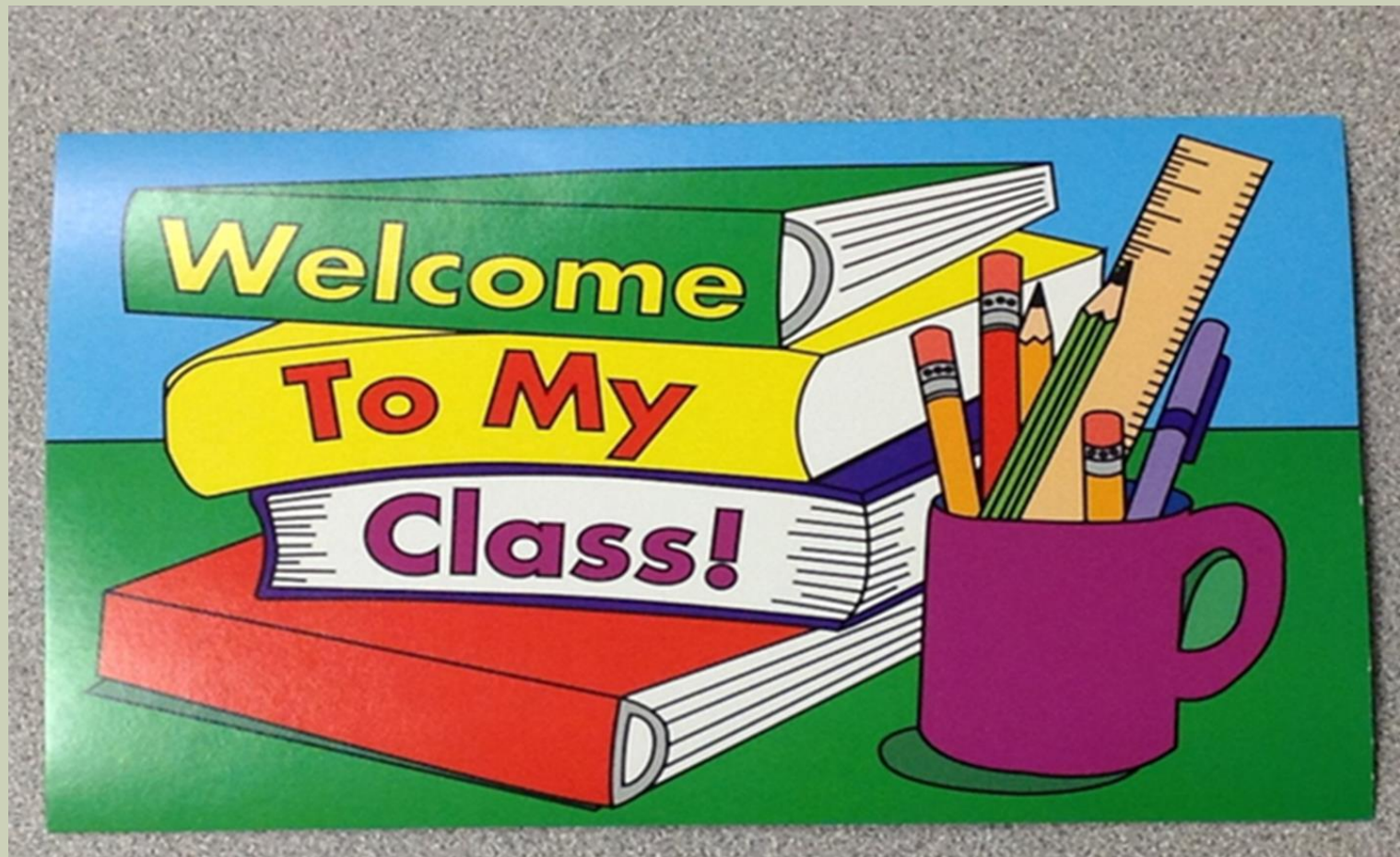




Pakistan School
Kingdom of Bahrain

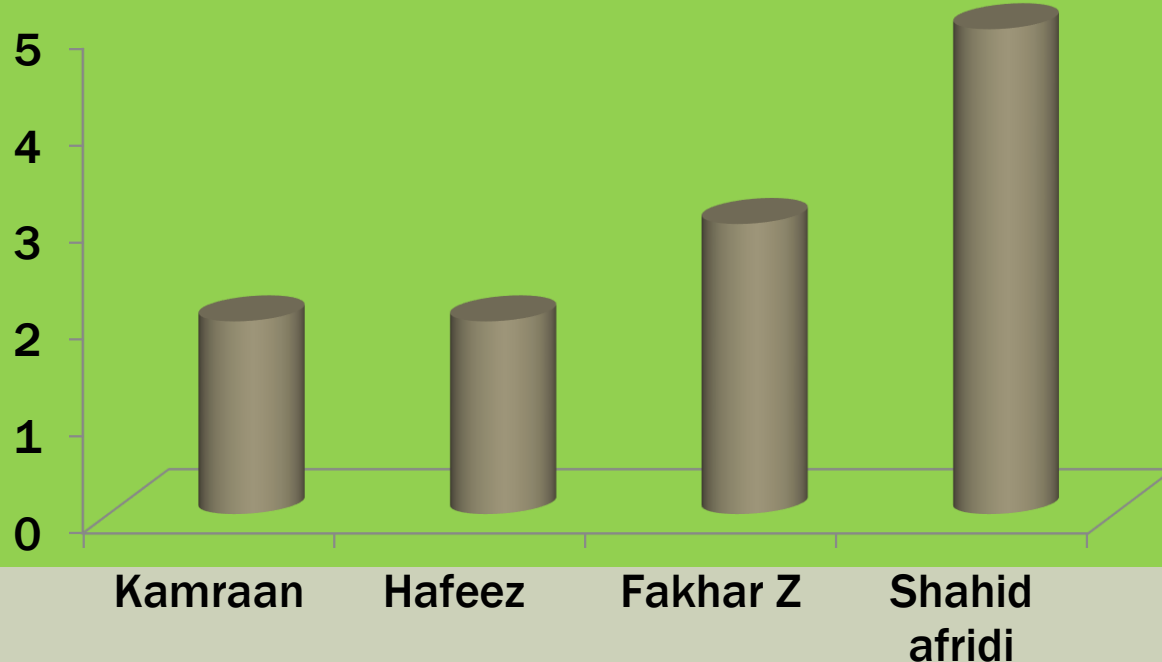


CLASS: 9
SUBJECT : PHYSICS



ENGAGING STARTER

A cricket match is played in Pakistan .
Highest score is shown by?



TOPIC

Graphical analysis of motion

OBJECTIVE

At the end of this lesson
students will be able to :
Analyze the graphical
representation of
motion.

GRAPH

“Graph is a pictorial way of presenting information about the relation between various quantities”.

VARIABLES

**The quantities
between which a
graph is plotted
are called the
variables.**

DIFFERENCE BETWEEN DEPENDENT AND INDEPENDENT VARIABLES

Independent variable

- One of the quantities is called the independent quantity . Which does not depend on any other quantity.

Dependent variable

- The value of quantity which varies with the independent quantity is called the dependent quantity.

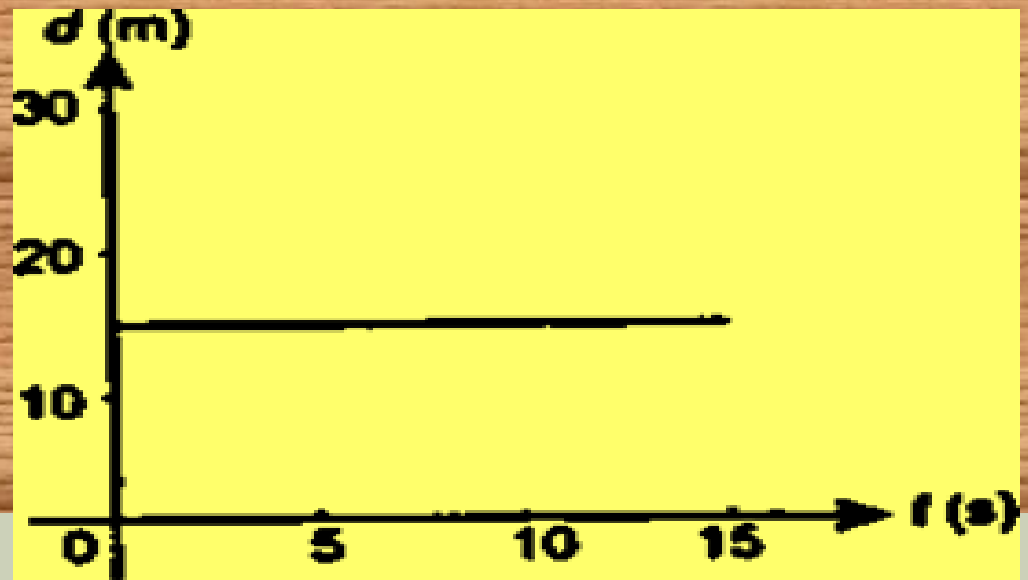
DISTANCE TIME GRAPH

Similarly if the motion is in a straight line then speed and velocity are also used interchangeably.

In a distance-time graph, time is taken along horizontal axis while vertical axis shows the distance covered by the object.

BODY AT REST

- In the graph, the distance moved by the object with time is zero. That is, the object is at rest. Thus a horizontal line parallel to time axis on a distance-time graph shows that speed of the object is zero.



OBJECT MOVING WITH CONSTANT SPEED

The speed of an object is said to be constant if it covers equal distances in equal intervals of time. The distance-time graph is a straight line. Its slope gives the speed of the object.

Consider two points A and B on the graph.

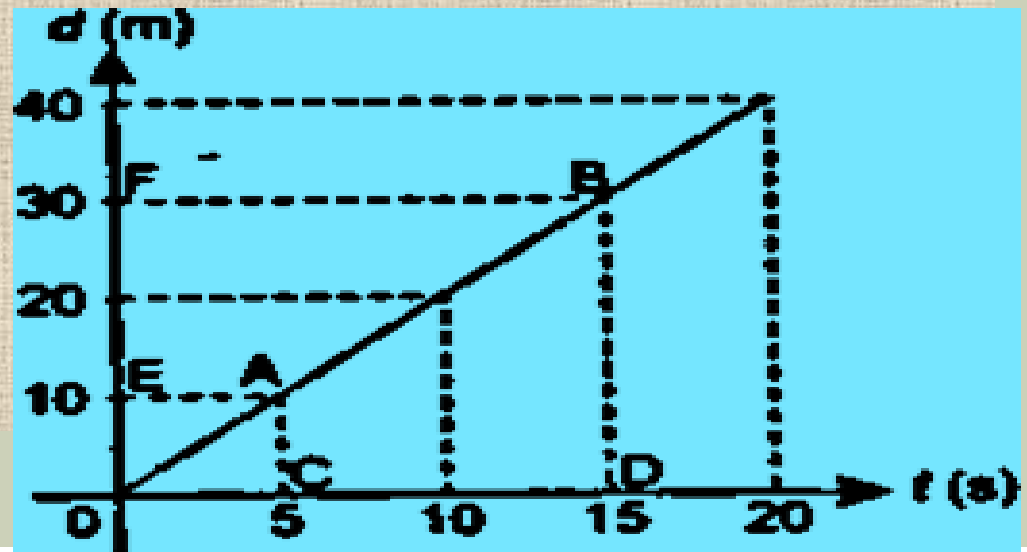
Speed of the object = slope of line AB

= distance EF/time CD

= 20 m/10 s

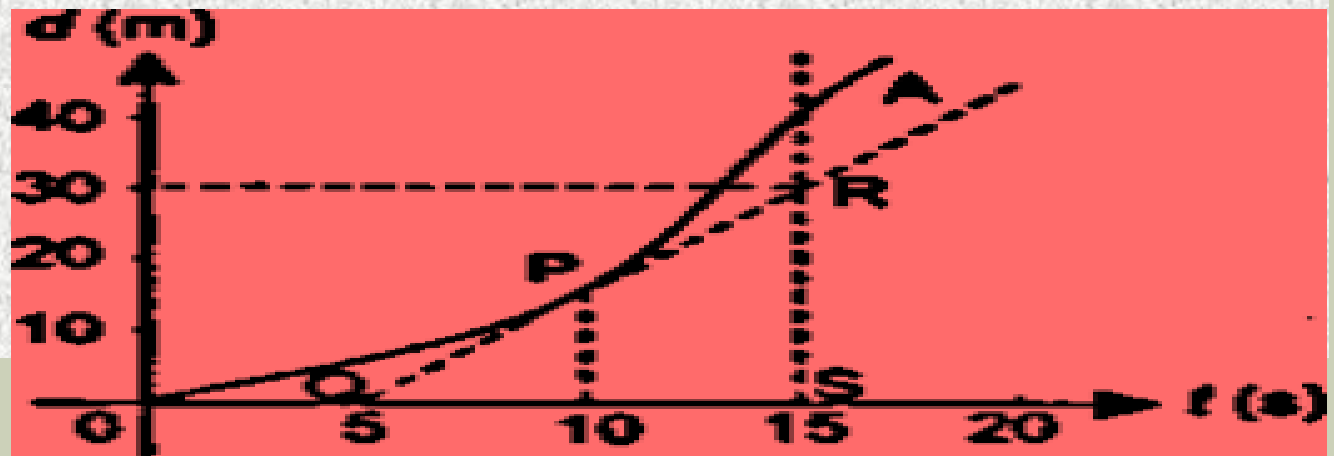
= 2 ms⁻¹

The speed found from the graph is 2 ms⁻¹.



OBJECT MOVING WITH VARIABLE SPEED

.When an object does not cover equal distances in equal intervals of time then its speed is not constant. In this case the distance-time graph is not a straight line. The slope of the curve at any point can be found from the slope of the tangent at that point. the tangent at that point. As Slope of the tangent at P = $RS/QS = 30 \text{ m}/10 \text{ s}$ Thus, speed of the object at P is 3 m/s.

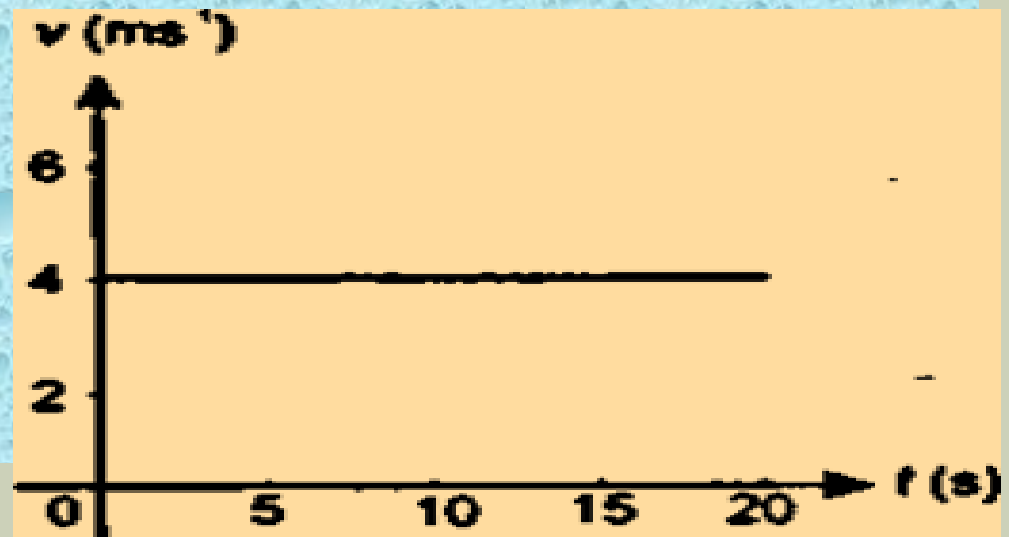


SPEED TIME GRAPH

In a speed-time graph, time is taken along x-axis and speed is taken along y-axis.

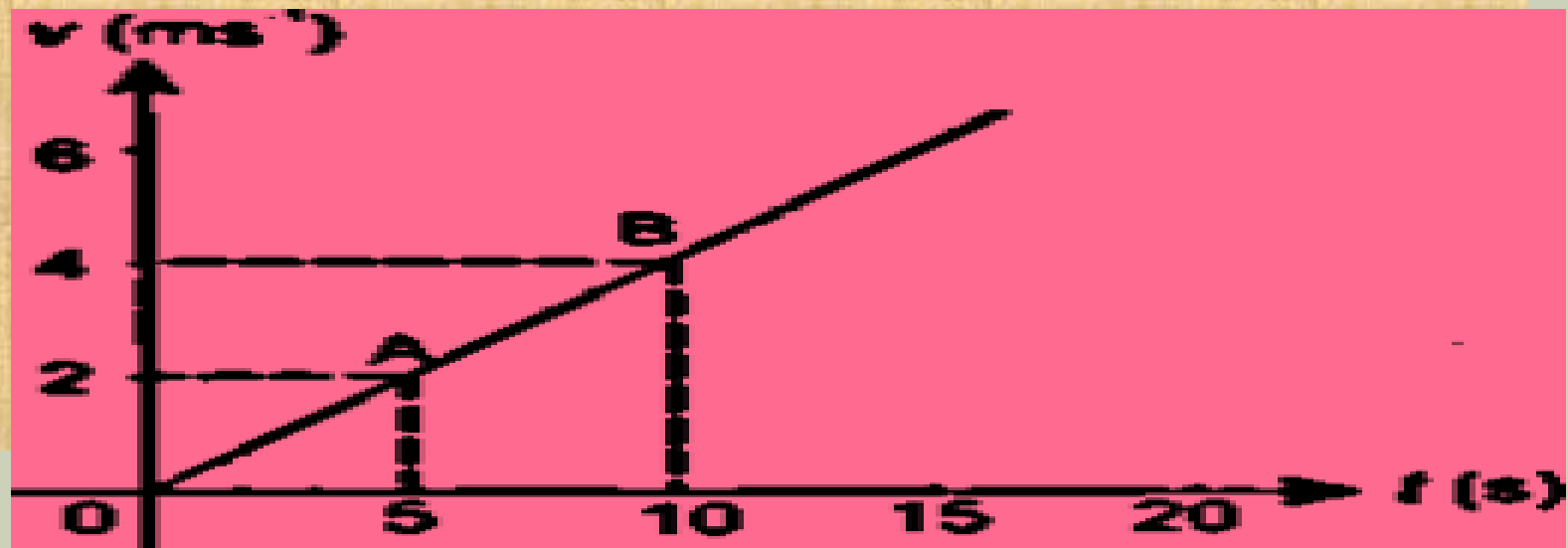
OBJECT MOVING WITH CONSTANT SPEED:

- When the speed of an object is constant (4 ms^{-1}) with time, then the speed-time graph will be a horizontal line parallel to time-axis along x-axis. In other words, a straight line parallel to time axis represents constant speed of the object.



OBJECT MOVING WITH UNIFORMLY CHANGING SPEED (UNIFORM ACCELERATION):

- Let the speed of an object be changing uniformly. In such a case speed is changing at constant rate. Thus its speed-time graph would be a straight line. A straight line means that the object is moving with uniform acceleration. Slope of the line gives the magnitude of its acceleration.



NUMERICAL

A car starts from rest. Its velocity becomes 20 ms^{-1} in 8 s. Find its acceleration.

Given :

Initial velocity = $V_i = 0 \text{ m/s}$

Final velocity = $V_f = 20 \text{ m/s}$

Time taken = 8s

To find

Acceleration = ?

Solution

Using formula $a = \frac{V_f - V_i}{t}$

$$a = \dots - \dots / \dots$$

$$a = \dots \text{m/s.s}$$

NUMERICAL

A sprinter completes its 100m race in 12s. Find its average speed.

Given

Distance = $S = 100\text{m}$

Time taken = =

To find = = ?

Solution

Using formula

Average speed = total distance / total time

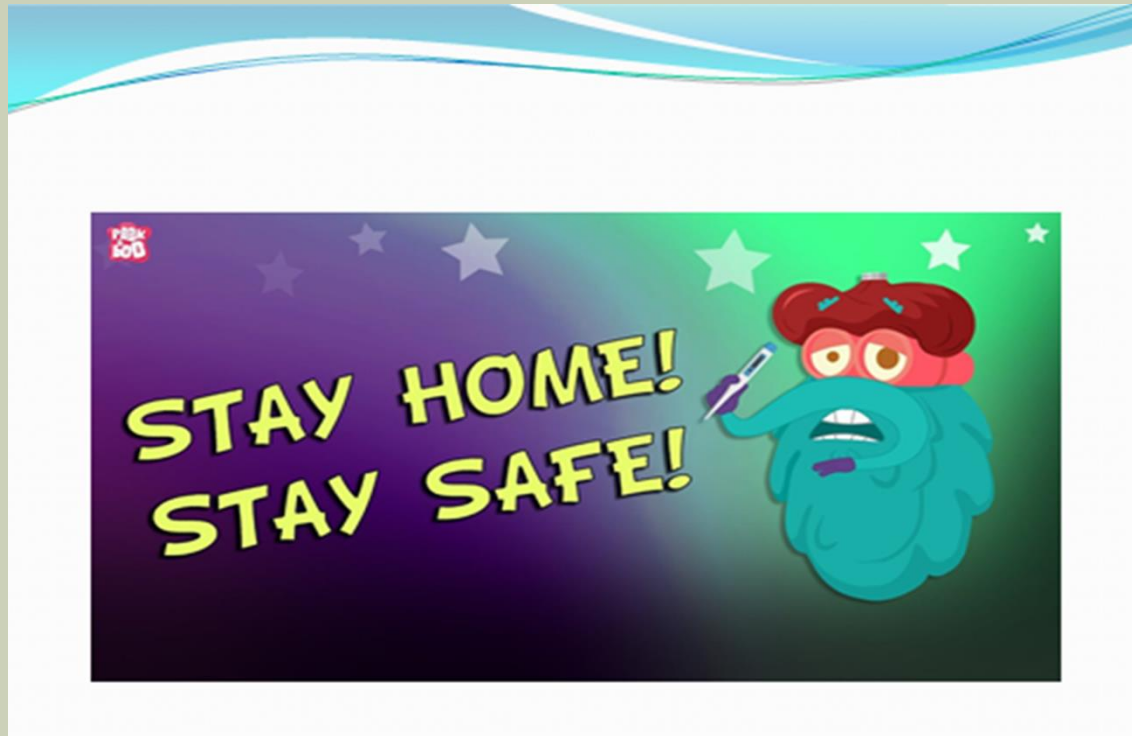
$V_{av} = \text{.....} / \text{.....}$

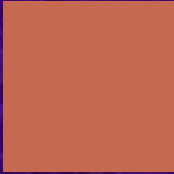
$V_{av} = \text{.....m/s}$

HOME WORK

- Chapter 2 page number 54
- Solve Numerical 2.1 in your notebook.

MESSAGE





Allah

Hafiz