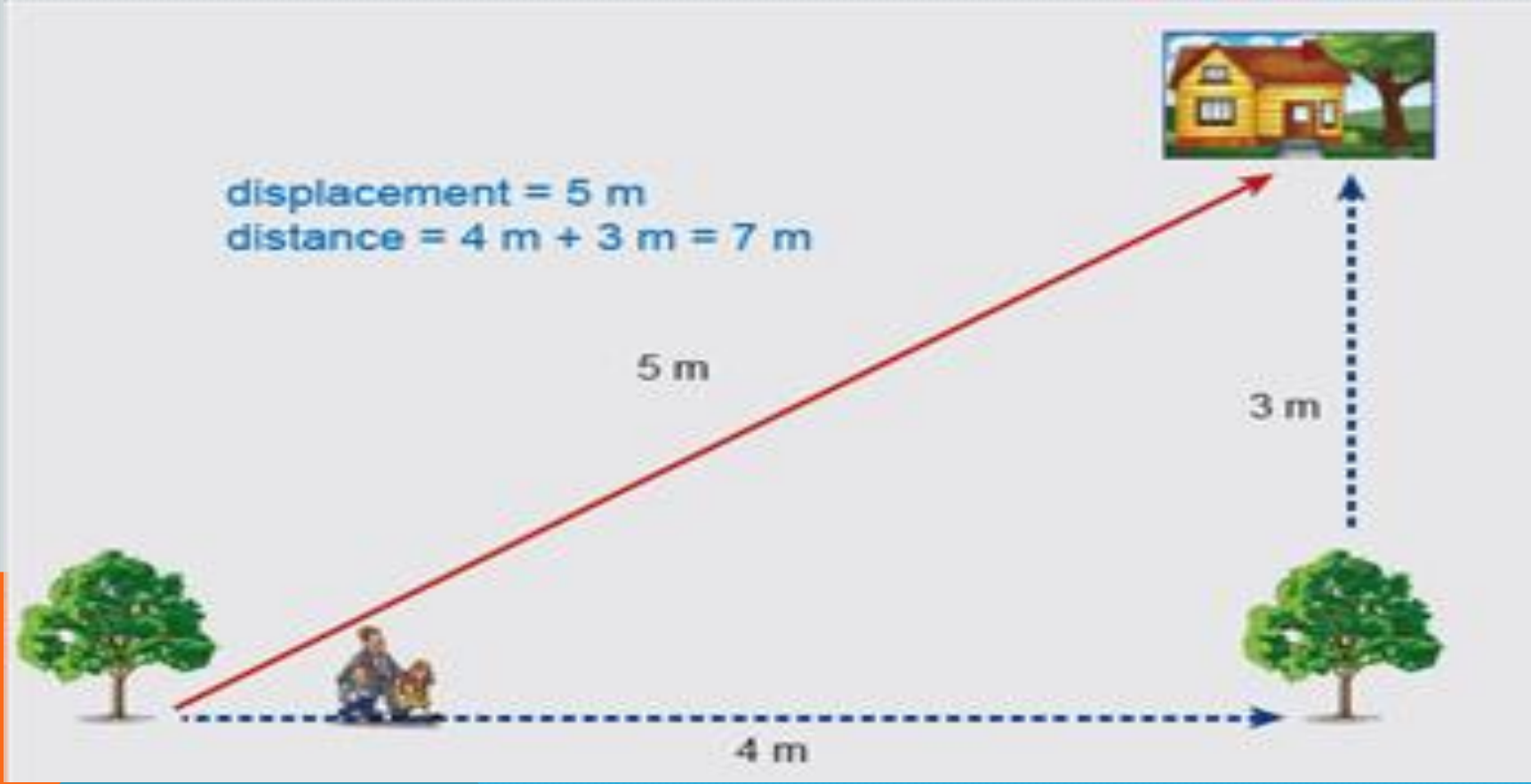
Unit: its unit is meter (m).

Representation: It is represented by d.



Identify distance and displacement.

Which term is shortest distance and displacement?



SPEED:

"The distance covered by an object in unit time is called its speed".

Mathematically:

Speed = Distance/Time

or $v = S/t$

or $S = v\,t$

Here S is the distance covered by the object, v is its speed and t is the time taken by it.

Quantity: Distance is a scalar therefore, speed is also a scalar.

Unit: SI unit of speed is meter per second (m/s)

EXAMPLES

Falcon can fly at speed of 200 km /h.

Cheetah can run at a speed of 70 km/h.

VELOCITY:

"The rate of displacement of a body is called its velocity".

Mathematically:

$$\text{Velocity} = \text{displacement} / \text{time}$$

$$V = d/t$$

Here d is the displacement of the body, v is its velocity and t is the time taken by it.

Quantity: Displacement is a vector therefore, velocity is also a vector.

Unit: SI unit of velocity is the same as speed i.e., meter per second (m/s).

UNIFORM VELOCITY:

"A body has uniform velocity if it covers equal displacement in equal intervals of time however short the interval may be".

ACCELERATION:

"The rate of change of velocity of a body is called acceleration".

Mathematically:

Acceleration = Change of velocity/time

or a = final velocity – initial velocity /time

or a = (Vf – Vi) /t

Here acceleration is a, initial velocity as Vi, final velocity as Vf and time interval as t.

Quantity: Velocity is a vector therefore, acceleration is also a vector.

Unit: SI unit of acceleration is meter per second per second (m/s.s.)

ACCELERATION EXAMPLE

TYPES OF ACCELERATION

POSITIVE ACCELERATION:

"Acceleration of a body is positive if its velocity increases with time. Note :The direction of this acceleration is the same in which the body is moving without change in its direction

NEGATIVE ACCELERATION:

"Acceleration of a body is negative if velocity of the body decreases with time.

Note The direction of negative acceleration is opposite to the direction in which the body is moving. Negative acceleration is also called deceleration or retardation".

EXAMPLES

Positive acceleration

Negative acceleration

PLENARY

- Define scalars.
- Give one example of vectors.
- Graphically vectors are represented by …. (arrow / doted line).
- Change in velocity is called ….. (Acceleration /speed) .
- Negative acceleration is also called retardation. T/F
- The shortest distance between two points is called …….. (distance / displacement).

HOME WORK

Find and write some daily life examples of terms associated with motion .

1.Speed

2. Acceleration .


STAY HOME!
STAY SAFE!

Allah Hafiz