Motion, Force and Work

EXERCISE [PAGE 50]

Exercise | Q 1.1 | Page 50

Fill in the blanks with the proper words given below

If a body traverses a distance in direct proportion to the time, the speed of the body is ..... .

1. stationary
2. zero
3. changing
4. **constant**
5. displacement
6. velocity
7. speed
8. acceleration
9. stationary but not zero
10. increases

Solution: If a body traverses a distance in direct proportion to the time, the speed of the body is constant.

Exercise | Q 1.2 | Page 50

Fill in the blanks with the proper words given below

If a body is moving with a constant velocity its acceleration is ..... .

1. stationary
2. **zero**
3. changing
4. constant
5. displacement
6. velocity
7. speed
8. acceleration
9. stationary but not zero

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10. increases

Solution: If a body is moving with a constant velocity its acceleration is zero.

Exercise | Q 1.3 | Page 50

Fill in the blanks with the proper words given below

..... is a scalar quantity.

1. stationary
2. zero
3. changing
4. constant
5. displacement
6. velocity
7. **speed**
8. acceleration
9. stationary but not zero
10. increases

Solution: Speed is a scalar quantity.

Exercise | Q 1.4 | Page 50

Fill in the blanks with the proper words given below

..... is the distance traversed by a body in a particular direction in unit time.

1. stationary
2. zero
3. changing
4. constant
5. displacement
6. **velocity**
7. speed
8. acceleration
9. stationary but not zero
10. increases

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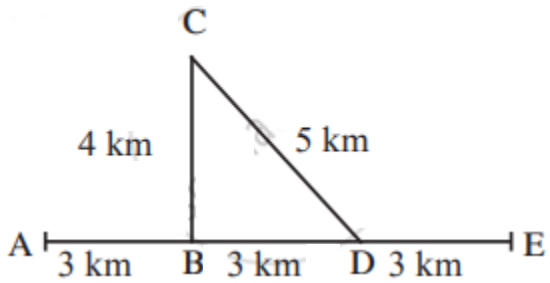
Solution: Velocity is the distance traversed by a body in a particular direction in unit time.

Exercise | Q 2 | Page 50

Observe the figure and answer the questions.



Sachin and Sameer started on a motorbike from place A, took the turn at B, did a task at C, travelled by the route CD to D and then went on to E. Altogether, they took one hour for this journey.

Find out the actual distance traversed by them and the displacement from A to E.

From this, deduce their speed.

What was their velocity from A to E in the direction AE?

Can this velocity be called average velocity?

Solution: Actual distance travelled by Sachin and Sameer from A to E = AB + BC + CD + DE = 3 + 4 + 5 + 3 = 15 km

Displacement from A to E = AB + BD + DE = 3 + 3 + 3 = 9 km

$$\text{Speed of the motorbike from A to E}$$
$$= \frac{\text{Total distance travelled from A to E}}{\text{Total time taken from A to E}} = \frac{15}{1} = 15\text{km/h}$$

$$\text{Velocity of the motorbike from A to E} =$$
$$\frac{\text{Total displacement from A to E}}{\text{Total time taken from A to E}} = \frac{9}{1} = 9\text{km/h}$$

Yes, this can be called the average velocity of the motorbike from A to E.

Exercise | Q 3 | Page 50

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From the groups B and C, choose the proper words, for each of the words in group A.

A	B	C
Work	Newton	erg
Force	Metre	cm
Displacement	Joule	dyne

Solution:

A	B	C
Work	Joule	erg
Force	Newton	dyne
Displacement	Metre	cm

Exercise | Q 4 | Page 50

A bird sitting on a wire, flies, circles around and comes back to its perch. Explain the total distance it traversed during its flight and its eventual displacement.

Solution: The total distance travelled by the bird during its flight = 2×(Distance between the point where the bird was sitting and the point from where it takes a turn)

The eventual displacement of the bird is zero as it returns to its initial point i.e. where it was sitting.

Exercise | Q 5.1 | Page 50

Explain the following concept in your own words with everyday examples: Force

Solution: Force: It is any kind of push or pull on a body due to another body when the bodies interact with each other. It is a vector quantity. For example, a person applies a force in the form of push or pull to open a door.

Exercise | Q 5.2 | Page 50

Explain the following concept in your own words with everyday examples: Work

Solution: Work: It is defined as the work done by a force that causes a displacement in an object. It is a scalar quantity. For example, a child does work when he drags a toy car on the ground.

Exercise | Q 5.3 | Page 50

Explain the following concept in your own words with everyday examples: Displacement

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Solution: Displacement: It is the shortest distance between the initial and final position of an object. It is a vector quantity. For example, when we go to a mall for shopping from our house and then return to the house, the displacement would be 0 as our initial position (house) and final position (house) is same.

Exercise | Q 5.4 | Page 50

Explain the following concept in your own words with everyday examples: Velocity
Solution: Velocity: Velocity is defined as the rate of change of displacement. It is a vector quantity. For example, a car running on a straight road has some velocity.

Exercise | Q 5.5 | Page 50

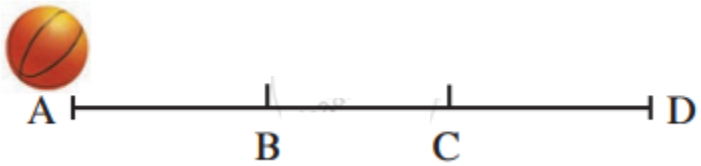
Explain the following concept in your own words with everyday examples: Acceleration
Solution: The rate of change of velocity is known as acceleration. It is a vector quantity. For example, if a car is moving on a straight with variable speed, it will posses some acceleration. In case the speed of the car remains same but the direction of car changes, then also the car would be accelerating.

Exercise | Q 5.6 | Page 50

Explain the following concept in your own words with everyday examples: Distance
Solution: Distance: It is the actual path length covered by an object during its motion. It is a scalar quantity. For example, when we go to a mall for shopping from our house and then return to the house, the distance travelled by us would be twice the distance between our house and the mall.

Exercise | Q 6 | Page 50

A ball is rolling from A to D on a flat and smooth surface. Its speed is 2 cm/s. On reaching B, it was pushed continuously up to C. On reaching D from C, its speed had become 4 cm/s. It took 2 seconds for it to go from B to C. What is the acceleration of the ball as it goes from B to C?



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Solution: The acceleration of the ball between A to B is zero as the speed and direction of the ball is constant. After point B, a force is applied. Thus, the ball will get accelerated.

$$\text{Acceleration of the ball from B to C} = \frac{\text{Change in velocoty from B to C}}{\text{Time taken for this change}}$$

$$\text{Acceleration of the ball from B to C} = \frac{4-2}{2} = 1m/s^2$$

Exercise | Q 7.1 | Page 50

A force of 1000 N was applied to stop a car that was moving with a constant velocity. The car stopped after moving through 10 m. How much is the work done?

Solution: Work done by the force to stop the car = F × S = 1000 × 10 = 10000J

Exercise | Q 7.2 | Page 50

A cart with mass 20 kg went 50 m in a straight line on a plain and smooth road when a force of 2 N was applied to it. How much work was done by the force?

Solution: Work done by the force = F × S = 2 × 50 = 100J

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