|  |
| --- |
| **Karan Arora**  **R.L. Institute M: 9416974837**  **Class : IX**  **“MOTION”** |

**Worksheet – 1**

Multiple Choice Questions :

1. A vector quantity has :

|  |  |
| --- | --- |
| a) Direction | b) Magnitude |
| c) Both magnitude and direction | d) None of these |

1. Two different physical quantities, which are used to describe the overall motion of an object and to locate its final position with reference to its initial position at a given time are :

|  |  |
| --- | --- |
| a) Distance and Displacement | b) Magnitude of Displacement and speed |
| c) Distance and velocity | d) Speed and velocity |

1. Which one of the following is true for distance and displacement?

|  |  |
| --- | --- |
| a) Distance is scalar , Displacement is vector | b) Both are scalar |
| c) Both are vectors | d) Distance is vector , Displacement is scalar |

1. When final position of an object in motion coincides with its initial position.

|  |  |
| --- | --- |
| a) Both displacement and distance are zero | b) Displacement is zero , but distance is not zero. |
| c) Distance is zero , but displacement is not zero | d) Both displacement & distance are non-zero |

1. The magnitude of the displacement of an object is always:

|  |  |
| --- | --- |
| a) Greater than the distance travelled | b) Equal to the distance travelled |
| c) Less than the distance travelled | d) Less than or equal to the distance travelled |

1. Odometer of automobiles records

|  |  |  |  |
| --- | --- | --- | --- |
| a) Average speed | b) Instantaneous speed | c) distance travelled | d) acceleration |

1. Out of distance and displacement which one tells us about the nature of motion?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Distance | b) Displacement | c) Both | d) Neither |

1. Which of the following is a scalar quantity?

|  |  |  |  |
| --- | --- | --- | --- |
| a) distance | b) displacement | c) non-uniform velocity | d) uniform velocity |

1. A particle undergo displacement of 3 m due to north and 4 m due to east. The net displacement is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 5 m | b) 7 m | c) 1 m | d) None of these |

1. A particle is moving in a circle of radius 7 m. The distance travelled in two complete revolutions is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 44 m | b) 22 m | c) 88 m | d) 66 m |

1. A particle moving uniformly along a circle of diameter 5 m completes two revolutions. What is the displacement :

|  |  |  |  |
| --- | --- | --- | --- |
| a) zero | b) 5 m | c) 10 m | d) 20 m |

1. A particle executes one and a half revolution along a circle of radius 1 m. The displacement of the particle is

|  |  |  |  |
| --- | --- | --- | --- |
| a) zero | b) 1 m | c) 2 m | d) 3 m |

1. A body travels a distance of meter over a semicircle of radius ‘r’. let r = 1. What is the displacement of the particle is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 m | b) m | c) zero | d) 1 m |

1. The numerical value of the ratio of displacement to distance is :

|  |  |
| --- | --- |
| a) Always less than one | b) Always equal to one |
| c) Always more than one | d) equal to or less than one |

1. A man goes 10 m towards North, then 20 m towards East. His displacement is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 22.5 m | b) 25 m | c) 255 m | d) 30 m |

1. A body covers a distance of 6 m along a semicircular path. The ratio of the distance to displacement is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 7 : 6 | b) 9 : 7 | c) 11 : 7 | d) 7 : 5 |

1. The concept of average speed arises when speed is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Uniform | b) Non-uniform | c) both (a) and (b) | d) None of these |

1. A speed of 36km/hr. is equivalent to:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 m/s | b) 100 m/s | c) 1000 m/s | d) None of these |

1. An objects travels 10 km at a speed of 100 m/s and another 10 km at 50 m/s. The average speed over the whole distance is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 75 m/s | b) 55 m/s | c) 66.7 m/s | d) 33.3 m/s |

1. A train moving with a speed of 36 km/hr takes 14 sec to cross a bridge of length 100 m. The length of the train is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 140 m | b) 40 m | c) 100 m | d) 360 m |

1. A body is moving with a uniform velocity of 20 m/s. After 10 sec, its velocity would be :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 200 m/s | b) 20 m/s | c) 30 m/s | d) 10 m/s |

1. A cyclist moving on a circular track of radius 40 m completes half a revolution in 40 sec. Its average velocity is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) zero | b) 2 m/s | c) 2 m/s | d) 4 m/s |

1. A body covers first one-third of the distance with a velocity 20 m/s, the second one-third distance with a velocity of 30 m/s, and the last one-third distance with a velocity of 40 m/s. The average velocity nearly is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 28 m/s | b) 38 m/s | c) 18 m/s | d) 8 m/s |

1. A body starting from rest acquires a velocity of 10 m/s in 2 seconds. The acceleration of the body is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 5 m/s2 | b) 10 m/s2 | c) 1 m/s2 | d) zero |

1. Retardation of a body is :

|  |  |
| --- | --- |
| a) Negative speed of the body | b) Negative acceleration of the body |
| c) Negative velocity of the body | d) None of the above |

1. Retardation is expressed in :

|  |  |  |  |
| --- | --- | --- | --- |
| a) m | b) ms – 1 | c) – ms – 2 | d) ms – 2 |

**Answers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. c | 1. a | 1. a | 1. b | 1. d | 1. c | 1. d |
| 1. a | 1. a | 1. c | 1. a | 1. c | 1. a | 1. d |
| 1. a | 1. c | 1. b | 1. a | 1. c | 1. b | 1. b |
| 1. b | 1. a | 1. a | 1. b | 1. c |  |  |

Problem For Practice :

**Based on Distance and Displacement :**

1. An object is moving in a circle of radius ‘r’. Calculate the distance and displacement :

(i) when it completes half the circle. (ii) When it completes one full circle.

1. A particle moves 3 m due to North , then 4 m due East and finally 6 m due South. Calculate the distance travelled and the displacement.
2. An object starts from O and travels 5 km towards East , 5 km towards North and finally 10 km towards West. Calculate distance travelled and displacement of the object.
3. A body travels a distance of 15 m from A to B and then moves a distance of 20 m at right angles to AB. Calculate the total distance travelled and the displacement.
4. A particle is moving in a circle of diameter 5 m. Calculate the distance covered and the displacement when it completes 3 revolutions.
5. In a long distance race, the athletes were expected to takes 4 rounds of the track such that the line of finish was same as the line of start. Suppose the length of the track was 200 m.
6. What is the total distance to be covered by the athletes?
7. What is the displacement of the athletes when they touch the finish line?
8. Is the motion of the athletes uniform or non-uniform?
9. Is the displacement of an athlete and the distance move by him at the end of the race equal?
10. An athlete completes one round of a circular track of diameter 200 m in 40 s. What will be the distance covered and the displacement at the end of 2 minutes 20 seconds?
11. A farmer moves along the boundary of a square field of side 10 m in 40 s. What will be the magnitude of displacement of the farmer at the end of 2 minutes 20 seconds?
12. A particle moves in circle with O as centre and AO = OB = 5 cm, as radius. It starts from A. Calculate the Distance travelled and the displacement when it reaches B.

**Based on Speed and Velocity :**

1. During an experiment , a signal from a spaceship reached the ground station in five minutes. What was the distance of the spaceship from the ground station? The signal travels at the speed of light i.e. , 3 x 108 m/s.
2. Abdul, while driving to school, computes the average speed for his trip to be 20 km/hr. On his return trip along the same route , there is less traffic and the average speed is 30 km/h. What is the average speed for Abdul’s trip?
3. A car travels 30 km at a uniform speed of 40 km/h and the next 30 km at a uniform speed of 20 km/h. Find its average speed.
4. Joseph jogs from one end A to the other end B of a straight 300 m road in 2 minutes 30 seconds and then turns around and jogs 100 m back to point C in another 1 minute. What are the joseph’s average speeds and velocities in jogging (a) from A to B (b) from A to C ?
5. A train travels 60 km/h for 0.52 h ; at 30 km/h for the next 0.24 h and at 70 km/h for the next 0.71 h. What is the average speed of the train?
6. An objects travel 16 m in 4 sec and then another 16 m in 2 sec. What is the average speed of the object?
7. A 200 m long train crosses a 400 m bridge with a velocity of 36 km/h. find the time taken by the train to cross the bridge.
8. A train 100 m long moving on a straight level track passes a pole in 5 sec. Find the (a) Speed of the train (b) The time it will take to cross a bridge of 500 m long.
9. A car travels along a straight line for first half time with speed 40 km/h and the second half time with speed 60 km/h. Find the average speed of the car.
10. 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 hours, calculate the average speed of the car in km/h and m/s.
11. A body is moving with a velocity of 15 m/s. If the motion is uniform, what will be the velocity after 10 sec.
12. A body travels along a circular path of radius 70 m. After travelling half a revolution in 20 sec,

Find the average speed and average velocity.

1. A cheetah is the fastest land moving animal and can achieve a peak velocity of 100 km/h up to distances less than 500 m. If a cheetah spots its prey at a distance of 100 m, what is the minimum time it will take to get its prey, if the average velocity attained by it is 90 km/h.
2. Usha swims in a 90 m long pool. She covers 180 m in one minutes by swimming from one end to the other and back along the same straight path. Find the average speed and average velocity of Usha.

**Based on Acceleration** :

1. A bus decreases its speed from 80 km/h to 60 km/h in 5 sec. Find the acceleration of the bus.
2. A scooter acquires a velocity of 36 km/h in 10 seconds just after the start. It takes 20 seconds to stop. Calculate the acceleration in the two cases.
3. A train starting from a railway station and moving with uniform acceleration attains a speed of 40 km/h in 10 minutes. Find its acceleration
4. Starting from a stationary position, Rahul paddles his bicycle to attain a velocity of 6 m/s in 30 s. Then he applies brakes such that the velocity of bicycle comes down to 4 m/s in the next 5 sec. Calculate the acceleration of the bicycle in both the cases.
5. A car travelling at 36 km/h speeds upto 72 km/h in 5 sec What is its acceleration? If the same car stops in 20 sec, what is the retardation?
6. A body starts rolling over a horizontal surface with an initial velocity of 0.5 m/s2. Due to friction, its velocity decreases at the rate of 0.05 m/s2. How much time will it take for the body to stop.

**Answers**

1. (i) r , 2r (ii) 2 r , 0 2. 13 m , 5 m 3. 20 km , 5 km 4. 35 m , 25 m

5. 15 m , 0 6. (a) 800 m (b) 0 (c) non-uniform (d) No 7. 2200 m , 200 m

8. 10 km 9. 5 cm , 10 cm 10. 9 x 1010 m 11. 24 km/h

12. 26.7 km/h 13. (a) 2 m/s , 2 m/s (b) 1.9 m/s , 0.95 m/s 14. 59.9 km/h

15. 5.33 m/s 16. 1 minute 17. (a) 20 m/s (b) 30 s 18. 50 km/h

19. 50 km/h , 13.9 m/s 20. 15 m/s 21. 11 m/s , 7 m/s 22. 4 s

23. 3 m/s , 0 24. – 1.11 m/s2 25. 1 m/s2 , – 0.5 m/s2 26. 1.85 x 10 – 2 m/s2

27. 0.2 m/s2 , – 0.4 m/s2 28. 2 m/s2 , – 1 m/s2 29. 10 sec

|  |
| --- |
| **Karan Arora**  **R.L. Institute M: 9416974837**  **Class : IX**  **“MOTION”** |

**Worksheet – 2**

Multiple Choice Questions :

1. On a velocity time graph, a horizontal straight line corresponds to motion at :

|  |  |  |  |
| --- | --- | --- | --- |
| a) constant velocity | b) zero velocity | c) increasing velocity | d) decreasing velocity |

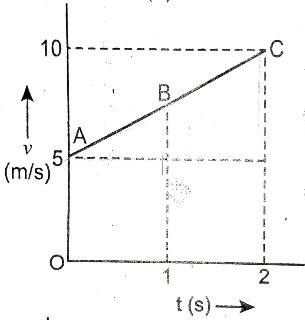
1. If the displacement -time graph of a particle is parallel to the time axis, the velocity of the particle is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) unity | b) infinity | c) zero | d) none of these |

1. Which of the following graphs show that the body is at rest?

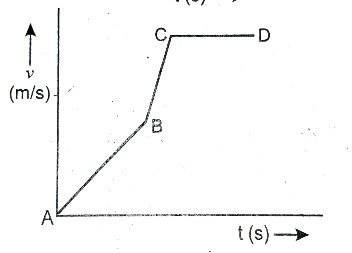
|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) |

1. The velocity time graph of a moving particle is shown in figure. The acceleration of the particle is :



|  |  |  |  |
| --- | --- | --- | --- |
| a) 5 m/s2 | b) 10 m/s2 | c) 20 m/s2 | d) 2.5 m/s2 |

1. The velocity time graph of a moving particle is shown in figure. The acceleration is maximum for segment:



|  |  |  |  |
| --- | --- | --- | --- |
| a) AB | b) BC | c) CD | d) equal for all parts |

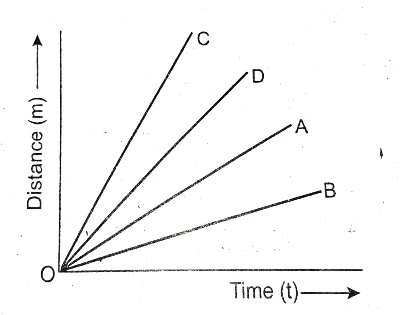
1. Suppose a boy is enjoying a ride on a merry-go-round which is moving with a constant speed of 10 m/s. It implies that the body is :

|  |  |
| --- | --- |
| a) at rest | b) moving with no acceleration |
| c) in accelerated motion | d) Moving with unform velocity |

1. Area under velocity time graph [a(v-t)] represents a physical quantity which has the unit:

|  |  |  |  |
| --- | --- | --- | --- |
| a) m2 | b) m | c) m3 | d) m/s |

1. Four cars A , B , C and D are moving on a levelled road. Their distance versus time graphs are shown in 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 |

1. Which of the following figures represents uniform motion of a moving object correctly?

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) |

1. Slope of velocity-time graph gives :

|  |  |  |  |
| --- | --- | --- | --- |
| a) the distance | b) the displacement | c) the acceleration | d) the speed |

1. The velocity time graph of a body is straight line parallel to time axis, the acceleration of the body is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) positive | b) negative | c) zero | d) none of these |

1. A body starting from rest acquires a velocity of 10 m/s in 5 seconds. The acceleration of the body is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 m/s2 | b) 5 m/s2 | c) 2 m/s2 | d) none of these |

1. A body starting from rest moving with an acceleration of 5 m/s2 acquires a velocity of 10 m/s. The distance travelled by the body is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 m | b) 20 m | c) 50 m | d) 100 m |

1. The velocity time graph of a body is a straight line with negative slope. It implies that :

|  |  |  |  |
| --- | --- | --- | --- |
| a) velocity is uniform | b) velocity is zero | c) a = positive | d) a = negative |

1. A body starting from rest acquires a velocity of 10 m/s in 2 seconds. The acceleration of the body is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 5 m/s2 | b) 10 m/s2 | c) 1 m/s2 | d) zero |

**Answers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. a | 1. c | 1. a | 1. d | 1. b | 1. c | 1. b |
| 1. b | 1. a | 1. c | 1. c | 1. c | 1. a | 1. d |
| 1. a |  |  |  |  |  |  |

Problem For Practice :

**Based on Equations Of Motion :**

1. A car increases its speed from 20 Km/h to 50 km/h in 10 seconds. What is its acceleration?
2. A moving train is brought to rest within 20 seconds by applying brakes. Find the initial velocity, if the retardation due to brakes is 2 m/s2.
3. A ship is moving at a speed of 56 Km/h. One second later, it is moving at 58 Km/h. What is its acceleration?
4. A scooter acquires a velocity of 36 Km/h in 10 seconds just after the start. Calculate the acceleration of the scooter.
5. A body is accelerating at a constant rate of 10 m/s2. If the body starts from rest, how much distance will it cover in 2 seconds?
6. A body starts to slide over a horizontal surface with an initial velocity of 0.5 m/s. Due to friction, its velocity decreases at the rate of 0.05 m/s2. How much time will it take for the body to stop?
7. A car acquires a velocity of 72 Km/h in 10 seconds starting from the rest. Find :

(a) The acceleration (b) The average velocity (c) The distance travelled in this time.

1. A train starting from rest moves with a uniform acceleration of 0.2 m/s2 for 5 minutes. Calculate the speed acquired and the distance travelled in this time.
2. 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.
3. A motor cycle moving with a speed of 5 m/s is subjected to an acceleration of 0.2 m/s2. Calculate the speed of the motor cycle after 10 second, and the distance travelled in this time.
4. The brakes applied to a car produce an acceleration of 6 m/s2 in the opposite direction to the motion. If the car takes 2 second to stop after the application of brakes. Calculate the distance travelled during this time.
5. A train is travelling at a speed of 90 Km/h. Brakes are applied so as to produce a uniform acceleration of – 0.5 m/s2. Find how far the train will go before it brought to rest.
6. A trolley, while going down an inclined plane, has an acceleration of 2 cm/s2 starting from rest. What will be its velocity 3 s after the start?
7. A racing car has a uniform acceleration of 4 m/s2. What distance will it cover in 10 s after start?
8. A train starting from rest attains a velocity of 72 Km/h in 5 minutes. Assuming that the acceleration is uniform, Find : (a) The acceleration (b) The distance travelled by the train.
9. A car accelerates uniformly from 18 Km/h to 36 Km/h in 5 second. Calculate : (a) The acceleration (b) The distance covered by the car in this time.
10. A bus starting from rest moves with a uniform acceleration of 0.1 m/s2 for 2 minutes. Find :

(a) The speed acquired (b) The distance travelled.

1. A motorboat starting from rest on a lake accelerates in a straight line at a constant rate of 3 m/s2 for 8 second. How far does the boat travel during this time?
2. A stone is thrown in a vertically upward direction with a velocity of 5 m/s. If the acceleration of the stone during its motion is 10 m/s2 in the downward direction, what will be the height attained by the stones and how much time will it take to reach there?
3. A ball is gently dropped from a height of 20 m. If its velocity increases uniformly at the rate of 10 m/s2, with what velocity will it strike the ground? After what time will it strike the ground?

**Based on Uniform Circular Motion :**

1. A cyclist goes once round a circular track of diameter 105 m in 5 minutes. Calculate his speed.
2. An athlete completes two rounds of a circular track 100 m long in 20 seconds. Calculate diameter of the track and speed of the athlete, supposed to be uniform.
3. Calculate the speed of the tip of second’s hand of a watch of length 1.5 cm.
4. The length of minutes hand of a clock is 5 cm. Calculate its speed.
5. An artificial satellite is moving in a circular orbit of radius 42250 km. Calculate its speed if it takes 24 hours to revolve around the Earth.

**Answers**

**1.** 0.83 m/s2  **2.**  40 m/s  **3.**  0.56 m/s2 **4.** 1 m/s2 **5.**  20 m

**6.** 10 s  **7.**  (a) 2 m/s2 (b) 10 m/s (c) 100 m  **8.**  60 m/s , 9 Km

**9.** – 1.87 m/s2 , 60.2 m **10.** 7 m/s ; 60 m **11.** 12 m  **12.** 625 m

**13.** 6 cm/s **14.**  200 m  **15.**  (a) 1/15 m/s2 (b) 3 Km

**16.** (a) 1 m/s2 (b) 37.5 m  **17.**  (a) 12 m/s (b) 7.2 x 102 m **18.** 96 m

**19.** 1.25 m , 0.5 s  **20.**  20 m/s , 2 s  **21.**  1.1 m/s

**22.** 31.8 m , 10 m/s  **23.**  0.16 cm/s **24.** 8.7 x 10 – 3 cm/s **25.** 1.1 x 104 km/h