	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**Department: SCIENCE 2023 – 24** **SUBJECT: PHYSICS**	**Date of submission:** **05-06-2023**
Worksheet No: 02 **WITH ANSWERS**	**CHAPTER / UNIT: MOTION – PART 2**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT:	**CLASS & SEC:**	**ROLL NO.:**

OBJECTIVE TYPE OF QUESTIONS (1 MARK):

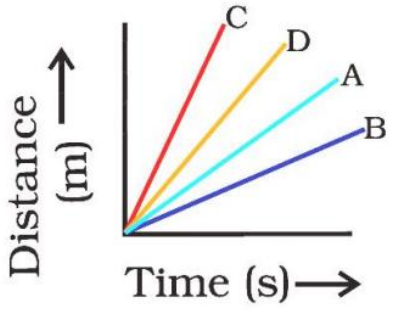
1) The distance time graph of a body coincides with its time axis. The body must be
   a) In uniform motion
   b) At rest
   c) In uniformly accelerated motion
   d) In zig-zag motion

2) Suppose a boy is enjoying a ride on a merry – go – round which is moving with a 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

3) Area under a v-t graph represents a physical quantity which has the unit
   a) m^2
   b) m
   c) m^3
   d) m/s

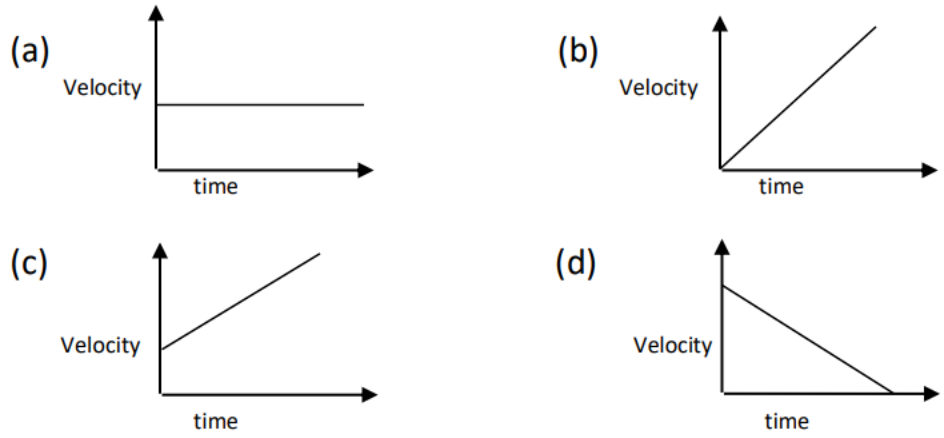
4) four cars A, B, C and D are moving on a leveled rod. Their distance versus time graphs are shown in below figure. Choose the correct statement

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



5) A velocity-time graph for zero acceleration represents
   a) A straight line parallel to the time axis
   b) An upward slope
   c) A downward slope
   d) A curved line

6) In the following graphs, which graph shows retardation (negative acceleration)



7) If a body is moving at constant speed in a circular path, its
   a) Velocity is constant and its acceleration is zero
   b) Velocity and acceleration are both changing in direction only
   c) Velocity and acceleration are both increasing
   d) Velocity is constant and acceleration is changing direction

8) The acceleration of a car that speeds up from 12 m/s to 30 m/s in 15 seconds is
   a) 2.4 ms^{-2}
   b) 1.2 ms^{-2}
   c) 2 ms^{-2}
   d) 5.2 ms^{-2}

9) Area below v-t graph is a measure of
   a) acceleration
   b) velocity
   c) speed
   d) displacement

10) The motion of blades of an electric fan around the axle is an example of

   a) Uniform circular motion
   b) Linear motion
   c) Non uniform motion
   d) Uniform retarded motion

ASSERTION AND REASONING TYPE OF QUESTIONS (1 MARK):

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 A and R are true, and R is the correct explanation of A.
b) Both A and R are true, and R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true

11) **Assertion:** The motion of an athlete moving along a circular path is an example of an accelerated motion.
Reason: If a body moves with a velocity of constant magnitude along a circular path, the change in his velocity is due to the change in the direction of motion.

12) **Assertion:** Motion of satellites around their planets is considered an accelerated motion
Reason: During their motion, the speed remains constant while the direction of motion changes continuously.

13) **Assertion:** The position-time graph of a stationary object is a straight line parallel to time axis.
Reason: For a stationary object, position does not change with time.

14) **Assertion**: A body can have acceleration even if its speed is constant.
Reason: In uniform circular motion, speed of body is constant but its velocity continuously changes

15) **Assertion:** A negative slope on a velocity-time graph indicates that the object is moving in the positive direction.
Reason: The slope of a velocity-time graph represents the rate of change of velocity, and a positive slope indicates that the velocity is increasing, which implies motion in the positive direction.

VERY SHORT ANSWER TYPE OF QUESTIONS: (2 MARK)

16) Write any two examples of uniform circular motion

17) Velocity time graph for the motion of an object in a straight path is a straight line parallel to the time axis. Find the nature of motion of the body and also draw the shape of distance – time graph for this type of motion.

18) Why is circular motion with constant speed called accelerated motion?

19) A car travels with a velocity 10 m/s with uniform acceleration of 5 ms^{-2}. Calculate the final velocity when it has travelled 30 m.

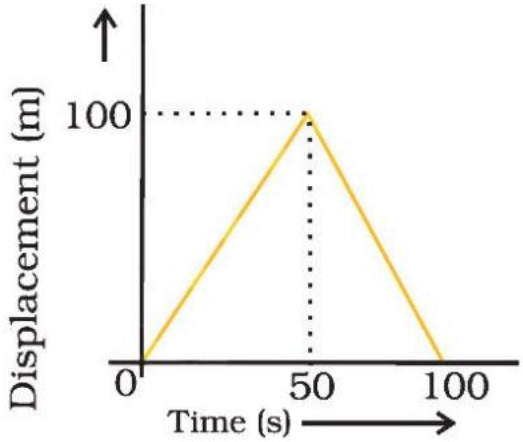
20) Using the following data draw displacement time graph for a moving object.

Time (hour)	0	2	4	6	8	10	12
Displacement (m)	0	2	4	4	4	6	4

21) How will the equations of motion for an object moving with a uniform velocity change?

22) Draw a velocity time graph of a stone thrown vertically upwards and then coming downwards after attaining the maximum height.

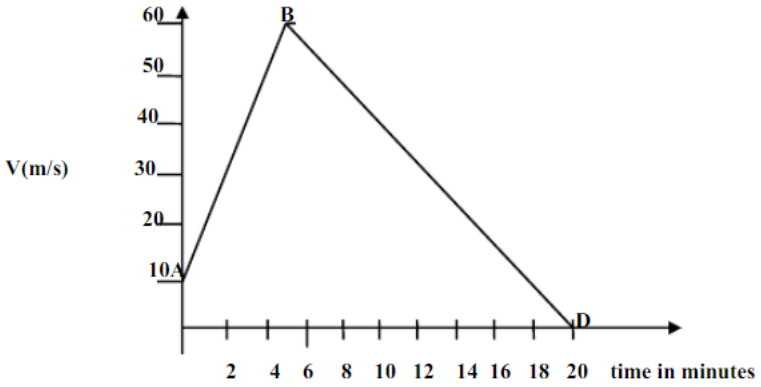
23) A girl walks along a straight path to drop a letter in the letterbox and comes back to her initial position. Her displacement time graph is shown below figure. Plot a velocity time graph for the same.



24) A car accelerates uniformly from 18 km/h to 36 km/h in 5 seconds. Calculate acceleration and the distance covered by the car in that time.

25) A body is accelerating at a constant rate of $10 m/s^2$. If the body starts from rest, how much distance will it cover in 2 seconds?

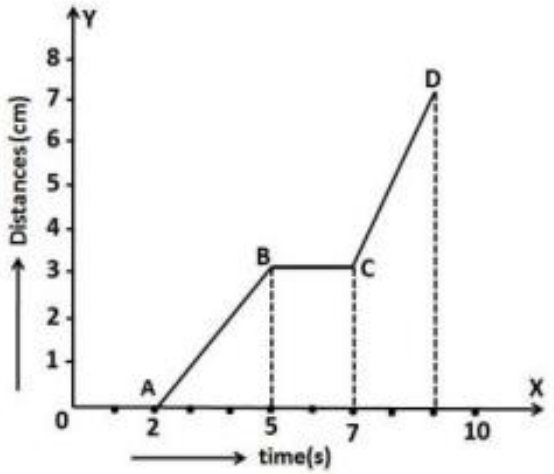
26) Read the following graph carefully and answer the questions given below:



i. Find the acceleration of the body.
ii. Which part of the graph shows uniform retardation?

SHORT ANSWER TYPE OF QUESTIONS (3 MARK):

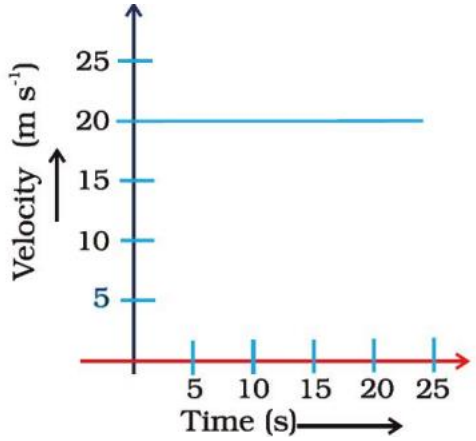
27) The graph in below figure shows the positions of a body at different times. Calculate the speed of the body as it moves from (i) A to B (ii) B to C (iii) C to D



28) A bus was moving with a speed of 54 km/h. On applying brakes, it stopped in 8 seconds. Calculate the acceleration and the distance travelled before stopping.

29) A car starts from rest and moves along the x axis with constant acceleration 5 ms^{-2} for 8 seconds. If it then continues with constant velocity, what distance will the car cover 12 seconds since it started from the rest?

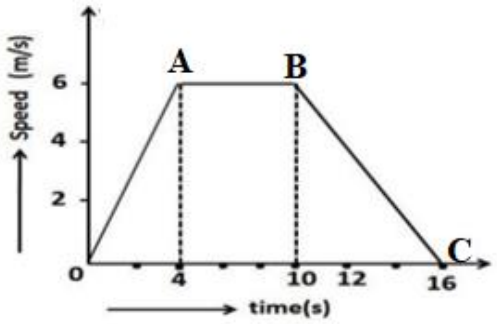
30) The velocity – time graph shows the motion of a cyclist. Find (i) its acceleration (ii) its velocity (iii) the distance covered by the cyclist in 15 seconds.



LONG ANSWER TYPE OF QUESTIONS (5 MARK):

31) An electron moving with a velocity of 5×10^4 m/s enters into a uniform electric field and acquires a uniform acceleration of 10^4 ms^{-2} in the direction of its initial motion.
   i. Calculate the time in which the electron would acquire a velocity double of its initial velocity.
   ii. How much distance the electron would cover in this time?

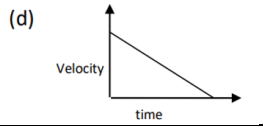
32) Study the speed-time graph of a body shown in below figure and answer the following questions:
(a) What type of motion is represented by OA?
(b) What type of motion is represented by AB?
(c) What type of motion is represented by BC?
(d) Calculate the acceleration of the body.
(e) Calculate the retardation of the body.
(f) Calculate the distance travelled by the body from A to B

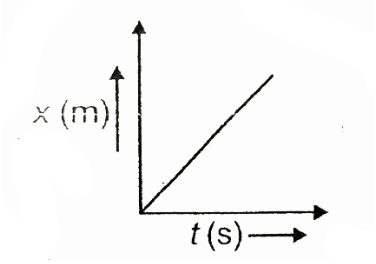
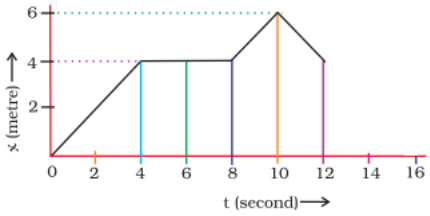


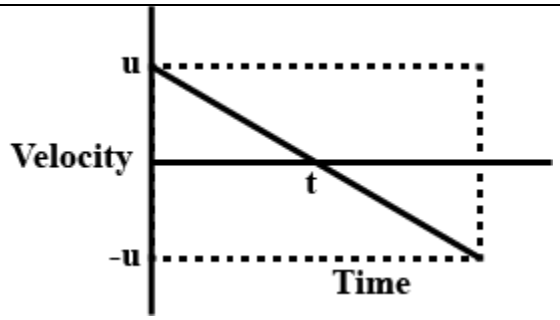
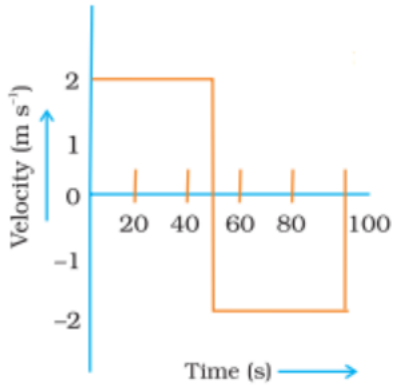
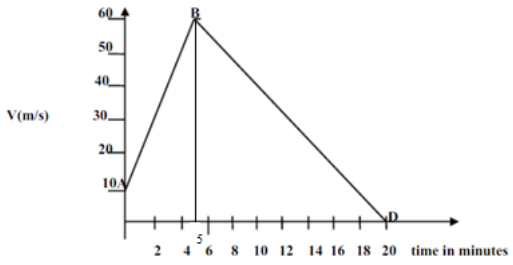
33) A car a moving at rate of 72 km/h and applies brakes which provide a retardation of $5ms^{-2}$.
(i) How much time does the car takes to stop?
(ii) How much distance does the car cover before coming to rest?
(iii) What would be the stopping distance needed if speed of the car is doubled?

CASE STUDY TYPE OF QUESTIONS (4 MARK):

34) We know that the circumference of a circle of radius *r* is given by $2\pi r$. If the body takes *t* seconds to go once around the circular path of radius *r*, the speed *v* is given by $v=2\pi r/t$. When an object moves in a circular path with uniform speed, its motion is called uniform circular motion. Refer the paragraph and answer the following questions:
a) Is the speed of an object in uniform circular motion constant? Why or why not?
b) If the radius of a circular path is doubled, how does it affect the period of motion?
c) Can an object in uniform circular motion have a changing speed? Explain.
d) A car is traveling along a circular path with a radius of 50 meters. If it completes one revolution in 20 seconds, what is the car's speed?

ANSWER KEY	
1	b) At rest
2	c) In accelerated motion
3	b) m
4	b)car B is the slowest
5	a)A straight line parallel to the time axis
6	(d) 

7	b)Velocity and acceleration are both changing in direction only
8	b)1.2 ms^{-2}
9	d)displacement
10	a)Uniform circular motion
11	b) Both A and R are true, and R is not the correct explanation of A.
12	a) Both A and R are true, and R is the correct explanation of A.
13	a) Both A and R are true, and R is the correct explanation of A.
14	a) Both A and R are true, and R is the correct explanation of A.
15	d) A is false but R is true
16	A car moving around a circular track at a constant speed A spinning top
17	When the velocity-time graph for the motion of an object in a straight path is a straight line parallel to the time axis, it indicates that the object is moving with a constant velocity. 
18	Circular motion with a constant speed is called accelerated motion because, in circular motion, the direction of the velocity vector changes continuously. Acceleration is defined as the rate of change of velocity, which includes changes in magnitude (speed) and direction
19	$v^2 - u^2 = 2as$ $v^2 - 10^2 = 2(5)30$ v = 20 m/s
20	
21	When object is moving with a uniform velocity, v=u and a = 0 1) v=u 2) s=ut 3) $v^2=u^2$

22	
23	Initially, at time t = 0, the displacement = 0 and at time t = 50 s, displacement = 100 m We know, velocity = $\frac{\text{displacement}}{\text{time}} = \frac{100-0}{50-1} = 2\ ms^{-1}$ and after time t = 50 s, the velocity is decreasing at a uniform rate. At t = 100 s, displacement = 0 Therefore in this case, velocity = $\frac{0-100}{100-50} = -2\ ms^{-1}$ 
24	$v = u + at$ $10 = 5 + a(5)$ $a = 1m/s^2$ $s = ut + \frac{1}{2}at^2$ $= 5(5) + \frac{1}{2}(1)(5)^2 \quad = 37.5m$
25	S=ut+1/2 at^2 S=0+1/2 (10)2^2 S=20 m
26	

	slope of the graph AB =(60-10) / 5 – 0 =10 m/s^2 ii) BD
27	(i) Speed = slope of AB = 3-0/5-2= 1cm/s (ii) Speed between B to C = 0 cm/s (iii) Speed = slope of C to D = 7-3 / 9-7 =2 cm/s
28	$u = 54km/h = \frac{54 \times 1000m}{60 \times 60s} = 15m/s, v = 0, t = 8s, a = ?, s = ?$ From $v = u + at$, $a = \frac{v-u}{t} = \frac{0-15}{8} = -1.87m/s^2$ From $s = u + \frac{1}{2}at^2$, $s = 15 \times 8 + \frac{1}{2}(-1.87)(8)^2 = 60.2m$
29	$s = ut + \frac{1}{2}at^2$ $s = 0 + \frac{1}{2} \times 5 \times 8^2$ $s = 160\ metres$ $v = u + at$ $v = 0 + 5 \times 8 = 40\ m/s$ Therefore, since the car has moved with constant velocity from 8th second to 12 second, the distance traveled is $s = v \times t = 40 \times 4 = 160\ m.$ Therefore, the total distance traveled is $160 + 160 = 320m$
30	i)acceleration = 0 m/s^2 ii)velocity=20 m/s iii) area under v-t graph gives displacement(distance) area =distance= 20×15 =300 m
31	V= 2u = 2×5×10^4 =10×10^4 m/s using v = u + at we get $10 \times 10^4 = 5 \times 10^4 + 10^4 \times t$ or t = 5s (ii) Using $s = ut + \frac{1}{2}at^2$, we get $s = 5 \times 10^4 \times 5 + \frac{1}{2} \times 10^4 \times 5^2$

	$= 25 \times 10^4 + 12.5 \times 10^4$ $= 37.5 \times 10^4$ m.
32	a) Uniformly Accelerated b) Constant speed c) Uniform retardation d) Slope of AB = 6-0 /4-0 = 1.5 m/s^2 e) Slope of BC = 0-6 / 16-10 = -1 m/s^2 f) Area under AB = 6×6 = 36 m
33	i) v=u+at 0=20+(-5)t t = 4 s ii) $v^2 - u^2 = 2as$ 0 – 20^2 = 2 (-5)s S = 40 m iii) $v^2 - u^2 = 2as$ 0-40^2 = 2(-5)s S = 160 m
34	a) For a body moving in uniform circular motion the speed attained by the object will remain constant not the velocity as velocity depends on the direction of motion, and in circular motion the direction of the object changes at every point b) The time period also gets doubled. c) No, an object in uniform circular motion cannot have a changing speed. In uniform circular motion, the speed of the object remains constant throughout its motion. The term "uniform" implies that the speed does not vary or change over time. d) Speed = distance/time = 2πr / t = 2(3.14)50/20 = 15.7 m/s

Prepared by : Ms Vivette Shirly Lasrado	Checked by: HOD SCIENCE & FRENCH