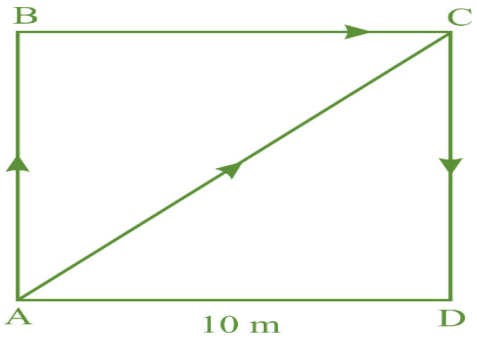
Page 100

Question 1:
An object has moved through a distance. Can it have zero displacement? If yes, support your answer with an example.

Answer 1:
Yes, zero displacement is possible if an object has moved through a distance. Suppose a body is moving in a circular path and starts moving from point A and it returns back at same point A after completing one revolution, then the distance will be equal to its circumference while displacement will be zero.

Question 2:
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 from his initial position?

Answer 2:



Given, side of the square field = 10 m
Therefore, perimeter = 10 m × 4 = 40 m
Farmer moves along the boundary in 40 s
Time = 2 minutes 20 s = 2 × 60 s + 20 s = 140 s
since, in 40 s farmer moves 40 m
Therefore, in 1s distance covered by farmer = 40 ÷ 40 = 1m.
Therefore, in 140s distance covered by farmer = 1 × 140 m = 140 m
Now, number of rotation to cover 140 along the boundary = $\frac{Total\ distance}{Perimeter}$

= 140 m ÷ 40 m = 3.5 round

Thus after 3.5 round farmer will at point C (diagonally opposite to his initial position) of the field.

Therefore, Displacement AC $= \sqrt{10^2 + 10^2} = \sqrt{200} = 10\sqrt{2}$ m

Thus, after 2 minute 20 second the displacement of farmer will be equal to $10\sqrt{2}$ m north east from initial position.

Question 3:
Which of the following is true for displacement?
(a) It cannot be zero.
(b) Its magnitude is greater than the distance travelled by the object.
Answer 3:
None of (a) and (b) are true.