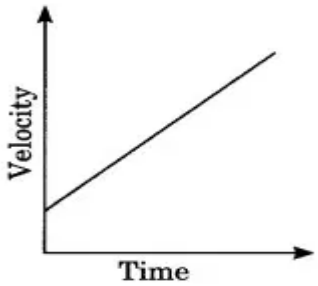
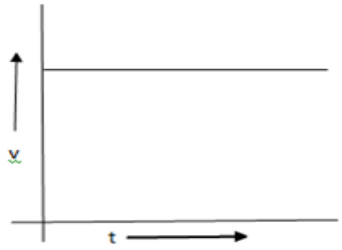
	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**DEPARTMENT OF SCIENCE -2021-22** **SUBJECT: PHYSICS**	DATE OF COMPLETION: 10/6/21
WORKSHEET NO:1 WITH ANSWERS	**TOPIC: MOTION**	**A4 FILE FORMAT (PORTFOLIO)**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

I. OBJECTIVE TYPE QUESTIONS

1. The numerical ratio of displacement to distance for a moving object is
   (a) always less than 1 (b) always equal to 1
   (c) always more than 1 (d) equal or less than 1
2. According to the given velocity-time graph, the object

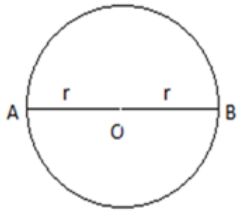


   (a) is moving with uniform velocity (b) has some initial velocity
   (c) is moving uniformly with some initial velocity (d) is at rest
3. When a car driver travelling at a speed of 10 m/s applies brakes and brings the car to rest in 20 s, then the retardation will be:
   (a) + 2 m/s^2 (b) − 2 m/s^2
   (c) − 0.5 m/s^2 (d) + 0.5 m/s^2
4. From the given v-t graph, it can be inferred that the object is

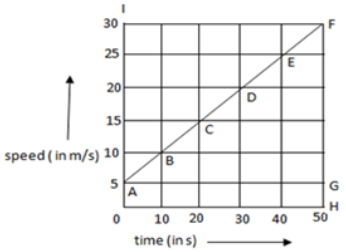


(a) At rest (b) In uniform motion
(c) Moving with uniform acceleration (d) In non-uniform motion

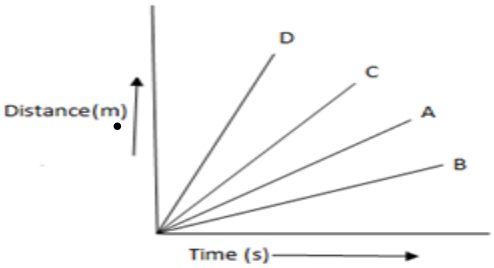
5. Suppose a boy is enjoying a ride on a marry-go-round which is moving with a constant speed of 10 m/s. It implies that the boy is:
   (a) At rest (b) Moving with no acceleration
   (c) In accelerated motion (d) Moving with uniform velocity
6. A particle is moving in a circular path of radius r. The displacement after half a circle would be:



   (a) Zero (b) πr
   (c) 2r (d) 2πr
7. The speed - time graph of a car is given here. Using the data in the graph calculate the total distance covered by the car.



   (a) 1250 m (b) 875 m
   (c) 1500 m (d) 870 m
8. Four cars A, B, C and D are moving on a levelled, straight road. Their distance time graphs are shown in the figure below. Which of the following is the correct statement regarding the motion of these cars?



   (a) Car A is faster than car D (b) Car B is the slowest
   (c) Car C is faster than car D (d) Car C is the slowest

ASSERTION AND REASONING

DIRECTION: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
(e) Both Assertion and Reason are false.

9. Assertion : An object can have constant speed but variable velocity.
   Reason : Speed is a scalar but velocity is a vector quantity.

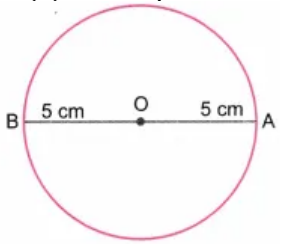
10. Assertion : A body having non-zero acceleration can have a constant velocity.
    Reason : Acceleration is the rate of change of velocity.
11. Assertion : Displacement of a body may be zero when distance travelled by it is not zero.
    Reason : The displacement is the longest distance between initial and final position.
12. Assertion: A bus moving due north takes a turn and starts moving towards east with same speed. There will be no change in the velocity of bus.
    Reason: Velocity is a vector quantity
13. Assertion: Uniform circular motion is accelerated motion
    Reason: The accelerated motion of an object may be due to change in magnitude of velocity or direction or both of them.
14. Assertion : An object may acquire acceleration even if it is moving at a constant speed.
    Reason : With change in the direction of motion, an object can acquire acceleration.

ONE MARK TYPE QUESTIONS

15. . Suppose a ball is thrown vertically upwards from a position P above the ground. It rises to the highest point Q and returns to the same point P. What is the net displacement and distance travelled by the ball?
16. Can the displacement be greater than the distance travelled by an object?
17. When do the distance and displacement of a moving object have the same magnitude?
18. A body is moving with a velocity of 50 m/s. If the motion is uniform, what will be the velocity after 20 s?
19. The speed of a particle is constant. Will it have acceleration? Justify with an example

TWO MARKS TYPE QUESTIONS

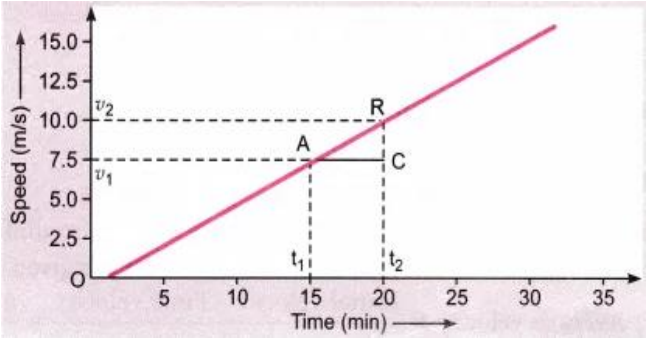
20. What is the difference between uniform velocity and non-uniform velocity?
21. What is negative acceleration? Explain with example
22. A particle moves in a circle with O as centre and AO = OB = 5 cm, as radius, as shown in the figure. It starts from A. Calculate:
    (a) the distance covered, and
    (b) the displacement, when it reaches B.



23. A body is thrown vertically upwards with a velocity u, the greatest height h to which it will rise is:

THREE MARKS TYPE QUESTIONS

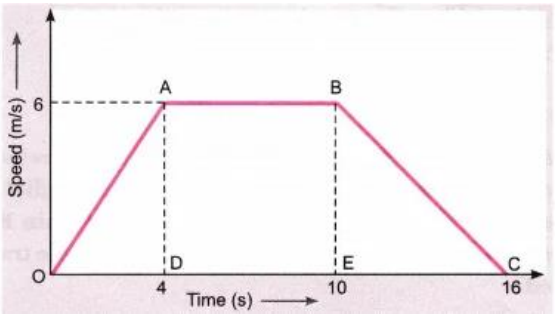
24. Given below is the velocity-time graph for the motion of the car. What does the nature of the graph show? Also find the acceleration of the car.



25. The brakes applied to a car produce an acceleration of 6 ms^{-2} in the opposite direction to the motion. If the car takes 2s to stop after the application of brakes, calculate the distance it travels during this time.
26. A car moving with a speed of 72 km/h is brought to rest in 10 seconds by applying brakes. Find the magnitude of average retardation due to brakes and distance travelled by car after applying the brakes.
27. When will you say a body is in (i) uniform acceleration? (ii) Non-uniform acceleration?

FIVE MARKS TYPE QUESTIONS

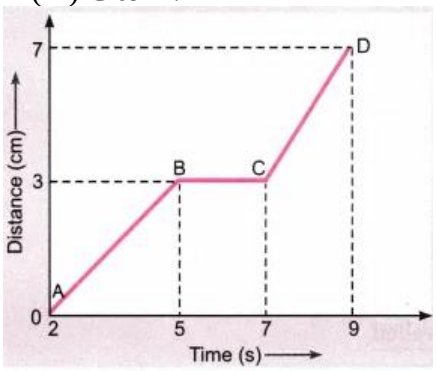
28. . Study the speed-time graph of a body given here and answer the following questions:



(a) What type of motion is represented by OA?
(b) What type of motion is represented by AB?
(c) What type of motion is represented by BC?
(d) Find out the acceleration of the body.
(e) Calculate the retardation of the body.
(f) Find out the distance travelled by the body from A to B.

29. The graph given below shows the positions of a body at different times. Calculate the speed of the body as it moves from

(i) A to B
(ii) B to C and
(iii) C to D.



PREVIOUS YEAR BOARD QUESTIONS

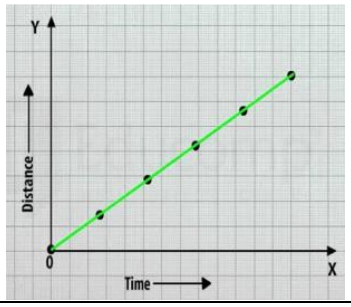
30. What is the numerical ratio of average velocity to average speed of an object when it is moving along a straight path? CBSE 2014
31. What do you mean by positive acceleration? CBSE 2013
32. What will you say about the motion of a body if its distance-time graph is a straight line having a constant angle with time axis? CBSE 2010
33. Usha swims in a 90 m long pool. She covers 180 m in one minute by swimming from one end to the other and back along the same straight path. Find the average speed and average velocity of Usha.

ANSWERS

1.	(d) equal or less than 1
2.	(b) has some initial velocity
3.	(d) - 0.5 m/s^2
4.	(b) **In uniform motion**
5.	(c) In accelerated motion
6.	(c) 2r
7.	(b) 875 m (Hint:- distance= area under speed time graph=area of triangle AGH+ area of rectangle AGHO)
8.	(b) Car B is the slowest
9.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
10.	(d) Assertion (A) is false but reason (R) is true
11.	(c) Assertion (A) is true but reason (R) is false.
12.	(d) Assertion (A) is false but reason (R) is true
13.	(a) Both assertion and reason are true and reason is the correct explanation of assertion
14.	(a) Both assertion and reason are true and reason is the correct explanation
15.	Displacement is zero. Distance is twice the distance between position P and Q
16.	No, it is always either equal to or less than the distance travelled by the object.
17.	The magnitude of distance and displacement of a moving object are same when the object moves along the same straight line in the same fixed direction.
18.	As the motion is uniform, the velocity remains 50 m/s after 20 s.

19.	If speed of particle is constant then the particle may have acceleration or not. If direction of the particle changes with constant speed then there is acceleration, and if direction doesn't changes there is no acceleration.
20.	Uniform velocity: An object with uniform velocity covers equal distances in equal intervals of time in a specified direction, e.g., an object moving with speed of 40 kmh^{-1} towards west has uniform velocity. Non-uniform velocity: When an object covers unequal distances in equal intervals of time in a specified direction, or if the direction of motion changes, it is said to be moving with a non-uniform or variable velocity, e.g., revolving fan at a constant speed has variable velocity.
21.	If the velocity of a body decreases with time, then its final velocity is less than the initial velocity and thus its acceleration is negative. Negative acceleration is called retardation or deceleration. For example, when brakes are applied to a moving truck, its velocity gradually decreases.
22.	(a) Distance covered = $\pi \times OA = \pi \times 5 = 5\pi$ cm (b) Displacement = $2 \times OB$ $= 2 \times 5 = 10$ cm along AB
23.	The body that is thrown vertically upward with velocity u will have final velocity v=0 at the greatest height h. Substituting the given values in the third equation of motion, $v^2=u^2+2as$ we have $0=u^2-2gh$. (taking g in the upward direction) or $h=u^2/2g$.
24.	The nature of the graph shows that velocity changes by equal amounts in equal intervals of time. For a uniformly accelerated motion, velocity-time graph is always a straight line. As we know, acceleration is equal to the slope of the graph $i.e., \quad a = \frac{BC}{AC}$ or $a = \frac{v_2 - v_1}{t_2 - t_1}$ $\therefore \quad a = \frac{(10.0 - 7.5)\ \text{ms}^{-1}}{(20 - 15)\ \text{s}}$ $\text{or} \quad a = \frac{2.5\ \text{ms}^{-1}}{5\ \text{s}}$ $\text{or} \quad a = 0.5\ \text{ms}^{-2}$

25.	We have been given $a = -6\,\text{ms}^{-2}; t = 2\ \text{s and}\ v = 0\,\text{ms}^{-1}$ We know that $v = u + at$ $0 = u + (-6\,\text{ms}^{-2}) \times 2\text{s or } u = 12\,\text{ms}^{-1}$ We get $s = ut + \frac{1}{2}at^2$ $= (12\ \text{ms}^{-1}) \times (2\text{s}) + \frac{1}{2}(-6\text{ms}^{-2})\,(2\text{s})^2$ $= 24\ \text{m} - 12\ \text{m} = \mathbf{12\ m}$ Thus, the car will move 12 m before it stops after the application of brakes.
26.	Given, initial velocity = 72 km/h = 72 x 518 = 20 m/s Final velocity = 0 m/s Time taken = 10s. 1. Retardation Acceleration, a = υ–u/t a = 0–20/10 = -2m/s^2 ∴ Retardation = 2 m/s^2 2. Distance travelled using equation, $\upsilon^2 - u^2 = 2as$ $(0)^2 - (20)^2 = 2\,(-2)s$ ∴ s = 100 m
27.	(i) A body is said in uniform acceleration when its motion is along a straight line and its velocity changes by equal magnitude in equal interval of time. (ii)A body is said in non-uniform acceleration when its motion is along a straight line and its velocity changes by unequal magnitude in equal interval of time
28.	(a) OA is a straight line graph between speed and time, and it is sloping upward from O to A. Therefore, the graph line OA represents uniform acceleration. (b) AB is a straight line graph between speed and time, which is parallel to the time axis (x-axis). So, AB represents uniform speed. There is no acceleration from A to B. (c) BC is a straight line graph between speed and time which is sloping downwards from B to C. Therefore, BC represents uniform retardation or negative acceleration. (d) Acceleration of the body as we see from graph line OA represents it. So, the slope of velocity-time graph OA will give the acceleration of the body. Thus, Acceleration = Slope of line OA = AD/OD We have, AD = 6 m/s, and OD = 4 s So, acceleration = $\frac{6\text{m/s}}{4\text{s}}$ = 1.5 m/s (e) The slope of line graph BC represents the retardation of the body. So, retardation = Slope of line BC = BE/EC We have, BE = -6m/s, EC = 16 – 10 = 6s Retardation = -6/6 = -1m/s^2

29.	Ans:- (i) The distance-time graph represents the line AB which shows the speed of the body. So, Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{3\text{cm}}{(5-2)\text{s}}$ = 1 cm/s (ii) The distance-time graph shows that the body is at rest between graph line B to C, it means no movement. So speed is zero i.e., Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{0}{(7-5)\text{s}} = \frac{0}{2\text{s}}$ = 0 (iii) The distance-time graph represents the line CD which shows the speed of the body. So, Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{(7-3)\text{cm}}{(9-7)\text{s}} = \frac{4\text{cm}}{2\text{s}}$ = 2 cm/s
30.	Ratio is 1(both are equal)
31.	When the change in velocity of a body takes place in the direction of motion of the body , then the acceleration is positive
32.	Body is in uniform motion 
33.	Total distance covered by Usha in 1 min is 180 m. Displacement of Usha in 1 min = 0 m $\text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$ $= \frac{180\,\text{m}}{1\,\text{min}} = \frac{180\ \text{m}}{1\,\text{min}} \times \frac{1\ \text{min}}{60\,\text{s}}$ $= 3\ \text{m s}^{-1}$ $\text{Average velocity} = \frac{\text{Displacement}}{\text{Total time taken}}$ $= \frac{0\,\text{m}}{60\ \text{s}}$ $= 0\ \text{m s}^{-1}$ The average speed of Usha is 3 m s^{-1} and her average velocity is 0 m s^{-1}.

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