

CLASS - VIII

SUBJECT - PHYSICS

CHAPTER - 2

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Good Morning Students!

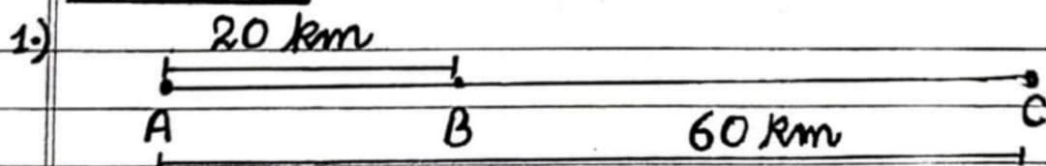
This lesson is of class - VIII, for the subject of 'Physics'. Topic - 'Distance and Displacement' which is covered in Chapter - 2 'Motion in One Dimension', of your Physics Textbook, titled - 'Concise Physics by Selina Publications' and is being submitted to you on _____.

Let us first understand the term DISTANCE.

DISTANCE - The total length of path through which a body moves, is called the distance travelled by that body. The distance travelled by a body depends on the path followed by it.

- Distance is a **SCALAR** quantity.
- S.I unit - meter (m)
- C.G.S unit - centimeter (cm)
- It is denoted by letter 's'.

EXAMPLE:



Suppose, a boy starts his journey from point A and after travelling a distance of 20 km, he had to return back to his original position A and then he again restarts his journey for his destination at point C. The total distance travelled by the boy is:

$$\text{Distance} = 20 + 20 + 60 = 100 \text{ km}$$

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DISPLACEMENT - The shortest distance from the initial to the final position of the body is the magnitude of the displacement and its direction is from initial (starting) position to the final position. It is a **VECTOR** quantity and is being represented by $\vec{r}$. (It is usually referred as position vector).

S.I. unit - metre (m)

C.G.S. unit - centimetre (cm)

EXAMPLE - 1) In the previous example, the displacement done by the boy is 60 km, that is, the distance (shortest) between point A and C.

EXAMPLES FOR CLEARING THE CONCEPT OF DISTANCE AND DISPLACEMENT

1.

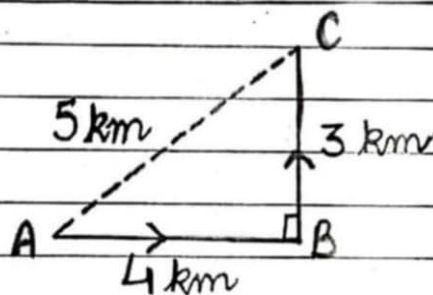


FIGURE-1

In figure - 1, a person moves 4 km in east direction and then he took a turn and travels 3 km North.

If we complete the triangle ABC, then using Pythagoras Theorem:

$$(AC)^2 = (AB)^2 + (BC)^2$$

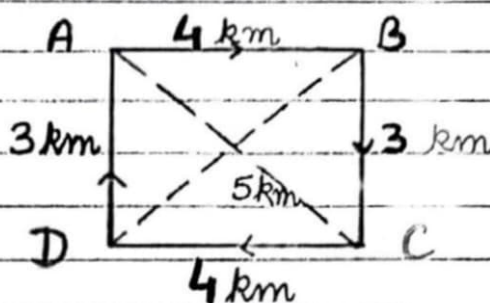
$$(AC)^2 = 4^2 + 3^2 = 16 + 9 = 25$$

$$\text{So, } AC = \sqrt{25} = 5 \text{ km}$$

So, total **DISTANCE** travelled by the person in going from A to B and then from B to C =
 $(3 + 4) \text{ km} = 7 \text{ km}$

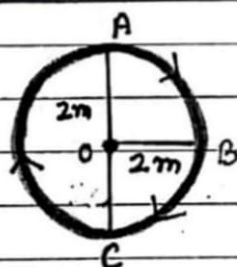
DISPLACEMENT between final and initial position = 5 km

FIGURE - 2



PERSON IS TRAVELLING		DISTANCE TRAVELLED	TOTAL DISPLACEMENT
FROM	TO		
A	B	4 km	4 km
A	C	$4+3 = 7$ km	5 km
A	D	$4+3+4 = 11$ km	3 km
A	A	$4+3+4+3 = 14$ km	0 km
B	D	$3+4 = 7$ km	5 km
C	D	4 km	4 km
C	A	$4+3 = 7$ km	5 km

FIGURE - 3



Case-1 - If a person starts from point A and reaches back at a point A, while moving in a circular track of radius 2m, then
Distance travelled = circumference of circular track
 $= 2\pi r = 2 \times 3.14 \times 2 \text{ m}$

Thus, Distance $= \frac{88}{7} = 12.57 \text{ m}$

Displacement $= 0 \text{ m}$

(as the shortest distance between starting and final position is 0m).

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CASE-2 - If the object starts from point A and stops at point C, then:

$$a) \text{ Distance travelled} = \frac{1}{2} \times \text{Circumference of complete circle}$$

$$= \frac{1}{2} \times 2 \times \frac{22}{7} \times 2 = \frac{44}{7} \text{ m}$$

$$\text{Distance travelled} = 6.286 \text{ m}$$

b) Displacement done is shortest distance between initial point A and final point C, thus

$$\text{Displacement} = \text{diameter of circle} = AO + OC$$

$$\text{Displacement} = 2 + 2 = 4 \text{ m}$$

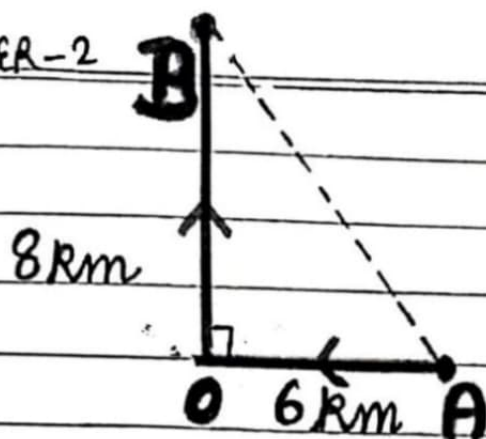
NOTE - ① It is to be observed that displacement can never be greater than distance. It can have value equal to or less than distance.

② **ODOMETER (or, ODOGRAPH)** is an instrument used for measuring the distance travelled by a vehicle.

Students, now I will be asking a question. You all are required to solve the question in your Physics notebook.

Q1. A person travelled a distance of 6 km towards West, then he took a turn towards North and travels 8 km further before taking a halt. Draw a diagram for this situation and hence find the total distance travelled as well as the displacement done by the person from his initial position to final position.

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Distance travelled from A to B = $(6+8)$ km = **14 km**

Displacement = shortest distance (AB)

In $\triangle AOB$, applying Pythagoras Theorem:

$$(AB)^2 = (AO)^2 + (OB)^2$$

$$= 6^2 + 8^2 = 36 + 64$$

$$(AB)^2 = 100$$

$$AB = \sqrt{100} = 10 \text{ km}$$

Thus, displacement = 10 km

With this I come to an end to this interactive session. You all are required to go through the given pdf again and then write down the answers of the tick marked questions of Exercise-2(A).

THANK YOU

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