



Class - VII November month Class Work Notes
13. Time and Motion

Technical Words:

1. Periodic motion - a movement that repeats itself at regular intervals of time.
2. Pendulum - a small mass hung from a fixed point such that it can swing freely under the influence of gravity
3. Length of a pendulum - the distance between the point from which it is hung and the centre of the bob
4. Oscillation - One complete to-and-fro movement of the pendulum.
5. Time period - the time taken by a pendulum to complete one oscillation.
6. Speedometer - an instrument that measures the speed of moving vehicles.
7. distance-time graph - a graph that plots distance travelled and the time taken to travel that distance by a moving object.

A. Answer the question.

Short answer question

1. Define periodic motion and explain how the motion of a pendulum is periodic.

[Answer] A motion that repeats itself at regular intervals of time is the periodic motion. A pendulum completes one oscillation, when the bob of the pendulum begins to oscillates from the mean position to one extreme position and then to the other and finally back to the mean position periodically.

2. What is an atomic watch and how does it work?

[Answer] An atomic watch is the clock which is used to measure extremely accurate time. It uses vibrations of atoms like caesium or rubidium to keep time.

3. What is the time period of a pendulum? What does it depend on?

[Answer] Time period of a pendulum is the time taken to complete one oscillation. It depends on the length of the pendulum.

4. Define the mean position of a pendulum with the help of an image.

[Answer] Mean position of a pendulum is the position when it is not moving. (Diagram: Refer to textbook)

5. Define average speed with an example.

[Answer] Average speed is calculated by dividing the total distance travelled by total time taken. For example, if a car moves initial 300 m in 60 s and later 300 m in 30 s then its average speed will be 6.67 m/s.

6. When can you say that an object is in non-uniform motion?

[Answer] An object is undergoing non-uniform motion when it covers unequal distance in equal intervals of time. For example, car moving in traffic.

Long answer question

(5 marks)

1. Name five different units of time and show how they are related to each other.

[Answer] Five different units of time are second, minute, hour, day and year.

1 Minute	1 Hour	1 Day	1 Year
60 Sec	60 Min	24 Hours	365 Days Leap Year: (366 Days)

2. Describe a process in detail to show how the time period of a pendulum can be changed without changing the bob.

[Answer] The time period of the pendulum depends upon the length of the string. If the length of the string is increased, the time period of the pendulum also increases and viceversa. Let us take a string of length 20 cm, a bob and stopwatch. Attach the bob to one end and tie the other end to a stand. Hold the bob to one side and gently release it. Do not push the bob. The pendulum should start to oscillate and not rotate. Record the time taken to complete 10, 20 and 30 oscillations. Divide the result by the number of oscillations to calculate time period of the pendulum. To change the time period of a pendulum, increase the length of the string to 40 cm. We will find that the time period also increases. Similarly, it can be verified that when the string's length is decreased, the time period of the pendulum also decreases. Therefore, to change the time period of a simple pendulum without any change in the bob, we can change the length of the string.

3. Ram was travelling to Jaipur from Delhi by bus. It took him 5 hours to reach Jaipur. If the distance between Jaipur and Delhi is 270 km, what was the average speed of the bus?

[Answer] Average speed of the bus = (Total distance travelled)/(Total time taken)
= $270/5$
= 54 km/h

4. Differential between uniform and non-uniform motion. Also, draw distance-time graphs for each of them.

[Answer] Difference between uniform and nonuniform motion.

Uniform Motion	Non-uniform Motion
An object is said to be in uniform motion, if it covers equal distance in equal intervals of time.	An object is said to be in non-uniform motion when it covers unequal distance in equal intervals of time.
Speed of the object remains same throughout.	Speed of the object keeps on changing.
For example, hour hand of a clock, motion of the Earth around the Sun.	For example, car moving in traffic, bouncing ball.

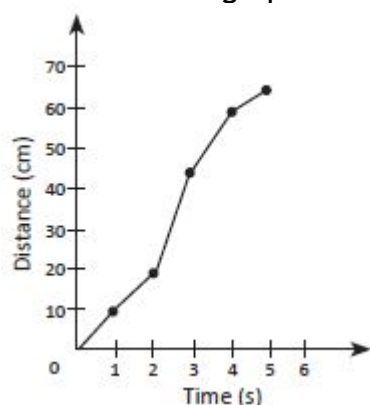
(Graphs: Refer to the textbook)

5. Draw a distance-time graph from the following table and explain the process in detail. Also, find the average velocity of the object after 5 seconds.

Time (s)	0	1	2	3	4	5
Distance (m)	0	10	20	45	60	65

[Answer] To draw a distance-time graph, follow these steps: (i) We will draw a horizontal axis X and a vertical axis Y. Time is represented along the X-axis and distance is represented along the Y axis. (ii) As per the table given, the object has travelled 10 m in 1 second. (iii) We will look for the point on the X-axis that represents 1 second. We will draw a line parallel to the Y-axis through this point. We will look for the point on the Y-axis that represents 10 m and draw a line parallel to the X-axis through this point. (iv) The two lines will intersect at a point. This point represents the first set of values on the graph. We will repeat the process for all the values for time and distance. We will get a point for each different set of values. These points can be connected to form a distance-time graph.

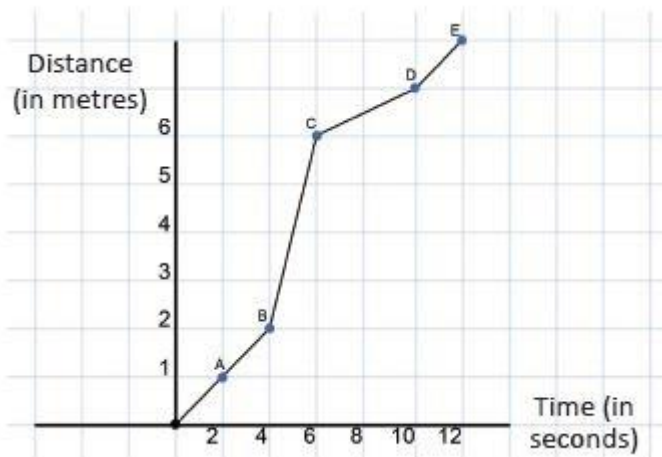
The line in the graph is not straight indicating that the motion is nonuniform.



After 5 seconds, average velocity = (Total distance travelled)/(Total time taken)
= $65/5$
= 13 m/s

B. Picture-based question.

The distance-time graph of an object is given below.



(3 marks)

1. What kind of motion is this?

[Answer] Non-uniform motion

2. Find out the speed at the following points: A, B, C, D.

[Answer] Speed at A = $(1/2) = 0.5$ m/s

Speed at B = $(2/4) = 0.5$ m/s

Speed at C = $(6/6) = 1$ m/s

Speed at D = $(7/10) = 0.7$ m/s

3. What is the average speed of the object from A to E?

[Answer] Average speed of the object from A to E = Total distance/Total time taken

Total distance covered = $1 + 4 + 1 + 1 = 7$

m; Total time taken = 10 s

Average speed = $7/10 = 0.7$ m/s

1.Assertion- a speed is distance time, the basic unit of speed is m/s.

Reason- we can write 50km and not 50kms or 8cm and not 8cms.

Ans: option A

2.Assertion- periodic motion of a pendulum has been used to make clocks and watches.

Reason- pendulum of given length does not takes the same time to complete one oscillation

Ans: option C