	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**Department: SCIENCE 2024 – 25** **SUBJECT: PHYSICS**	**Date:05-05-2024**
Worksheet No: 01 **WITH ANSWERS**	**CHAPTER 7: MOTION – PART 1**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT:	**CLASS & SEC:**	**ROLL NO.:**

OBJECTIVE TYPE OF QUESTIONS (1 MARK):

1) A particle is moving in a circular path of radius *r*. The displacement after half a circle would be,
   a) zero
   b) πr
   c) 2πr
   d) 2r

2) Which of the following can sometimes be 'zero' for a moving body?
   i. Distance travelled
   ii. Average velocity
   iii. Average speed
   iv. Displacement

   a) Only (i)
   b) (i) and (ii)
   c) (ii) and (iv)
   d) Only (iv)

3) In which of the following cases of motions, the distance moved and the magnitude of displacement are equal?
   a) If the car is moving on straight road
   b) If the car is moving in circular path
   c) The pendulum is moving to and fro
   d) The earth is revolving around the sun

4) In the case of moving body
   a) Displacement > Distance
   b) Displacement < Distance
   c) Displacement≥Distance
   d) Displacement ≤ Distance

5) Which of the following is not a characteristic of displacement?
   a) It is always positive.
   b) It has both magnitude and direction.
   c) It can be zero
   d) Its magnitude is less than or equal to the actual path length of the object

6) Which physical quantity is expressed in the unit m/s^2?
   a) Velocity
   b) Acceleration
   c) Distance
   d) Speed

7) Which of the following is not an example of non-uniform motion?
   a) A car moving with constant speed
   b) A train moving with varying speeds
   c) A car moving in busy traffic
   d) All of the above

8) 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

9) A car travels the first half of its journey with a speed of 40 km/h and the next half with a speed of 60 km/h. What is the average speed of the car?
   a) 48 km/h
   b) 50 km/h
   c) 40 km/h
   d) 58 km/h

10) Which of the following is a scalar quantity?
   a) Force
   b) Velocity
   c) Distance
   d) Acceleration

11) What does the path of an object look like when it is in a uniform motion?
   a) Straight
   b) Curved
   c) Zig – zag
   d) Circular

12) Which of the following statement is correct regarding velocity and speed of a moving body?
   a) Velocity of a moving body is always higher than its speed
   b) Speed of a moving body is always higher than its velocity

c) Speed of a moving body is its velocity in a given direction
d) Velocity of a moving body is its speed in a given direction

13) The rate of change of distance is called as ……
a) Speed
b) Velocity
c) Distance
d) Displacement

14) The value on converting km/h into m/s is
a) 5/18
b) 5/36
c) 18/5
d) 5/16

ASSERTION AND REASONING TYPE 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

15) **Assertion:** A car moving with a constant speed may have varying velocity.
Reason: Velocity is a vector quantity that includes both magnitude and direction.

16) **Assertion:** Acceleration of a moving body is always positive.
Reason: Acceleration of a moving body is the rate of change of velocity.

17) **Assertion:** Speedometer of an automobile measures the average speed of an automobile.
Reason: Average velocity is equal to total displacement per total time taken.

VERY SHORT ANSWER TYPE QUESTIONS: (2 MARKS)

18) "The direction in which an object moves is given by the direction of velocity of the object and not by the direction of acceleration". Give an example to justify this statement.

19) Can the average speed of a moving object be zero? Why?

20) Give an example each of a body under positive acceleration and a body under negative acceleration.

21) A particle is moving in a circle of diameter 5m. What is its displacement when it completes one and a half revolutions?

22) What do you mean by the term retardation? Give one example.

23) A physical quantity is measured as $-10\ ms^{-1}$. Is it speed or velocity? Justify.

24) What is the numerical ration of average velocity to average speed of an object when it is moving in a straight path without changing direction?

25) A motorcyclist drives from A to B with a uniform speed of 30 km/h and returns back with a speed of 20 km/h. Find its average speed.

SHORT ANSWER TYPE QUESTIONS (3 MARKS):

26) A bus accelerates uniformly from 54 kmh^{-1} to 72 kmh^{-1} in 10 seconds. Calculate the acceleration in ms^{-2}.

27) A girl moves with the speed of 6 km/h for 2 h and with the speed of 4 km/h for the next 3 h. Find the average speed of the girl and the total distance moved.

28) The length of minute hand of a clock is 14 cm. Calculate the speed with which the tip of the minute hand moves.

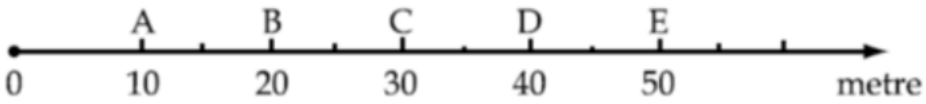
29) An object P is moving with a constant velocity for 5 min. Another object Q is moving with changing velocity for 5 min. Out of these two objects, which one has acceleration? Explain.

30) An athlete completes one round of a circular track of diameter 49 m in 20 s. Calculate the distance covered and displacement at the end of 30s.

31) Find the acceleration of the bus, when it decreases its speed from 80 km/h to 60 km/h in 5 s.

LONG ANSWER TYPE QUESTIONS (5 MARKS):

32) Look at the figure below.



An object starts its journey from point O. A, B, C, D and E represent position of the object at different instants. The objects moves through A, B, C, D and E and then moves back to point C. Calculate:
(a) The distance travelled by the object
(b) The displacement of the object
(c) Name the reference point in the diagram

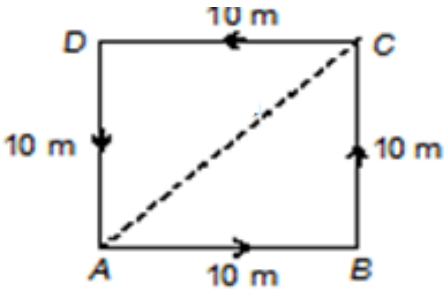
33) Sara travels from her home to the grocery store. Her initial odometer reading is 1520 km, and the final reading is 1535 km. If the time taken for the trip is 30 minutes, calculate Sara's average speed and velocity.

34) A bus between Kota to Jaipur passed the 100 km, 160 km and 220 km points at 10:30 am, 11:30 am and 1:30 pm. Find the average speed of the bus during each of the following intervals:
   a) 10:30 am to 11:30 am

b) 11:30 am to 1:30 pm
c) 10:30 am to 1:30 pm

CASE STUDY TYPE QUESTIONS (4 MARKS):

35) Answer the following questions by observing the following diagram:

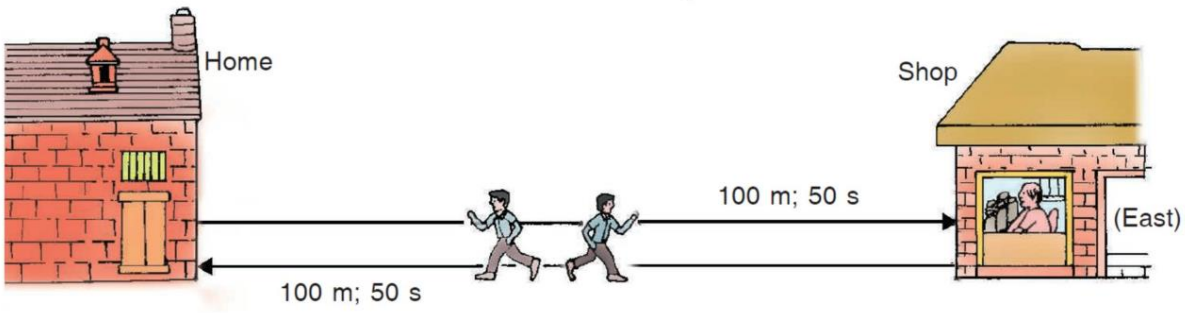


a) What is the displacement, when the particle moves from point A to D?

b) What is the displacement, when the particle moves from point A to C through A-B-C?

c) Find distance and displacement covered when the particle moves in path ABCDA i.e. starts from A and ends at A?

36) Suppose the boy first runs a distance of 100 metres in 50 seconds in going from his home to the shop in the East direction, and then runs a distance of 100 metres again in 50 seconds in the reverse direction from the shop to reach back home from where he started (see Figure).



a) Find the speed of the boy

b) Find the velocity of the boy

c) What is his distance and displacement?

37) A body is said to have uniform motion, if it travels equal distances in equal intervals of time, no matter how small these intervals may be. The distance travelled by an object in uniform motion increases linearly.

A train travels from one station to the next. The driver of train A starts from rest at time t = 0 and accelerates uniformly for the first 20 s. At time t = 20 s, train reaches its top speed of 25 ms^{-1}, then travels at this speed for further 30 s before decelerating uniformly to rest. Total time for the journey of train A is 60 s.

Another train B is travelling in the parallel of train A with zero initial speed at t = 0 and then accelerates uniformly for first 10 s.

At time t = 10 s it reaches its top speed of 30 ms^{-1}, then travels at this speed for further 20 s, before decelerating uniformly to rest. Total time for the journey of train B is 80 s.

a) What is the deceleration of the train A as it comes to rest?
b) In which time interval, speed of train B is constant?
c) What is the initial speed of trains A and B?

ANSWER KEY	
1	d) 2r
2	b) (ii) and (iv)
3	a)If the car is moving on a straight road
4	d)Displacement $\leq$ Distance
5	a)It is always positive.
6	b) acceleration
7	a) a car moving with constant speed
8	d)Equal or less than 1
9	a) 48 km/h
10	c) distance
11	a)straight
12	d)Velocity of a moving body is its speed in a given direction
13	a) speed
14	a) 5/18
15	a)Both A and R are true, and R is the correct explanation of A.
16	d)A is false but R is true
17	d)A is false but R is true
18	Velocity is the rate of change of displacement which shows how fast an object changes its distance and its direction. Acceleration is the rate of change of velocity which shows how fast an object changes its velocity. For example: Suppose a car is moving in the positive direction with acceleration 'a.' If we apply breaks the car slows down. Due to this its acceleration becomes negative i.e. '–a', however the motion of the car remains in forward direction.
19	No, the average speed of a moving object cannot be zero. If the object is moving then the distance covered by the body cannot be zero, so the speed cannot be zero for a moving body.

20	Speeding up a car is an example of positive acceleration and slowing down a moving vehicle is an example of negative acceleration.
21	The diameter of the circular path is 5 m. It completes 1 and ½ revolution. In 1 revolution its displacement is zero. In ½ revolution it reaches a point which is diametrically opposite to its starting point. So, the displacement is equal to the diameter which is 5 m.
22	Negative acceleration is called retardation. If the velocity of a body is decreasing with respect to time, the acceleration is said to be negative. Examples of retardation motion are: 1) Velocity of vehicle decreases when brake is applied. 2) Landing of an Aeroplane.
23	It is velocity because speed cannot be negative but velocity can. Velocity is a vector quantity whereas speed is a scalar quantity.
24	When an object is moving along a straight path without changing the direction, magnitude of average velocity is equal to the average speed. Therefore, numerical ratio of average velocity to average speed is one
25	$T = T_1 + T_2$ $= \frac{x}{30} + \frac{x}{20}$ $= \frac{3x+2x}{60}$ $= \frac{x}{12}$ Now calculate the average speed. $Average\ Speed = \frac{Total\ Distance}{Total\ Time}$ $= \frac{2x}{\frac{x}{12}}$ $= 24\ km/h$ **Hence, the average speed is $24\ km/h$.**
26	Initial velocity, $u = 54\ km/hr = 15m/s$ Final velocity, $v = 72\ km/hr = 20m/s$ Time, $t = 10s$ $a = \frac{v-u}{t}$ $= \frac{20-15}{10}$ $= 0.5\ m/s^2$

27	**1st Case --** **Speed = 6 km/h** **Time taken = 2 hour** **Distance = Speed x Time = 6 x 2 = 12 km** **2nd Case --** **Speed = 4 km/h** **Time taken = 3 hour** **Distance = 4 x 3 = 12 km** **Total distance = 12 + 12 = 24 km** **Total time = 3 + 2 = 5 hours** **Average speed = Total distance/ Total time =** **24/5 = 4.8 km/h = 1.33 m/s**
28	Tip of minute clock travels distance = circumference of circle of radius 14cm in 60 minutes (= 3600 seconds) Speed = Distance / Time Speed = 2π*(14) / (3600) Speed = 0.024 cm/s
29	Acceleration is defined as the change in velocity per unit time. As object P is moving with constant velocity, there is no change in velocity. But object Q is moving with changing velocity, hence it has acceleration.
30	Time taken to complete one round = 20s Total time = 30s Thus, no. of rounds completed = (30/20) = 1.5 Distance covered in 30 s = $2\pi r \times 1.5$ $= \frac{22}{7} \times 49 \times 1.5$ $= 231 m$ Now, in round displacement is zero. In the next half round the displacement of athlete is equal to the diameter of the circular track. Thus, displacement after 30s = 49 m.
31	Initial speed of the bus, u = 80 km/h = 80 × $\frac{5}{18}$ m/s = 22.22 m/s Final speed of the bus, v = 60km/h = 60 × $\frac{5}{18}$ m/s = 16.66 m/s Time taken to decrease the speed, t = 5 s Acceleration, a = $\frac{v-u}{t} = \frac{16.66-22.22}{5} = -1.112$ m/s^2
32	a) Distance = 70 m b) Displacement = 30 m

	c) Reference point is O.
33	Average speed = total distance/ total time = (1535 – 1520) / (30/60) = 30 km/h Average velocity = total displacement / total time = 30 km/h
34	The distance covered between 10.30 am to 11.30 am is 160km – 100km = 60km. The time interval is 1 hour. The average speed during this interval is $v_1 = \frac{60km}{1h} = 60km/hr$ The distance covered between 11.30 am and1.30 pm =220 km −160 km = 60 km The time interval =2 hours the average speed during this time interval $v_2 = \frac{60km}{2h} = 30km/h.$ The distance covered between 10.30 am to 1.30 pm is 220km – 100km = 120km. The time interval is 3 hour. The average speed during this interval is $v_3 = \frac{120km}{3h} = 40km/hr$
35	a) 10 m b) $10\sqrt{2}$ m c) Distance = 40 m Displacement = 0
36	Total distance travelled is 100 m + 100 m = 200 m and the total time taken is 50 s + 50 s = 100 s. $\text{Speed of boy} = \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{200\text{ m}}{100\text{ s}} = 2\text{ m/s}$ $\text{Velocity of boy} = \frac{\text{Displacement}}{\text{Time taken}} = \frac{0\text{ m}}{100\text{ s}} = 0\text{ m/s}$ Distance = 200 m Displacement = 0 m
37	a) Acceleration = change in velocity / time = 25/10 = 2.5 ms^{-2}

	b) Speed of train B is constant during the time interval 10 s to 30 s c) Initial speed of trains A and B is zero as both trains start from rest.

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