BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

SUBJECT: -PHYSICS
Class -IX

CHAPTER: -MOTION

TOPIC: GRAPHICAL REPRESENTATION OF MOTION

GUIDELINES FOR STUDENTS:

Dear Students

- o There are two assignments:
    - ➢ Assignment 7: Distance-Time Graph
    - ➢ Assignment 8: Velocity-Time Graph
- o Solve the assignments in a separate notebook made for Physics.
- o Suitable Video links have been provided.
- o Do read NCERT book too for better understanding of these concepts.

  NCERT LINK FOR THE CHAPTER:

  http://ncert.nic.in/textbook/textbook.htm?iesc1=8-15
  (page no104,105,106 and 107)

  YOUTUBE LINK

  https://www.youtube.com/watch?v=POdBG4nHalo&t=220s

  https://youtu.be/dZUMKUsPiUA

SUBTOPICS: 1. DISTANCE-TIME GRAPHS

2. VELOCITY-TIME GRAPHS

LET US INTERPRET THE KIND OF MOTION REPRESENTED BY FOLLOWING GRAPHS:

A) DISTANCE_TIME GRAPHS

The following table gives you information about the distance covered by a moving object in the given time.

Plot the distance -time graph for the given table and try to interpret the motion of the object from the graph.

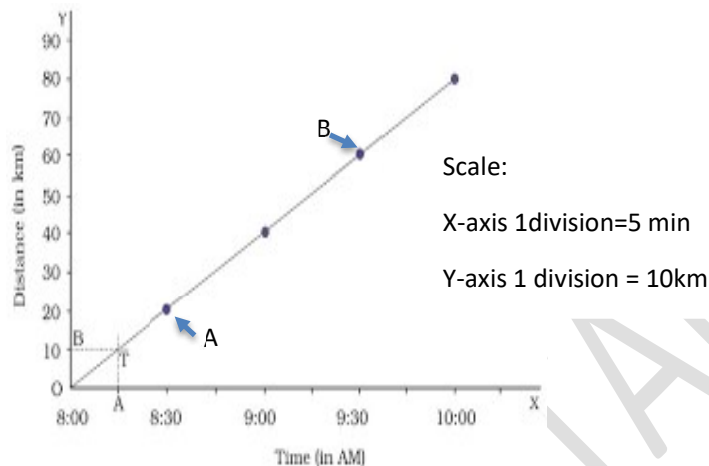| S.no	Time(AM)	Distance(km)
1.	8:00	0
2.	8:30	20
3.	9:00	40
4.	9:30	60
5.	10:00	80

INTERPRETATION:

Equal distances(20km) are covered in equal time intervals (30 min)

This is the case of uniform motion

The object must be moving at a constant speed

Observe that the graph here is a straight line inclined to the time axis

Scale:

X-axis 1division=5 min

Y-axis 1 division = 10km

Note:

Scale chosen to plot the graph should always be mentioned with the graph

Let us find the slope of this straight-line graph:

For finding slope of the graph, we choose two points on the line graph. Note their x and y coordinates

e.g. here we chose

point A (x1,y1)----→ x1=8:30, y1=20km

point B (x2,y2)------→ x2=9:30, y2 =60km

Slope of straight-line graph= Change in Y-axis / Change in X-axis

$$= (y2-y1)/(x2-x1)$$

$$= (60-20)/ (9:30-8:30) =40km/1hr$$
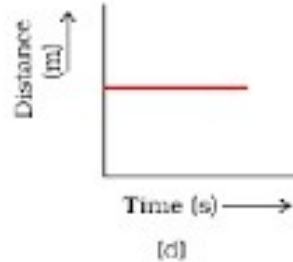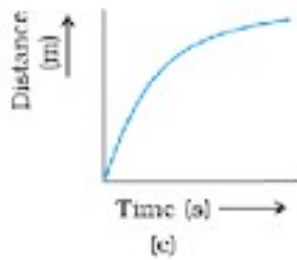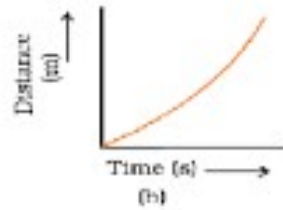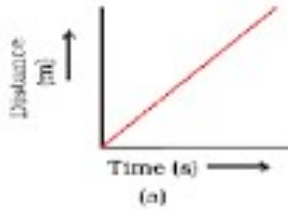
$$= 40km/hr$$

(i.e. Slope of distance time graph gives us the speed of an object)

NOW SOLVE THIS ASSIGNMENT:

ASSIGNMENT 7

Q1. Looking at the following graphs, what can you depict about the motion of the object in the four cases:

Justify your interpretation with suitable reason/s.

2. Study the following distance time graph depicting the motion of the   object and answer the following questions:

(a) When is the object exhibiting uniform motion?

(b) During which time interval is the object at rest?

(c) When is it moving at a greater speed and why? Support your answer with the calculation of speeds during different intervals.
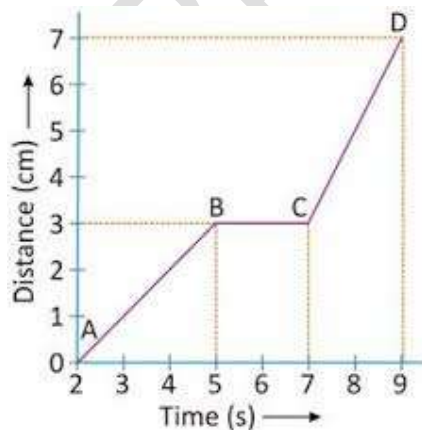
   B)   **VELOCITY-TIME GRAPH**

The following table gives us an information about the velocity gained by an object moving in a straight line in the given time interval.

Plot the velocity -time graph for the given table and try to interpret the motion of the object from the graph.

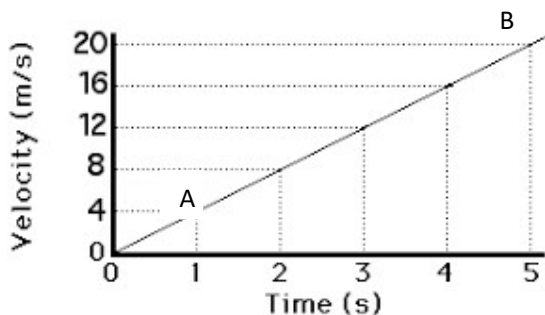| S.no	Time(s)	Velocity(m/s)
1.	0	0
2.	1	4
3.	2	8
4.	3	12
5.	4	16
6.	5	20

INTERPRETATION:

In equal time intervals (1s), the object is gaining equal velocity(4m/s

This is the case of uniformly accelerated motion

The object must be moving with a constant acceleration

Observe that the graph here is a straight line inclined to the time axis

Scale:

X-axis 1division= 1s

Y-axis 1 division = 4m/s

(i) Let us find the slope of this straight-line graph:

For finding slope of the graph, we choose two points on the line graph, Note their x and y coordinates

e.g. here we chose

point A (x1,y1)-----→ x1=1, y1=4

point B (x2,y2)-------→ x2=5, y2 =20

Slope of straight-line graph= Change in Y-axis / Change in X-axis

On y-axis we have velocity change and on x-axis time

Hence slope = change in velocity with time i.e. ACCELERATION

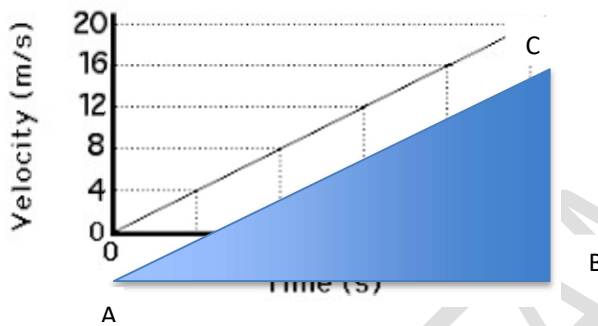SLOPE OF v-t GRAPH MEASURES ACCELERATION

$= (y2-y1)/(x2-x1)$

$= (20-4)/(5-1)$

$= (16m/s)/4s$

$= 4m/s^2$

(i.e. Slope of velocity time graph gives us the acceleration of an object)

Now let us calculate the distance covered by the object using the same graph.

Distance can be calculated by measuring the area under v-t graph

Area of the shaded part under the line graph = area of triangle ABC

$= \frac{1}{2} \times AB \times BC$

$= (1/2) \times 5 \times 20$

$= 50m$

Note: (1/2) ABXBC=(1/2)VelocityXtime = displacement=distance in straight line motion

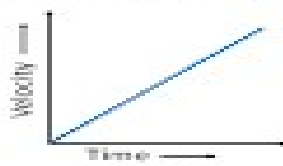Let us observe the following velocity time graphs:
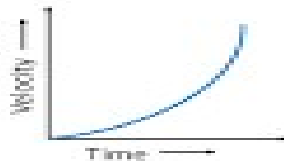
Velocity-Time Graph Summary

Constant Speed

Straight line
parallel to x-axis

Uniform Acceleration
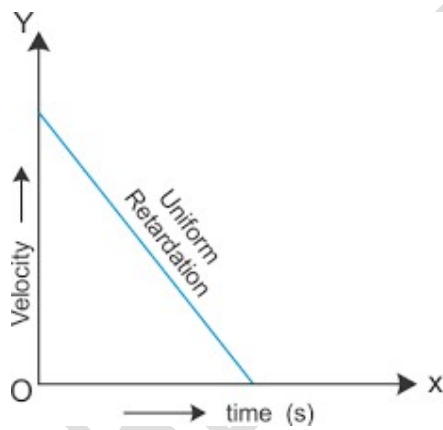

Straight Line

Non-Uniform Acceleration

Curved Line
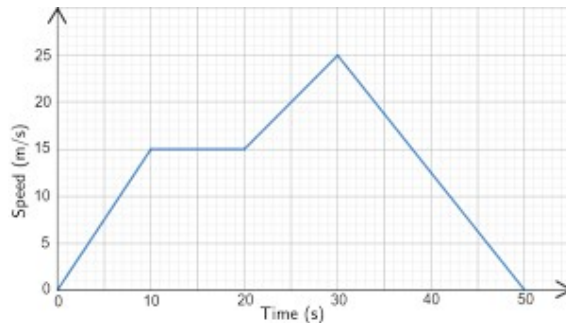
Non-Uniform Retardation

Curved Line

Final velocity is less than initial velocity, so change in velocity is negative. Hence the acceleration is negative. Negative acceleration is also known as **retardation.**

Now solve the following assignment:

ASSIGNMENT 8

1. **In the following speed time graph:**

(a) When is the object in uniform motion?
(b) During which time interval is the acceleration maximum ? Justify doing calculation for acceleration for each time interval.
(c) When is the object at rest?
(d) During which time interval is the acceleration negative?
(e) Calculate the negative acceleration too.

STAY HOME STAY SAFE