	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**Department: SCIENCE 2024 – 25** **SUBJECT: PHYSICS**	**Date: 06.06.2024**
Worksheet No: 02 **WITH ANSWERS**	**CHAPTER / UNIT: MOTION – PART 2**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT:	**CLASS & SEC:**	**ROLL NO.:**

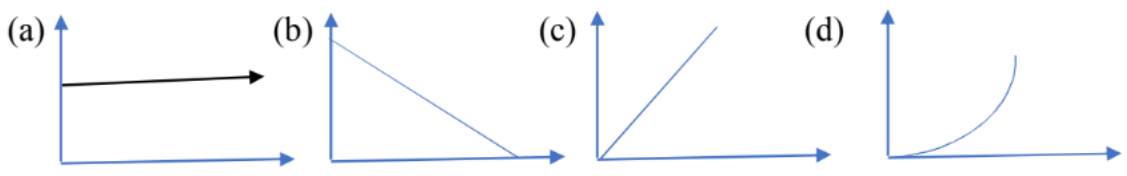
OBJECTIVE TYPE OF QUESTIONS (1 MARK):

1) A body moves in a uniform circular motion. Its speed is constant but its velocity is
   a) zero
   b) changing
   c) constant
   d) infinite

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

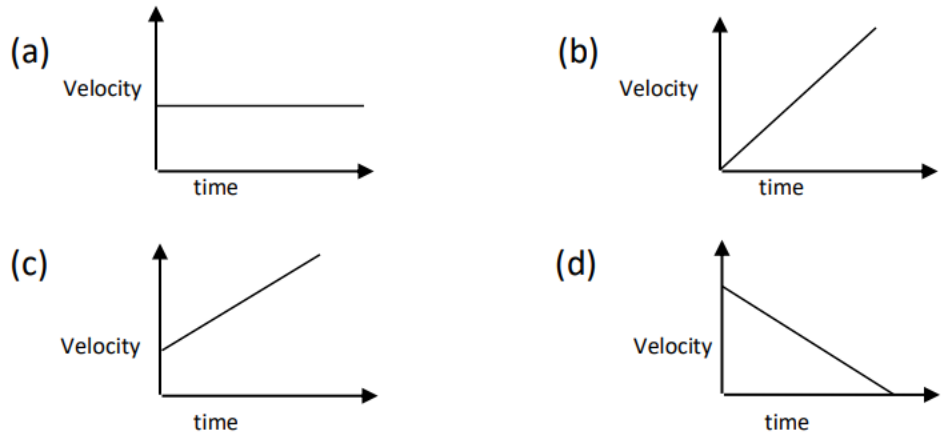
3) When a car driver travelling at a speed of 10 m/s applies brakes and brings the car to rest in 20 s, then the retardation will be:
   a) 2 ms^{-2}
   b) -2 ms^{-2}
   c) 0.5 ms^{-2}
   d) -0.5 ms^{-2}

4) Which of the following distance – time graph represents uniformly accelerated motion?



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) If the displacement of an object is proportional to square of time, then the object moves with:
   a) Uniform acceleration
   b) Uniform velocity
   c) Uniform speed
   d) None of the above

9) An object moving with a constant velocity has:
   a) Zero acceleration
   b) Positive acceleration
   c) Negative acceleration
   d) Infinite acceleration

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 area under the velocity-time graph represents the distance traveled by the object.
Reason: The slope of the velocity-time graph gives the acceleration of the object.

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 distance-time graph of a uniformly accelerated motion is a straight line.
Reason: In uniformly accelerated motion, distance is directly proportional to the square of 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 body moving with a constant speed in a straight line is said to have uniform acceleration.
Reason: In uniform acceleration, both speed and direction are not constant.

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) Four Cyclist A, B, C, D starts at the same point and at the same time and move in a straight line to reach destination. They all move with uniform velocities. They reach the destination in the following order C →A→B→D
Answer the following questions
a. If the displacement-time graph is plotted for each cyclist, which will be having highest slope
b. Arrange the cyclist in decreasing order of velocity

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	1	2	2	4	3	2

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

22) A train 100m long is moving with a velocity of 60 kmh^{-1}. Find the time it takes to cross the bridge 1 km long.

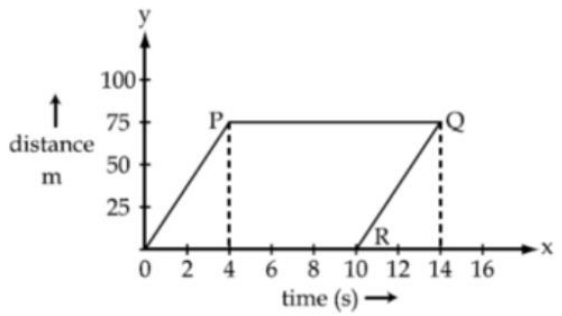
23) An air-plane accelerates down a runway at 3.20 m/s^2 for 32.8 s until is finally lifts off the ground. Determine the distance travelled before takeoff.

24) A Jeep starts from rest and accelerates uniformly over a time of 5.21 seconds for a distance of 110 m. Determine the acceleration of the Jeep.

25) How is uniform motion in a straight line different from uniform circular motion? Explain.

SHORT ANSWER TYPE OF QUESTIONS (3 MARK):

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

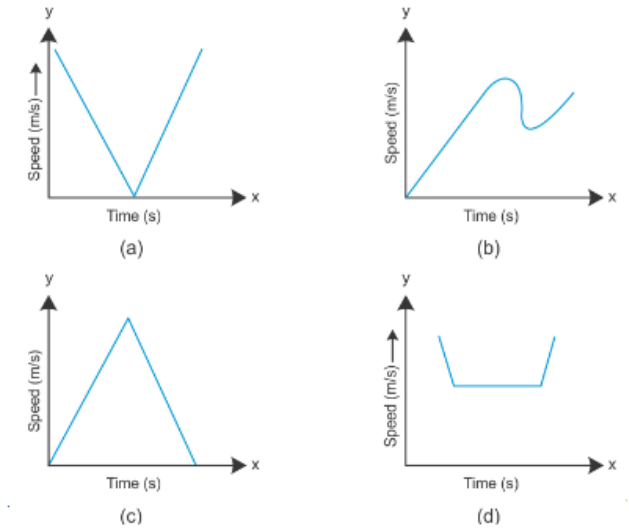


(i) Find the speed of the object during first four seconds of its journey.
(ii) How long was it stationary?
(iii) Does it represent a real situation? Justify your answer.

27) 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.

28) What do you infer if:
   a. Distance –time graph is straight line
   b. Velocity –time graph is curved
   c. Displacement –time is zig zag

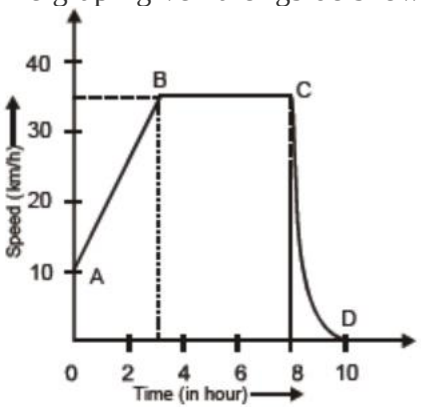
29) Four speed-time graphs are shown below. Explain the type of motion in each case.



LONG ANSWER TYPE OF QUESTIONS (5 MARK):

30) A driver of train travelling at a speed of 15m/s applies brakes and retards the train uniformly. The train stops in 5 seconds. Another train B is travelling on a parallel track with a speed of 10m/s. its' driver applies the brakes and the train stops in 10 seconds retarding uniformly.
(a) Plot speed-time graphs for train A and Train B.
(b) Calculate graphically which of the trains travelled farther after the brakes were applied.

31) The graph given alongside shows how the speed of a car changes with time.



a. What is the initial speed of the car?
b. What is the maximum speed attained by the car?
c. Which part of the graph shows zero acceleration?
d. Which part of the graph shows varying retardation?
e. Find the distance travelled in first 8 hours.

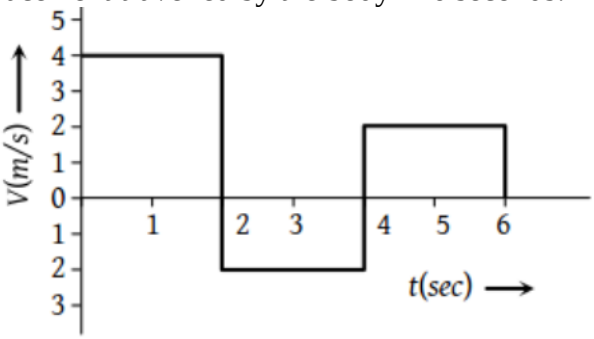
32) A car is moving on a straight road with a uniform acceleration. The following table gives the speed of the car at various instant of time.

Time(s)	0	10	20	30	40	50
Speed (m/s)	5	10	15	20	25	30

(i) Draw the shape of speed-time graph representing the above sets of observations.
(ii) Find the acceleration of the car.

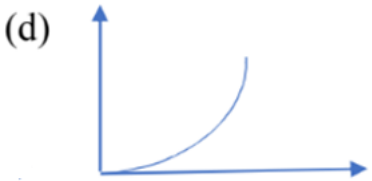
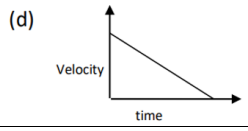
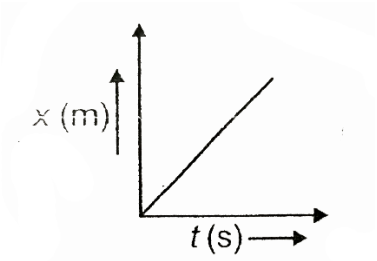
33) A car a moving at rate of 72 km/h and applies brakes which provide a retardation of $5ms^{-2}$.
   (i) How much time does the car takes to stop?
   (ii) How much distance does the car cover before coming to rest?
   (iii) What would be the stopping distance needed if speed of the car is doubled?

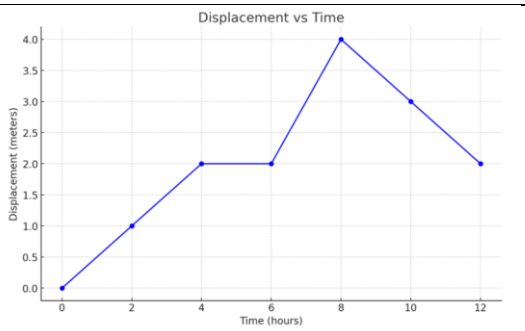
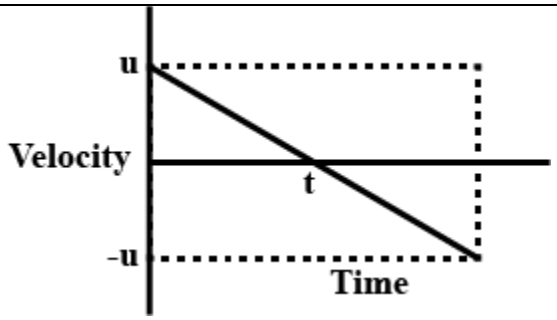
34) The v-t graph for a moving body in a straight line is shown below. Calculate the distance and displacement travelled by the body in 6 seconds:



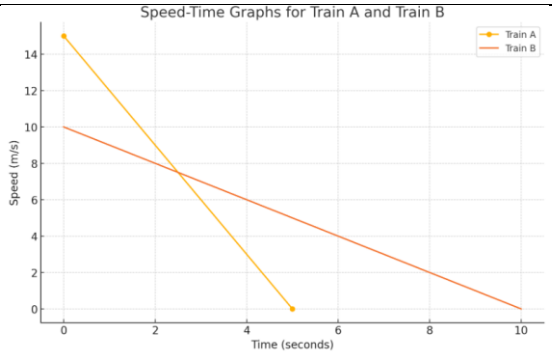
CASE STUDY TYPE OF QUESTIONS (4 MARK):

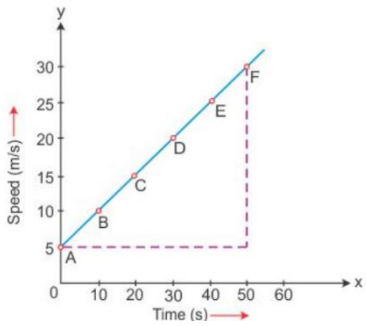
35) We know that the circumference of a circle of radius *r* is given by $2\pi r$. If the body takes *t* seconds to go once around the circular path of radius *r*, the speed *v* is given by $v=2\pi r/t$. When an object moves in a circular path with uniform speed, its motion is called uniform circular 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) Changing
2	c) In accelerated motion
3	c) 0.5 ms^{-2}
4	(d) 
5	a)A straight line parallel to the time axis
6	
7	b)Velocity and acceleration are both changing in direction only
8	a)Uniform acceleration
9	a)Zero acceleration
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	d)A is false but R is true
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	a) D b) D, B, A and C

19	$v^2 = u^2 + 2as$ Putting all the values $v^2 = 10^2 + 2 \times 5 \times 30$ Or, $v^2 = 100 + 300$ Or, $v^2 = 400$ Or, $v = \sqrt{400}$ Therefore, $v = 20$ m/sec
20	
21	
22	Length of train = 100m Length of bridge = 1km = 1000m Then, the total distance to be travelled = length of train + length of bridgee = 100 + 1100 = **1100m** Velocity/Speed = 60km/hr = $60 \times \frac{5}{18}$ = $\frac{50}{3} m/s$ $Distance = Speed \times Time$ Then, $Time = \frac{Distance}{Speed}$ $Time = \frac{1100}{\frac{50}{3}}$ $Time = \frac{1100 \times 3}{50}$ $Time = 66sec$

23	$s = ut + \frac{1}{2}at^2$ Where s = distance travelled u = Initial velocity t = Time a = acceleration Putting the values, we get; $s = 0 \times 32.8sec + \frac{1}{2} \times 3.2ms^{-2} \times (32.8sec)^2$ $s = 1.6 \times 32.8 \times 32.8$ $s = 1.6 \times 1075.84$ $s = 1721.344$ $s \approx 1721.3m$
24	using second eq of motion $s = ut + 1/2at^2$ as u=0, $a = \frac{2s}{t^2} = \frac{2 * 110}{5.21^2} = 8.10 m/s^2$
25	Uniform Linear motion: 1. An object is said to move in uniform linear motion , if it travels in straight line and covers equal DISTANCE in equal time interval. 2. No change in direction. 3.. SPEED is constant and constant velocity. 4. Acceleration is zero. Example: A car moving forward at speed of 40km/h towards North direction. Uniform circular motion: 1. When a body moves in circular path with uniform speed , it's motion is called uniform circular motion. 2. Motion is said to be accelerated. 3. SPEED is constant but direction of motion changes every point. Example: An Athelete running in a circular path.
26	**(i) The line OP, i.e. the first 4 seconds indicates uniform speed. Thus the speed of the object during this time interval will be the slope of line OP.** $= \frac{75-0}{4-0} = 18.75 \text{ m/s}$ **(ii) PQ is parallel to time axis, so speed is zero. Thus, the object is stationary between the time interval 14 s to 4 s.** **Thus, the object is stationary for 14 - 4 = 10 s.** (iii) OP situation is real as distance is increasing with time PQ is also real situation as distance can remain the same with increase in tine. But QR is unreal as the time interval decreases (negative time) which is not possible.

27	(u) = 54 km/hr $= \frac{54(1000)}{3600}$ m/s = 15 m/s Final velocity (v) = 0 m/s Time taken(t) = 8 s So acceleration, $a = \frac{v-u}{t}$ Put the values in the above equation to get the value of acceleration $a = \frac{0-15}{8}$ = -1.875 m/s^2
28	i. Speed is constant. ii. Acceleration is not uniform. iii. Nonuniform velocity.
29	a) The first segment (linear decrease) indicates uniform deceleration, meaning the object is slowing down at a constant rate until it stops. The second segment (linear increase) indicates uniform acceleration, where the object speeds up at a constant rate. b) This represents non-uniform acceleration. The changes in speed are not constant, indicating varying acceleration. The speed increases at different rates and the graph's curvature suggests changes in the rate of acceleration. c) The first segment (linear increase) indicates uniform acceleration, where the object speeds up at a constant rate. The second segment (linear decrease) indicates uniform deceleration, where the object slows down at a constant rate. d) The first segment (linear increase) indicates uniform acceleration, where the object speeds up at a constant rate. The second segment (linear decrease) indicates uniform deceleration, where the object slows down at a constant rate.
30	 $\text{Area for Train A} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 5 \times 15 = 37.5\,\text{m}$ $\text{Area for Train B} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 10 \times 10 = 50\,\text{m}$ So train B travels farther than A.
31	a. The initial speed of the car is 10 km/h b. Maximum speed attained by the car is 35 km/h

	c. BC d. CD e. The distance travelled in the first 8 hours = The area of trapezium OABE+ Area of the rectangle BCFE $= \frac{1}{2} \times (OA + BE) \times OE + BE \times BC$ $= \frac{1}{2} \times (10 kmh^{-1} + 35 kmh^{-1}) \times 3hrs + 35 kmh^{-1} \times (8hrs - 3hrs)$ $= \frac{45 \times 3}{2} + 35 \times 5$ $= \frac{135}{2} + 175$ $= 67.5 + 175$ $= 242.5 km$
32	a)  b) $a = \frac{30-5}{50-0} = 0.5\ m/s^2$
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	Displacement is equal to area under the velocity time graph with proper sign ∴ Displacement = 4 × 2 – 2 × 2 + 2 × 2 = 8m Distance is equal to total area under the speed time graph. ∴ Distance = 4 × 2 + 2 × 2 + 2 × 2 = 16m.
35	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 = $2\pi r / t = 2(3.14)50/20 = 15.7$ m/s

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