	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**Department: SCIENCE 2023 – 24** **SUBJECT: PHYSICS**	**Date of submission:** **10-05-2023**
Worksheet No: 01 **WITH ANSWERS**	**CHAPTER / UNIT: MOTION – PART 1**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT:	**CLASS & SEC:**	**ROLL NO.:**

OBJECTIVE TYPE OF QUESTIONS (1 MARK):

1) A person throws a ball vertically upwards. It rises to a height of 50 m and comes back to the thrower,
   a) the total distance covered by the ball is zero.
   b) the net displacement of the ball is zero.
   c) the displacement is 100 m.
   d) none of these.

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) A body whose position with respect to surrounding does not change is said to be in a state of:
   a) Rest
   b) Motion
   c) Vibration
   d) Oscillation

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) What would be the displacement of a particle moving in a circular path of radius r after a displacement of half a circle?
   a) $2\pi r$
   b) πr
   c) $2r$
   d) Zero

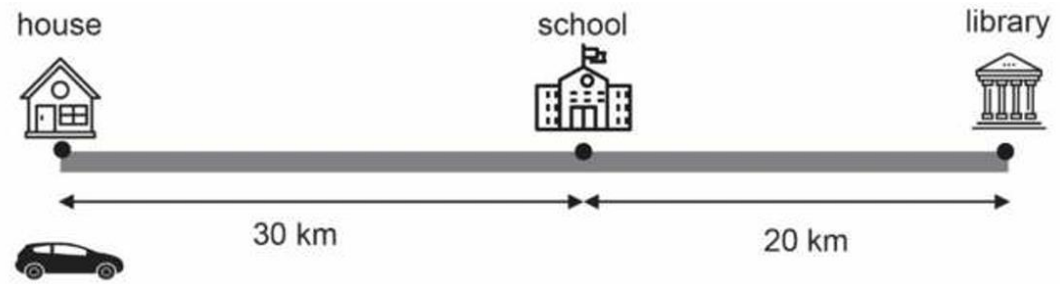
7) Which of the following situations is true and possible?
   a) If the velocity of a body is zero, then the acceleration can be non-zero
   b) A body moving at a constant velocity can have acceleration
   c) The magnitude of distance and displacement are always equal
   d) All of the above

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) In which of the following cases of motion, the distance moved and the magnitude of displacement are equal?
   a) If the car is moving on a 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

10)

The figure below shows the motion of a car along a straight path.
The car moves from house to school and school to library.
It then moves back to the school and stops.



1) What is the net displacement of the car?
   a) 20 km
   b) 30 km
   c) 50 km
   d) 70 km

2) What is the distance travelled by the car?
   a) 90 km
   b) 30 km
   c) 50 km
   d) 70 km

11) What is the correct unit for measuring the acceleration of a moving object?
   a) m
   b) ms
   c) ms^{-2}
   d) ms^{-1}

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

13) The speed of a moving object is determined to be 6 ms^{-1}. This speed is equal to
   a) 2.16 kmh^{-1}
   b) 21.6 kmh^{-1}
   c) 0.216 kmh^{-1}
   d) 216 kmh^{-1}

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

15) 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}

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

16) **Assertion:** Displacement of a body may be zero, when distance travelled by it is not zero.
Reason: The displacement is the longer distance between the initial and final positions.

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

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

19) **Assertion**: Velocity is the speed of an object in a particular direction.
Reason: SI unit of velocity is same as speed.

20) **Assertion:** An object can have constant speed but variable velocity.
Reason: velocity changes due to change in direction, though speed is same.

VERY SHORT ANSWER TYPE OF QUESTIONS: (2 MARK)

21) Differentiate between distance and displacement.

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

23) A person moves in a circular path centered at its origin O and having radius 1m. He starts from A and reaches diametrically opposite point B, then find the distance between A and B and the magnitude of displacement between A and B.

24) Define uniform acceleration. (CBSE 2010, 2013, 2014, 2015)
What kind of a quantity is acceleration?

25) Define non-uniform velocity. (CBSE 2011)
What is the acceleration of a body moving with uniform velocity? (CBSE 2014)

26) Differentiate between speed and velocity.

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

28) 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? (CBSE 2014)

29) What do you mean by positive and negative acceleration? (CBSE 2013, 2015)

30) 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.

31) The odometer of a car reads 2000 km at the start of a trip and 2400 km at the end of the trip. If the trip took 8 h, calculate the average speed of the car in kmh^{-1} and ms^{-1}.

SHORT ANSWER TYPE OF QUESTIONS (3 MARK):

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

33) A train moves with a speed of 30 kmh^{-1} in the first 15 minutes, with another speed of 40 kmh^{-1} in the next 15 minutes, and then with a speed of 60 kmh^{-1} in the last 30 minutes. Calculate the average speed of the train for this journey.

34) A train is running at a speed of 72 kmh^{-1}. It crosses a bridge of length half kilometer in 1 minute. Calculate the length of the train.

LONG ANSWER TYPE OF QUESTIONS (5 MARK):

35) Distance travelled by a train and time taken by it is shown in the following table,
(i) What is the average speed of the train?
(ii) When is the train travelling at the highest speed?
(iii) At what distance does the train slows down?
(iv) Calculate the speed of the train between 10:40 AM to 11:00 AM.

Time	Distance (in km)
10:00 AM	0
10:30 AM	25
10:40 AM	28
11:00 AM	40
11:15 AM	42
11:30 AM	50

36) The table given below shows distance (in cm) travelled by bodies A, B and C. Read this data carefully and answer the following questions.

Distance (in cm) covered by different bodies

Time in (s)	Body (A)	Body (B)	Body (C)
1st Second	20	20	20
2nd Second	20	36	60
3rd Second	20	24	100
4th Second	20	30	140
5th Second	20	48	180

i. Which of the bodies is moving with
(a) constant speed?
(b) constant acceleration?
(c) non-uniform acceleration?

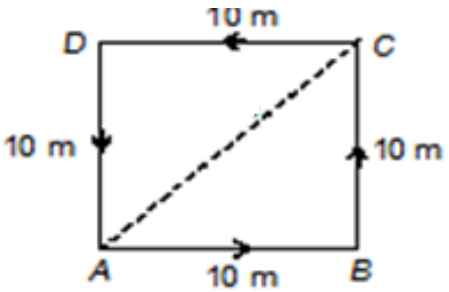
ii. Which of the bodies covers
(a) maximum distance in 3rd second?
(b) minimum distance in 3rd second?

CASE STUDY TYPE OF QUESTIONS (4 MARK):

37) Distance and displacement are two quantities that seem to mean the same but are different with different meanings and definitions. Distance is the measure of "how much distance an object has covered during its motion" while displacement refers to the measure of "how far is the object actually from initial place." Using this data answer the following questions.

a) Kapil travels 20 km North but then comes back to South for 40 km to pick up a friend. What is kapil's total distance?
b) Rahul travels 20 km East but then comes back to West for 10 km. Find displacement.
c) Define distance and displacement of a particle.

38) 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?

39) One day Rahul decided to go to his office by his car. He is enjoying the driving along with listening the old songs. His car is moving along a straight road at a steady speed. On a particular moment, he notices that the car travels 150 m in 5 seconds.

a) What is its average speed?

b) How far does it travel in 1 second?

c) How far does it travel in 6 seconds? How long does it take to travel 240 m?

40) 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	b) the net displacement of the ball is zero.
2	c) (ii) and (iv)
3	a)Rest
4	d)Displacement $\leq$ Distance
5	a)It is always positive.
6	c) 2r
7	a)If the velocity of a body is zero, then the acceleration can be non-zero
8	d) Equal or less than 1

9	a)If the car is moving on a straight road
10	1) b) 30 km 2) d) 70 km
11	c) ms^{-2}
12	a) Straight
13	b) 21.6 kmh^{-1}
14	a) speed
15	d) + 0.5 ms^{-2}
16	c)A is true but R is false.
17	d)A is false but R is true
18	d)A is false but R is true
19	b)Both A and R are true, and R is not the correct explanation of A.
20	a)Both A and R are true, and R is the correct explanation of A.

21

Distance	Displacement
The actual length of the path covered by a body in a certain interval of time is called distance travelled by a body.	The shortest distance between the initial position and final position of the body in a particular direction is called its displacement.
It is a scalar quantity	It is a vector quantity
Distance is always positive	It can be both positive or negative
Distance travelled by a moving body in a certain interval of time can never be zero	Displacement of a moving body in a certain interval of time can be zero
Distance can be greater than or equal to displacement	Displacement can be less than or equal to distance

22	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.
23	Distance = π m Displacement = 2 m
24	If an object travels in a straight line and its velocity increases or decreases by equal amounts in equal intervals of time, then the acceleration of the object is said to be uniform. Acceleration is a vector quantity.
25	When an object covers unequal distances in equal intervals of time in a specified direction, it is said to be in non-uniform velocity. Zero Acceleration

26

Speed	Velocity
Distance travelled by the body in a unit time interval.	Displacement of the body in unit interval of time.
It is a scalar quantity. It does not have	It is a vector quantity. Direction of

		any direction.	velocity gives direction of motion.
		Always positive	Can be both positive or negative depending upon direction of motion.
		Speed is not zero along a closed path	Velocity is zero along a closed path
27	It is velocity because speed cannot be negative but velocity can. Velocity is a vector quantity whereas speed is a scalar quantity.		
28	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		
29	When the change in velocity of a body takes place in the direction of motion of the body, then the acceleration is positive. When the change in velocity of a body takes place in a direction opposite to the direction of motion of the body, then the acceleration is negative.		
30	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}.		
31	Ans. Distance (s) = 2400 – 2000 = 400 km Time (t) = 8 hr Average speed = s/t = 400/8 = 50 km/h = 50 x 5/18 = 13.9 m/s.		

32	**Step 1: Given** Initial velocity, $u = 54\ km/hr = 15m/s$ Final velocity, $v = 72\ km/hr = 20m/s$ Time, $t = 10s$ **Step 2: Calculate the acceleration** Using first equation of motion, $a = \frac{v-u}{t}$ $= \frac{20-15}{10}$ $= 0.5\ m/s^2$
33	Distance 1 = 30 x 15/60 = 7.5 km Distance 2 = 40 x 15/60 = 10 km Distance 3 = 60 x 30/60 = 30 km Total distance = 47.5 km Total time = 15/60 + 15/60 + 30/60 = 1 hour Average speed = (Total Distance)/(Total Time) = 47.5/1 = 47.5 km/h
34	Given Speed of the train (v) = 72kmp h= $72 \times 1000/3600 = 20ms^{-1}$ Length of bride $= ½km = 500m$ …eqn(1) Time taken by train to cross bridge = 1 min = 60s Distance travelled by the train in $60s = 20 \times 60$ =1200m Length of train $= 1200 - 500$ = 700m

35	i) $\text{Average speed} = \frac{\text{Total distance travelled}}{\text{Total time taken}}$ In this problem, total distance travelled = 50 km. Total time taken 10:00 AM to 11: 30 AM $= 1 \text{ hour } 30 \text{ minutes} = 1\frac{1}{2} \text{ h} = \frac{3}{2} \text{h}$ $\therefore \quad \text{Now average speed} = \frac{50 \text{ km}}{\frac{3}{2} \text{ h}} = \frac{100}{3} \text{ km / h} = \mathbf{33.33 \text{ kmh}^{-1}}$ ii) The train is travelling at the highest speed between 10:00 AM to 10:30 AM iii) The train had minimum speed between 11:00 AM and 11:15 AM. Thus, the train had slowed down between 40 km and 42 km. iv) Speed between 10:40 AM to 11:00 AM = Distance /Time =(40−28)km/20min=12km/(20/60)h = 36 kmh^{-1}
36	(i) (a) Body A (b) Body C (c) Body B (ii) (a) Body C. Total distance travelled = 100 – 60 = 40 cm (b) Body B. Total distance travelled = 24 – 36 = (-) 12 cm The negative sign implies deceleration.
37	a) 60 km b) 10 km c) The actual length of the path covered by a body in a certain interval of time is called distance travelled by a body. The shortest distance between the initial position and final position of the body in a particular direction is called its displacement.
38	a) 10 m b) $10\sqrt{2}$ m c) Distance = 40 m Displacement = 0
39	a) Average speed = total distance travelled/total time taken = 150/5 = 30 m/s b) Distance = (average speed) x (time) = 30 m/s x 1s = 30 m c) Distance = (average speed) x (time) = 30 m/s x 6s = 180 m Time = Distance/average speed = 240/30 = 8 s
40	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.

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