

CSIR-NET General Aptitude: (Concept of Direction Sense Test)

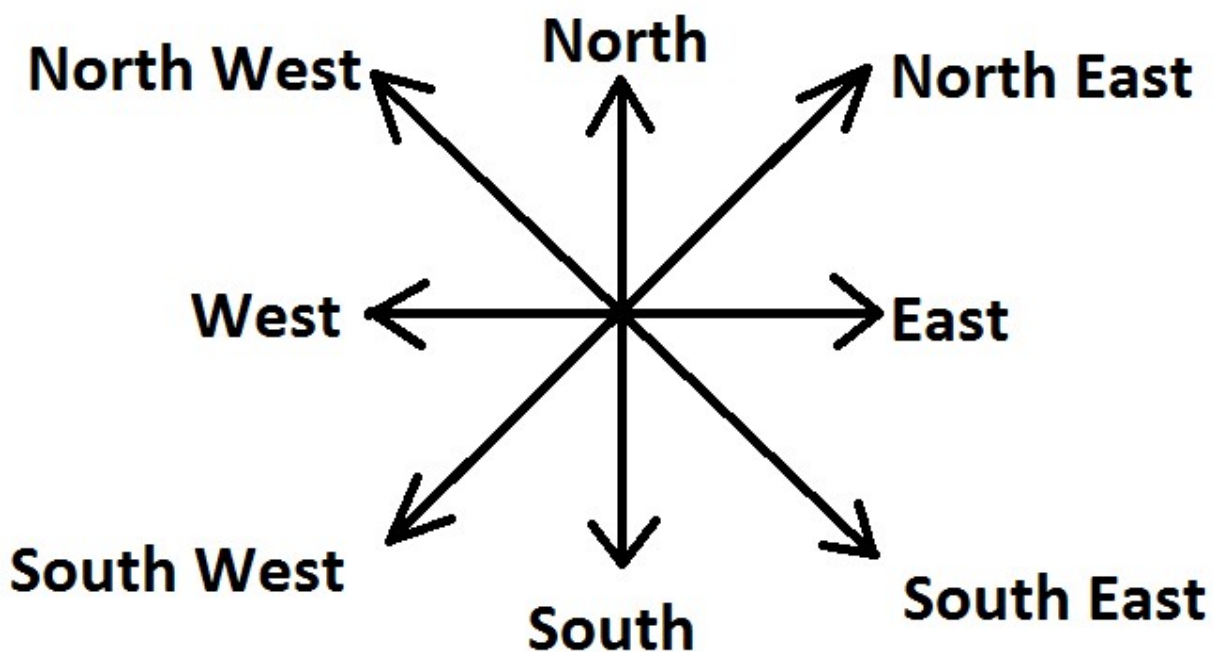


Direction Sense Test

As the name of the topic clearly explains, we deal with finding distance or direction in the questions of this topic. But for dealing with the questions from this topic, we must have an obvious idea about two things.

- Basic Directions
- Pythagoras theorem

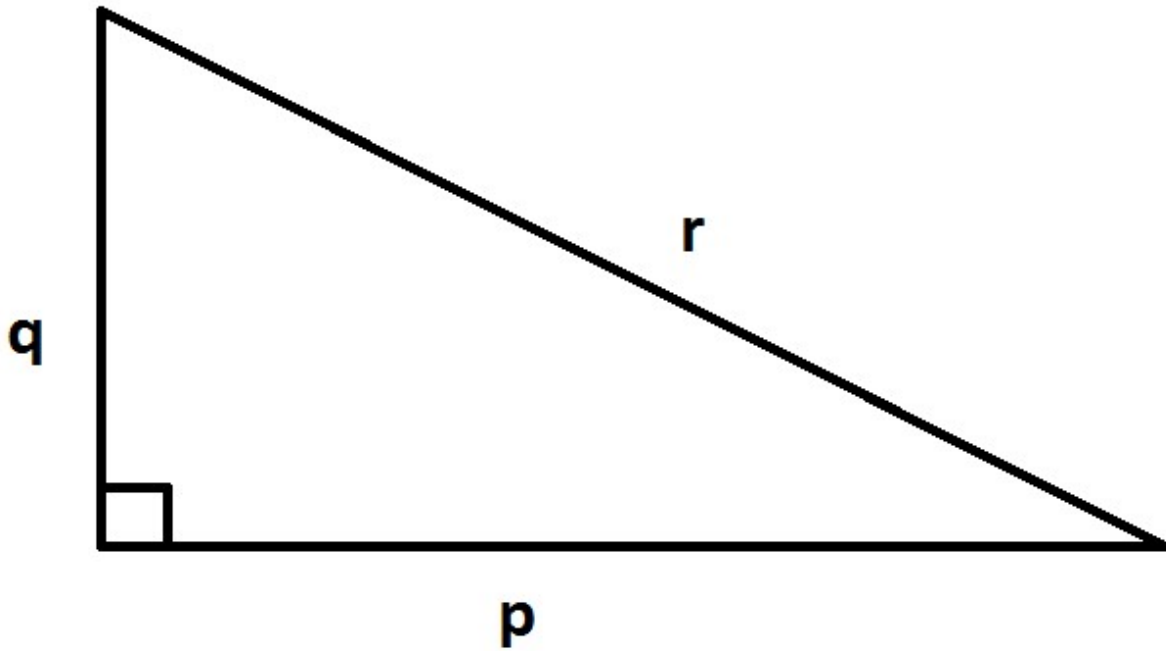
1. Basic Directions: We have eight basic directions, which should be crystal clear for attempting distance and direction questions.



One key point that should be kept in mind is that we always assume that the person is **facing north** if not mentioned.

2. Pythagoras theorem: According to this theorem, "The square of Hypotenuse is always equal to the sum of the squares of the other two sides of the right angle triangle".

Suppose we have a triangle having base p , height q and hypotenuse r . Then according to this theorem:

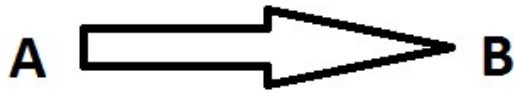


$$p^2+q^2=r^2$$

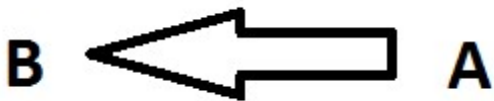
Now you have the basics required to attempt Distance & Direction questions. So let us try to look at a few questions on the same to get to know the proper approach to solve these questions.

Some other basics:

1. B is to the east of A.



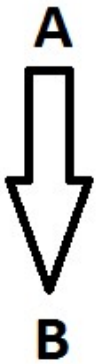
2. B is to the west of A.



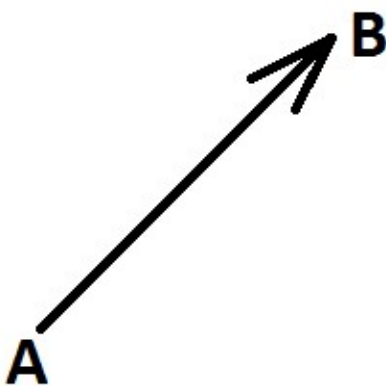
3. B is to the north of A.



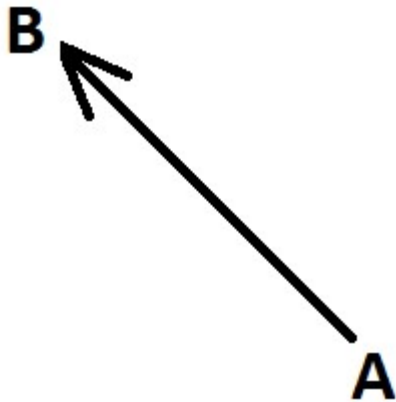
4. B is to the south of A.



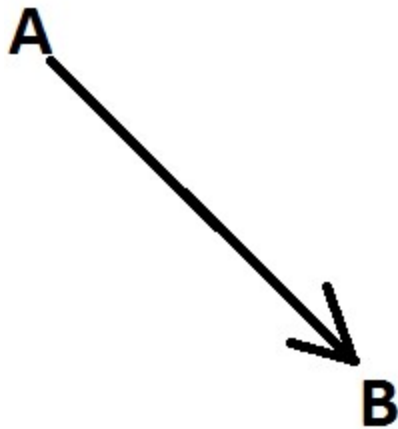
5. B is to the North East of A.



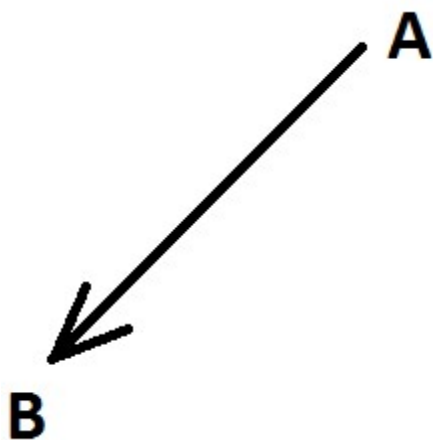
6. B is to the North West of A.



7. B is to the South East of A.



8. B is to the South West of A.



Direction: Ashok started walking towards the South. After walking 50 meters, he took a right turn and walked 30 meters. He then took a right turn and walked 100 meters. He

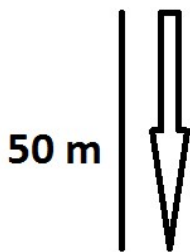
then took a left turn and walked 30 meters, and stopped. How far and in which direction was he from the starting point?

Solution:

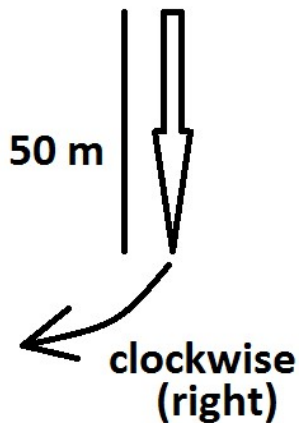
Ashok started walking towards the south.



After walking 50 meters...

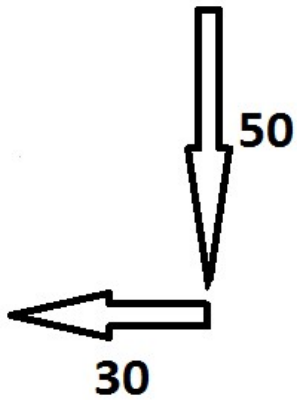


..he took a right turn...

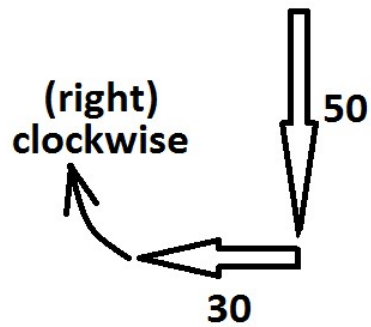


Some people have doubt in deciding left or right in direction questions; they can replace **right by clockwise** and **left by anticlockwise**. So now moving right (clockwise) from the tip of the arrow.

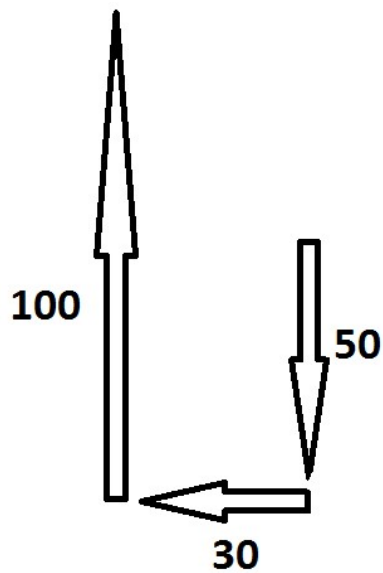
...and walked 30 meters.



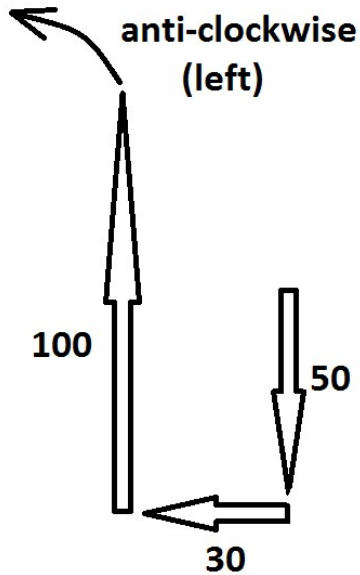
He took a right turn...



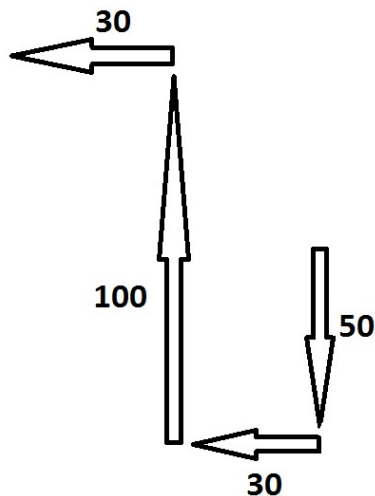
...and walked 100 meters.



He took a left turn...



...and walked 30 meters.



Now for finding how far he has moved, we will check two things:

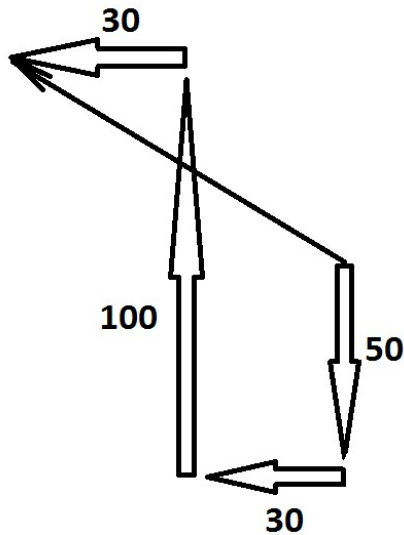
- Horizontal displacement
- Vertical displacement

Horizontal displacement = $30+30 = 60\text{m}$

Vertical displacement = $100-50 = 50\text{m}$

Final displacement = $\sqrt{(60^2+50^2)} = \sqrt{(3600+2500)} = \sqrt{6100} = 10\sqrt{61} \text{ m}$

Now for finding the direction with reference to initial position, we will draw a line joining two points which will give us the direction.



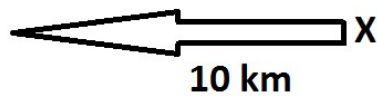
We can clearly see that the direction in which Ashok moved is **northwest**.

So the final answer for this question will be “Ashok moved $10\sqrt{61}$ meters in northwest direction”.

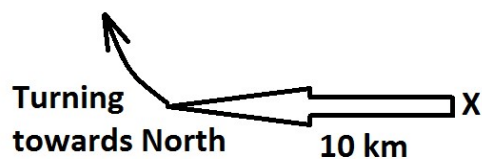
Directions: Jay starts his van from point X and covers a distance of 10 km towards west, then he turns north and covers a distance of 7 km. Again, he takes a right turn and covers 25 km. Now he covers 6 km, after taking a left turn. At last, he takes a left turn and covers 15 km and stops at point Z.

Solution:

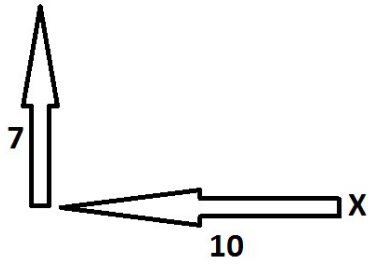
Jay starts his van from point X and covers a distance of 10 km towards west



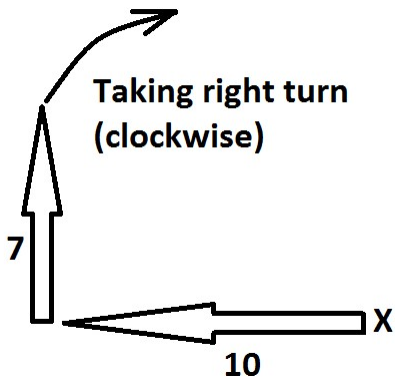
then he turns north



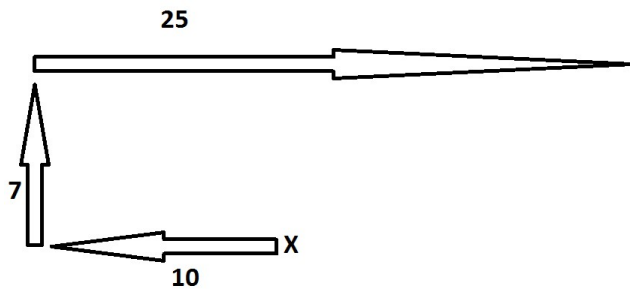
and covers a distance of 7 km



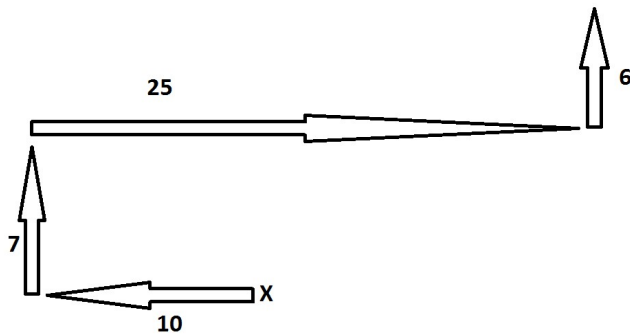
Again, he takes a right turn



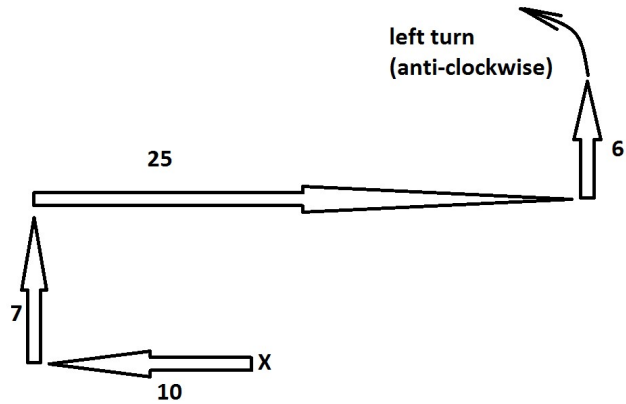
...and covers 25 km



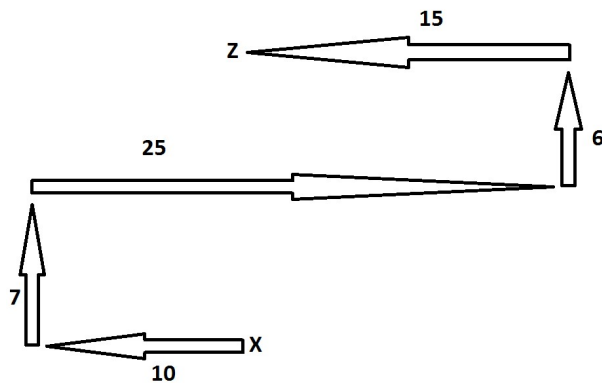
Now he covers 6 km, after taking a left turn.



At last, he takes a left turn...



...and covers 15 km and stops at point Z.



Q. Towards which direction was the van running before stopping at point Z?

- 1. North
- 2. East
- 3. West
- 4. South
- 5. None of these

Solution: We can clearly see that van was running towards the west before stopping at point Z.

So the correct answer is C.

Q. How far is Jay from point X?

- 1. 23 km
- 2. 25 km
- 3. 17 km
- 4. 50 km
- 5. None of these

Soution:

Horizontal movement = $10 - 25 + 15 = 0$ kms

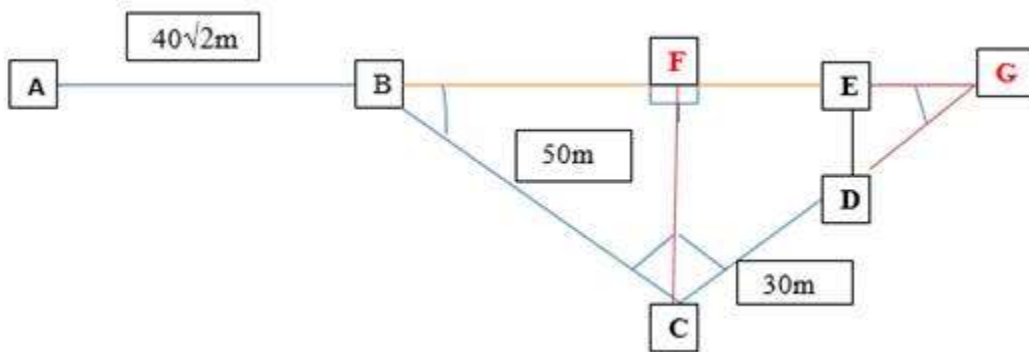
Vertical movement = $7 + 6 = 13$ km

So final movement = $\sqrt{(0^2 + 13^2)} = \sqrt{169} = 13$ km

Direction of movement is North.

Question - Point B is $40\sqrt{2}$ m to the East of point A. Point C is 50m in the direction, which is 225 degree anticlockwise north of point B. Point D is 30m to the North-East of point C. Rahul started from point A, after crossing point B reaches to point E in the east of point A. He took a right turn and after walking some distance he reaches to point D. find the total distance travelled by him?

Solution - Let us first draw some lines and take points, F and G such that Line CF is perpendicular to BE and also line DG is the extension of line CD, which meets at G when BE line is extended in east direction of point E.



The required length is $AB + BE + ED$, we know the length of AB that is 40m. We are required to find BE and ED.

For BE and ED:-

In triangle BCG, Angle C is 90 degree, angle B and G are of 45 degrees, and the total length of line CG must be 50m (symmetry).

$$BG^2 = BC^2 + CG^2 \text{ (PT theorem)}$$

$$BG^2 = 50^2 + 50^2 = 2 \cdot 50^2$$

$$BG = 50\sqrt{2}$$

$$\text{Length of DG} = CG - CD = 50 - 30 = 20\text{m.}$$

In triangle DEG

$$DE/DG = \sin 45$$

$$DE/20 = 1/\sqrt{2}, DE = 20/\sqrt{2} = 10\sqrt{2}$$

$$EG/DG = \cos 45$$

$$EG/20 = 1/\sqrt{2}, EG = 20/\sqrt{2} = 10\sqrt{2}$$

$$\text{The length BE} = BG - EG = 50\sqrt{2} - 10\sqrt{2} = 40\sqrt{2}$$

$$\text{Total Distance covered by him} = AB + BE + ED = 40\sqrt{2} + 40\sqrt{2} + 10\sqrt{2} = 90\sqrt{2}$$

Shadow Based Concepts of Direction Sense

In Morning (During Sunrise)

The sun rises in East direction. At the time of the sunrise/ morning, if a man is standing, the shadow of a man always falls on West.

In Evening (During Sunset)

The sun rises in the West direction. At the time of the sunset/ evening, if a man is standing, the shadow of a man always falls on East.

At 12'o clock

There is no shadow at this time. At this time, the sun is exactly above our head, so no shadow is formed at 12'o clock.

Question: One morning, Sonu and Akhil were standing to face each other. Sonu's shadow fell towards his right. Which direction was Akhil facing?

Solution - In the morning the sun is in the East so the shadow will form in the West. Thus, Sonu's right is west i.e Sonu is facing south. Hence, Akhil is facing north.

Key points related to Distance & Direction

- Always remember the **basic directions**.
- Pythagoras theorem is valid only for a **right angle triangle**.
- **The direction of the right turn is always in the clockwise direction.**
- The direction of the left turn is always in an anti-clockwise direction.
- The direction of the North is to the upwards side.
- **The Direction of East is to the right.**
- **The direction of the West is to left.**
- Always approach the question **step by step**.
- In the End, **join the initial and final point** to get to know the distance and relative direction.
- If in any of the questions, **the relative direction** is given. i.e. P is to the north of Q, then you can use the basic directions to get the location of P and Q.