



**STATE COUNCIL OF EDUCATIONAL RESEARCH & TRAINING
TELANGANA, HYDERABAD.**

ACADEMIC CALENDER 2020-21

Class: IX

LEVEL-2

Subject: Physical Science

Name of the lesson: MOTION. Topic: Speed and Velocity WORKSHEET: 11

KEY CONCEPT

- Average speed and Average velocity

LEARNING OUTCOMES

students can,

1. Measure average speed and average velocity
2. Compare speeds of people or vehicles in different situations
3. Differentiates between speed and velocity

INTRODUCTION

You can ride a bicycle faster than walking anywhere in your village or hometown. Similarly, to go to another town you can take a bus in a shorter time than on a bicycle. You know that a train can travel the same distance in less time. What causes these differences?

❖ AVERAGE SPEED:

For example, consider a train named Telangana express that starts at 2.00pm from Sirpur kagaznagar and reaches Hyderabad at 8.00pm the same day as shown in figure.

Let the distance from Sirpur Kagaznagar to Hyderabad be 300km, and the journey time is 6 hour then the distance covered by the train in each hour can be calculated as follows.

$$\text{Total distance} = 300\text{km}$$

$$\text{Total time} = 6\text{hour}$$

So, the distance traveled in each hour is equal to $300\text{km}/6\text{h} = 50\text{km/h}$.

It means the train has covered 60km in each hour on an average, which is termed as average speed.

The ratio of total distance covered to the total time taken is called average speed.



★ **Average Speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}}$**

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

- Speed or average speed is a scalar quantity as it does not depend on direction.
- Speed can be measured in m/s (or) km/h
- $1\text{km/h} = \frac{5}{18}\text{m/s}$ (or) $1\text{m/s} = \frac{18}{5}\text{km/h}$

❖ **AVERAGE VELOCITY:**

Draw a displacement vector **SH** joining Sirpur Kagaznagar (**S**) and Hyderabad (**H**) as shown in figure, this shortest distance is equal to 120km due south-west. As this is to be covered in 6h,

so displacement covered in each hour is
 $= 120\text{km}/6\text{h}$ south-west
 $= 20\text{ km/h}$ south-west

This displacement of an object per unit time is called average velocity.

i.e; The ratio of total displacement covered to the total time taken is called average velocity

Average velocity = $\frac{\text{Total displacement}}{\text{Total time taken}}$

- Velocity (or) average velocity is a vector quantity and it acts along the the direction of displacement
- Velocity possesses same units of speed i.e m/s (or) km/h

Difference between Speed and Velocity

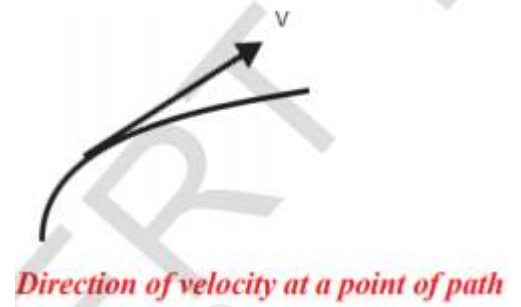
Speed gives the idea of how fast the body moves , In general bodies move in a particular direction at an instant of interest and this direction may not be constant throughout the journey. So, we need to define another quantity called “Velocity”.

For example : A car moves 15m/s due east. Here 15m/s is speed and 15m/s due east is velocity.

Velocity gives the idea of how fast the body moves in a specified direction.

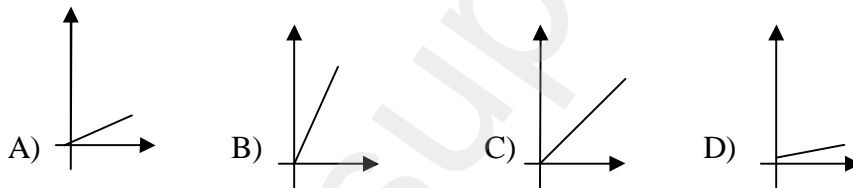


NOTE: If a body moves in a curved path, the tangent drawn at a point on the curve gives direction of velocity at that instant as shown in figure.



ASSESSMENT

1. Write difference between speed and velocity.
2. The initial reading of the odometer is 25530. After 6 hours of journey the odometer reading changes to 25860. Then find average speed of car.
3. A ball is thrown horizontally from a point "A" travels along a straight line and strikes the wall to a point "B", which is at a distance of 10m, and rebounds to the same point "A" in 8sec. Find the average speed and average velocity of the ball.
4. A bus travels a total distance of 225km in 5hour. Find its average speed.
5. Which of the following position-time graph indicates more (or) greater speed.



6. Which of the following is a vector quantity
 A) Distance B) Time C) Speed D) Velocity
7. A tangent drawn at a point to a curved path represent
 A) Magnitude of speed B) Magnitude of velocity
 C) Direction of velocity D) Distance travelled
