Distance and Direction

Distance and Direction are part of logical reasoning. It is one of the most commonly found topics in almost all the entrance exams. The topic requires analytical and logical skills to solve the questions. Mastering the directions topic will help in gaining the expertise in seating arrangement.

What is the Direction?

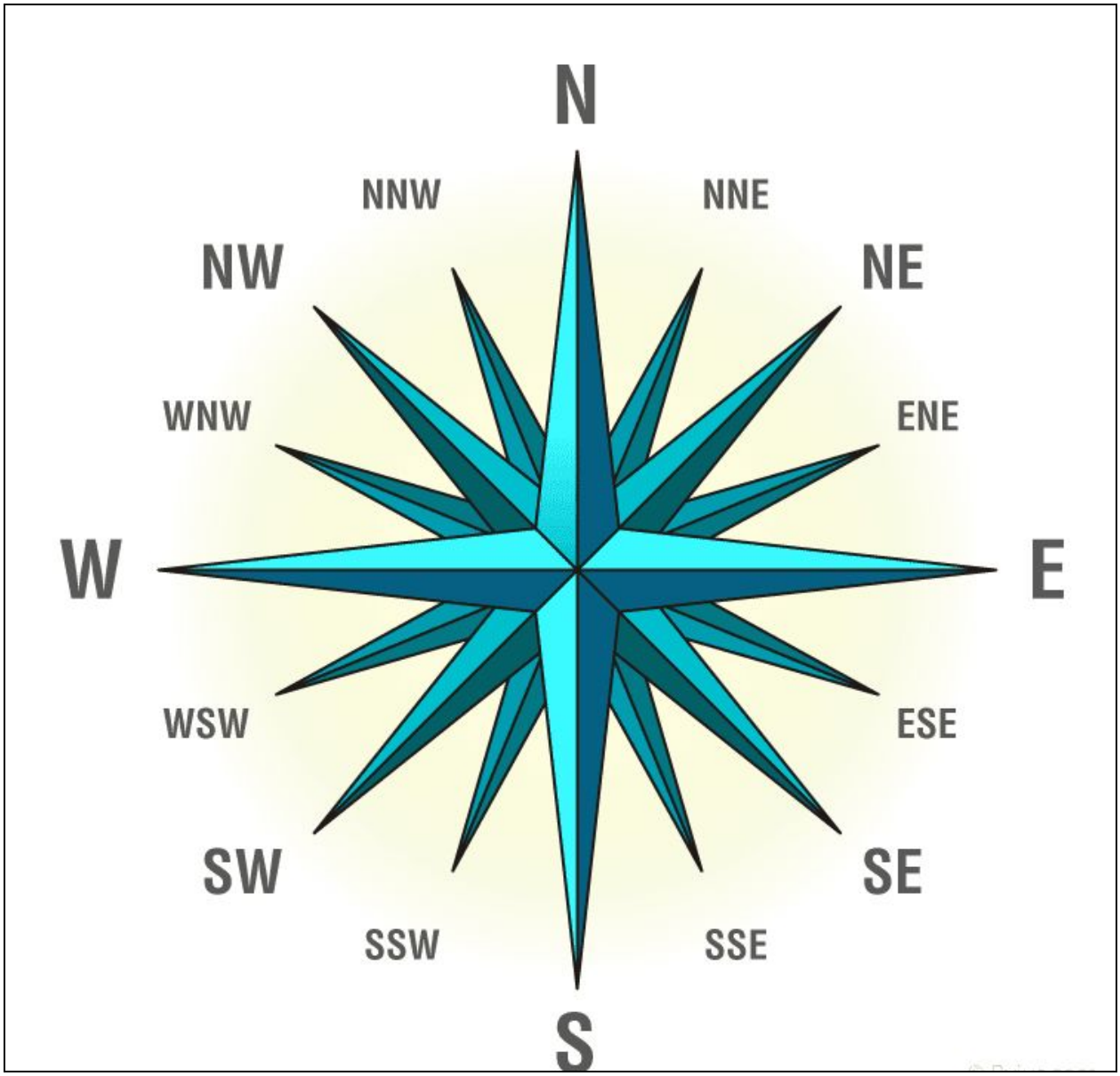
The direction is the information contained in the relative position of one point with respect to another point without the distance information. Directions may be either relative to some indicated reference or absolute according to some previously agreed upon frame of reference.

Cardinal directions

The four cardinal directions or cardinal points are:

1. North
2. East
3. South
4. West

These directions are commonly denoted by their initials: N, E, S, W. East and west are at right angles to north and south, with east being in the clockwise direction of rotation from north and west being directly opposite east.


N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S

Representation of all 16 cardinal directions

The intermediate directions of the four cardinal directions are:

Cardinal directions	
1	North – West
2	North – East
3	South – West
4	South – East

The intermediate directions are further classified as:

Intermediate directions	
North-North-West	West-North-West
North-North- East	East -North-East
South-South-West	West-South-West
South-South-East	East-South-East

Topics:

1. The right and left directional movement
2. The directional reference point
3. The directions of sun rays and shadow
4. The correct map v/s wrong map
5. Directions in Clocks
6. Directions in Seating arrangement

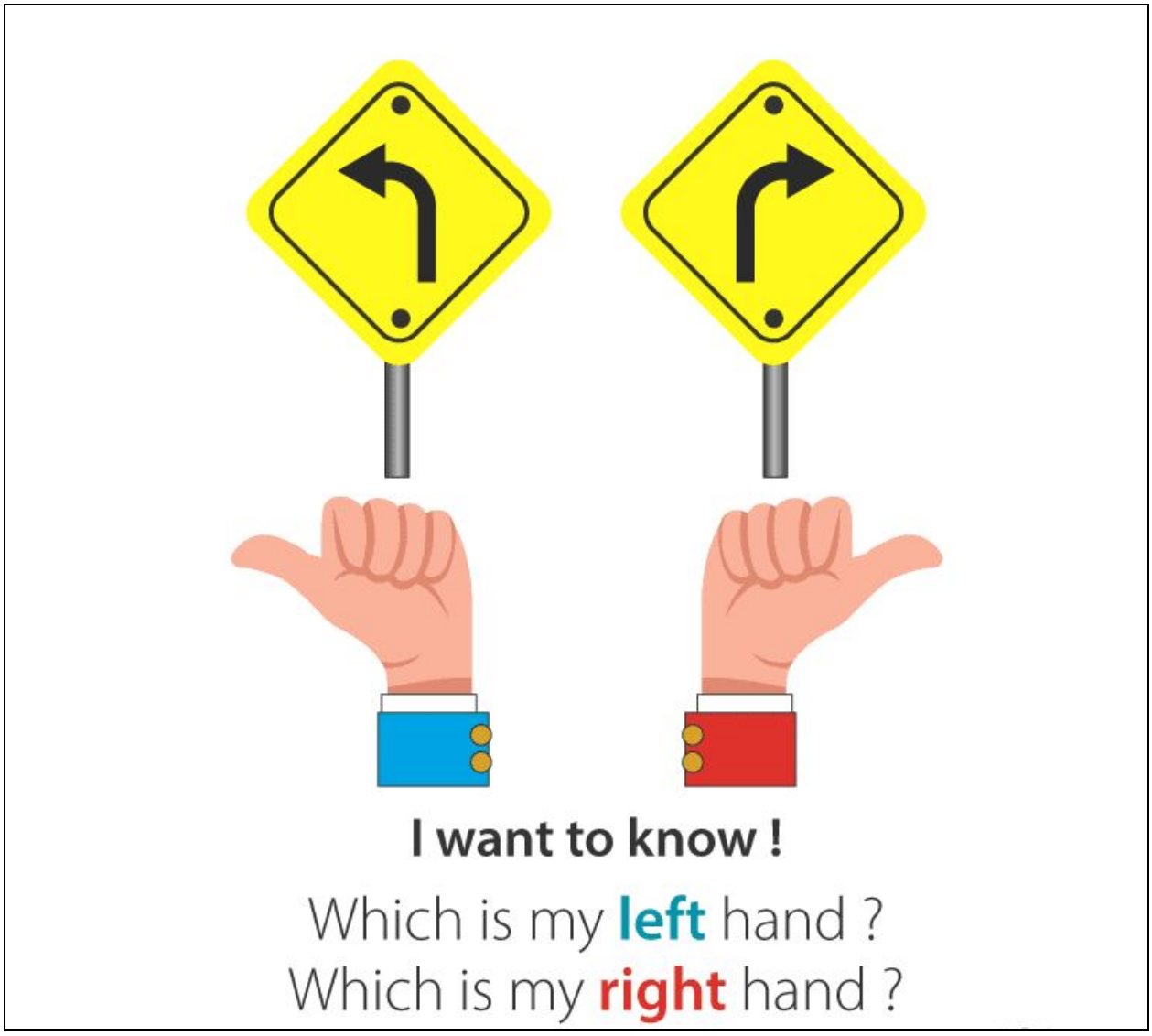
Assumptions:

Throughout the directions topic, the direction of the top of the page is always considered as North unless specified in the question.

Ex: The direction a person is facing at a present movement is always taken as north for convenience and thereby making the approach to solve the problem easier.

Topic 1: The Right and Left directional movement

The right and left movement of a person is always with reference to the body moving in the scenario. It is not with respect to the person who is solving the questions.



Right and left directions

Direct yourself

A person is walking towards you, and after walking for a few meters he takes a right turn. Which direction he is moving?

Solution: The direction we are facing is always assumed as North. Hence, if a person is walking towards us. He is walking facing(towards) South.

Example 1:

Mr Deepak Mohan walks 5 km towards the south and then turns to the right. After walking 3 km he turns to the left and walks 5 km. What direction is he facing right now?

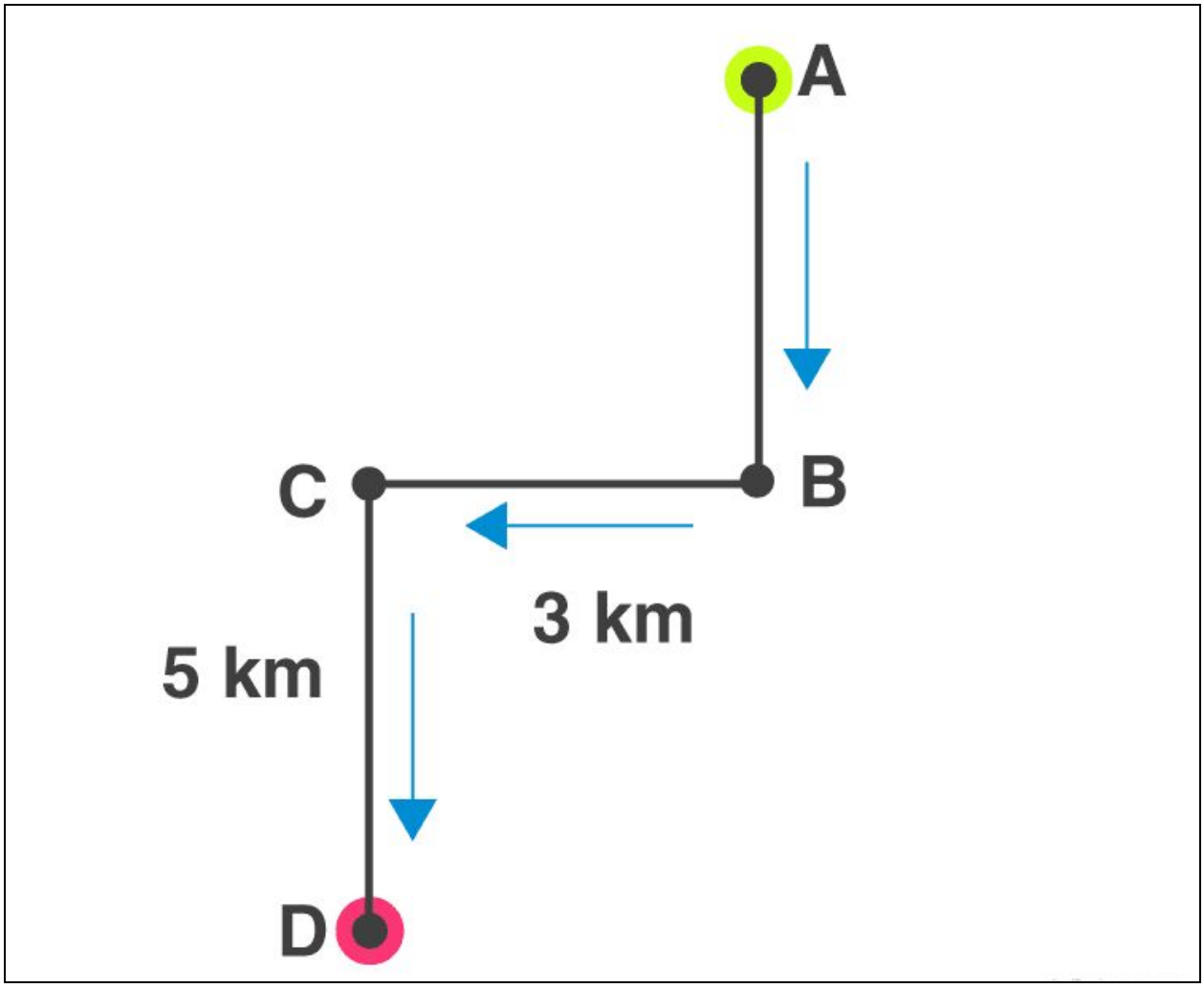
A.West

B.South

C.North-East

D.South-West

Solution:


A
B
C
D
3 km
5 km

The path traced by Deepak Mohan

The right and left movement are with respect to Mr Deepak Mohan. After walking 5 km towards South, he takes a right turn and now will be facing West. After walking 3 more km he turns left and walks 5 more km. Now he is facing the South.

Hence, the answer is option B.

Example 2:

Sowmya Krishnan walked 20 m towards the north. Then she turned right and walks 30 m. Then she turns right and walks 35 m. Then she turns left and walks 15 m. Finally she turns left and walks 15 m. In which direction and how many meters is she from the starting position?

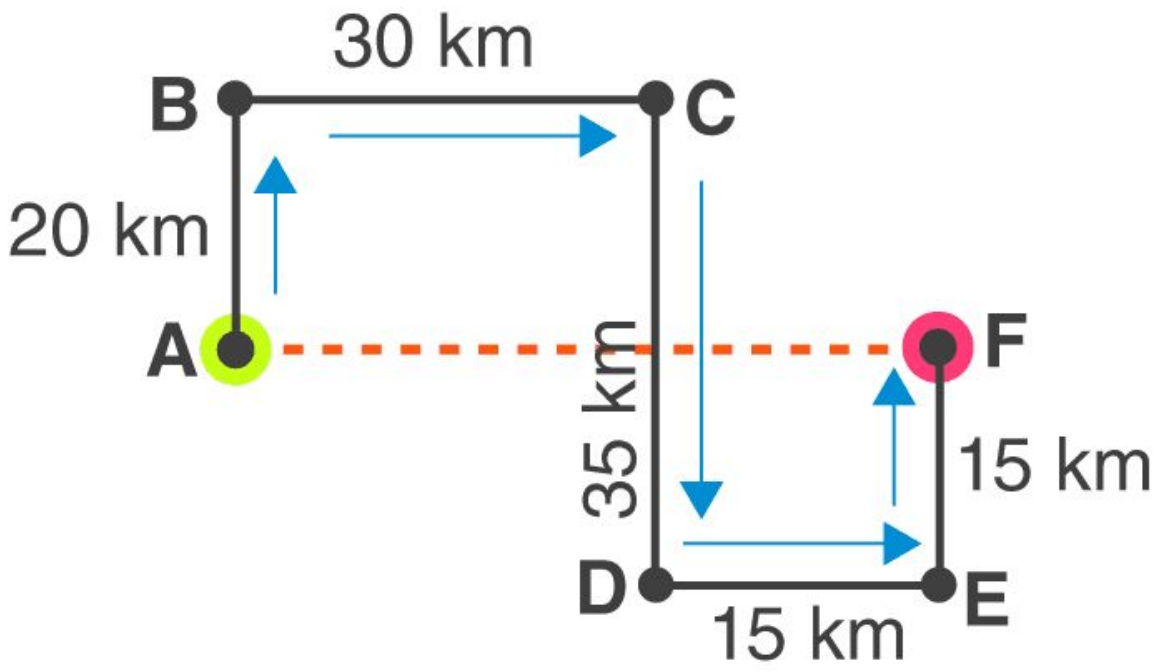
A.15 m West

B.30 m East

C.30 m West

D.45 m East

Solution:



Required distance = AF

= 30 + 15

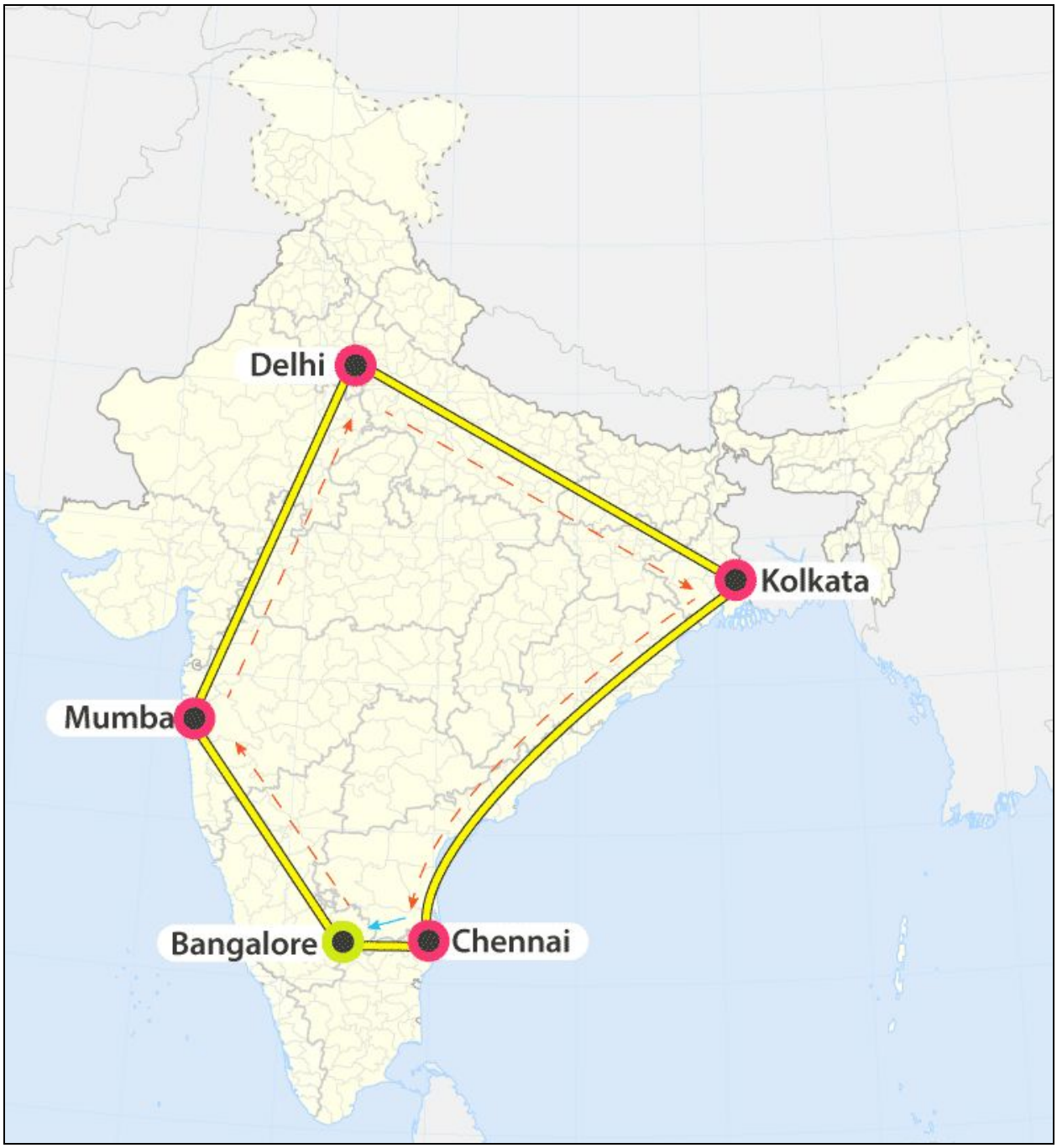
= 45m

From the above diagram, **F** is in East direction from **A**, Hence the required answer is **45m East**

The path traced by Sowmya Krishnan

Topic 2: The directional reference point

Observe the five cities on the map shown below. The five cities are New Delhi, Mumbai, Bengaluru, Chennai, and Kolkata.



The directional reference point of five cities

The city Bengaluru is exactly below New Delhi, Hence Bengaluru is in South direction with respect to New Delhi whereas it is in West direction with respect to Chennai.

Mumbai is in North West direction with respect to Bengaluru whereas Bengaluru is in South-East direction with respect to Mumbai. One should draw a cardinal direction at a reference city/place to find the direction of the other city.

Example 3:

Mrs.Veena wants to go to the Krishna Rajendra market. She moved northwards and after covering some distance turned left and moved 4 km and reached a crossing. The road in front of her led to Jaynagar while the road on to her left led to Bangalore Medical College and the road on to her right led to the Krishna Rajendra market. In which direction the Krishna Rajendra market is located with reference to the starting point?

A. West

B. North-West

C. South-West

D. East

Solution:

The diagram represents the path followed by Mrs Veena. According to the diagram the Krishna Rajendra market is in North – West Direction with respect to the starting point. Hence, option B is the correct answer.

Topic 3: The directions of sun rays and shadow

A boy is playing with a skipping rope in the playground and is facing North in the morning then, he observes that his shadow was towards his left as the Sun appeared in the East. The boy turned 180 degrees while playing, he is facing South now. His own shadow will be towards his right as the Sun is in the east.

Sunrise/sunset and the shadow

He does this every day once in the morning and evening. He plays facing south and observed that his shadow was towards his left and then turns and faces North he observed that his shadow was towards his right. The direction of one's shadow depends on the direction and time she/he is facing.

The table below summarises the relation of shadow with respect to the direction and time:

Direction v/s Time	Morning	Evening
North	Left	Right
South	Right	Left

Example 4:

One morning after sunrise, Nandita and Ravi were sitting in a lawn with their backs towards each other. Nandita's shadow fell exactly towards her left-hand side. Which direction was Ravi facing?

A. East

B. West

C. North

D. South

Solution:

Since it was morning and Nandita's shadow fell exactly to her left-hand side, Nandita was facing North and hence Ravi should be facing South. Hence the answer is option D.

Topic 4: Correct map v/s Wrong map

This section involves the comparison of two maps among which one is definitely wrong. One has to find the correct direction in the wrong map by applying logical analysis.

Example 5:

At a crossing, there was a direction pole, which was showing all the four correct directions. But due to the wind, it turns in such a manner that now West pointer is showing South. Harish went in the wrong direction thinking that he was travelling East. In what direction he was actually travelling?

A. South

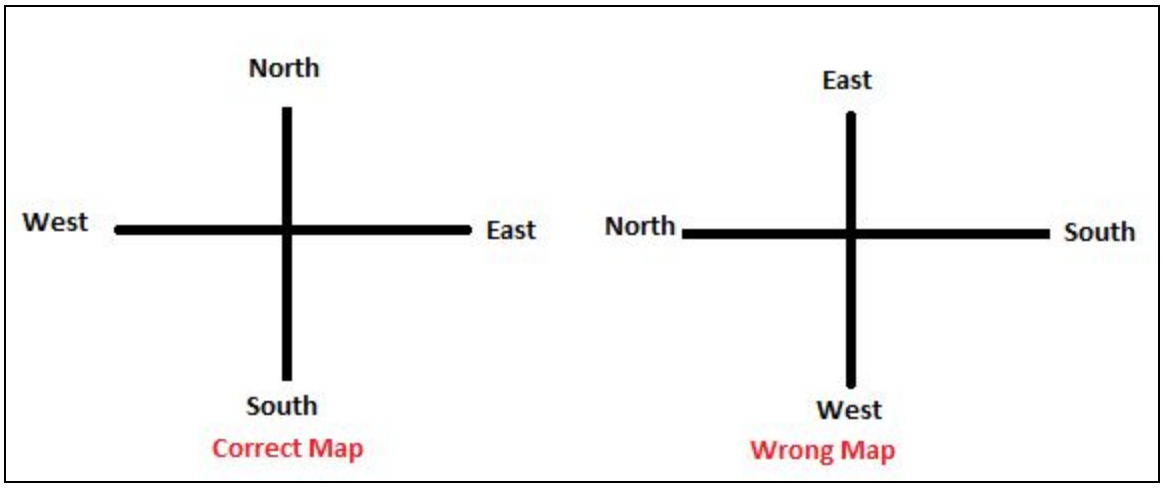
B. North

C. West

D. East

Solution:

The correct answer is option B, i.e., North.

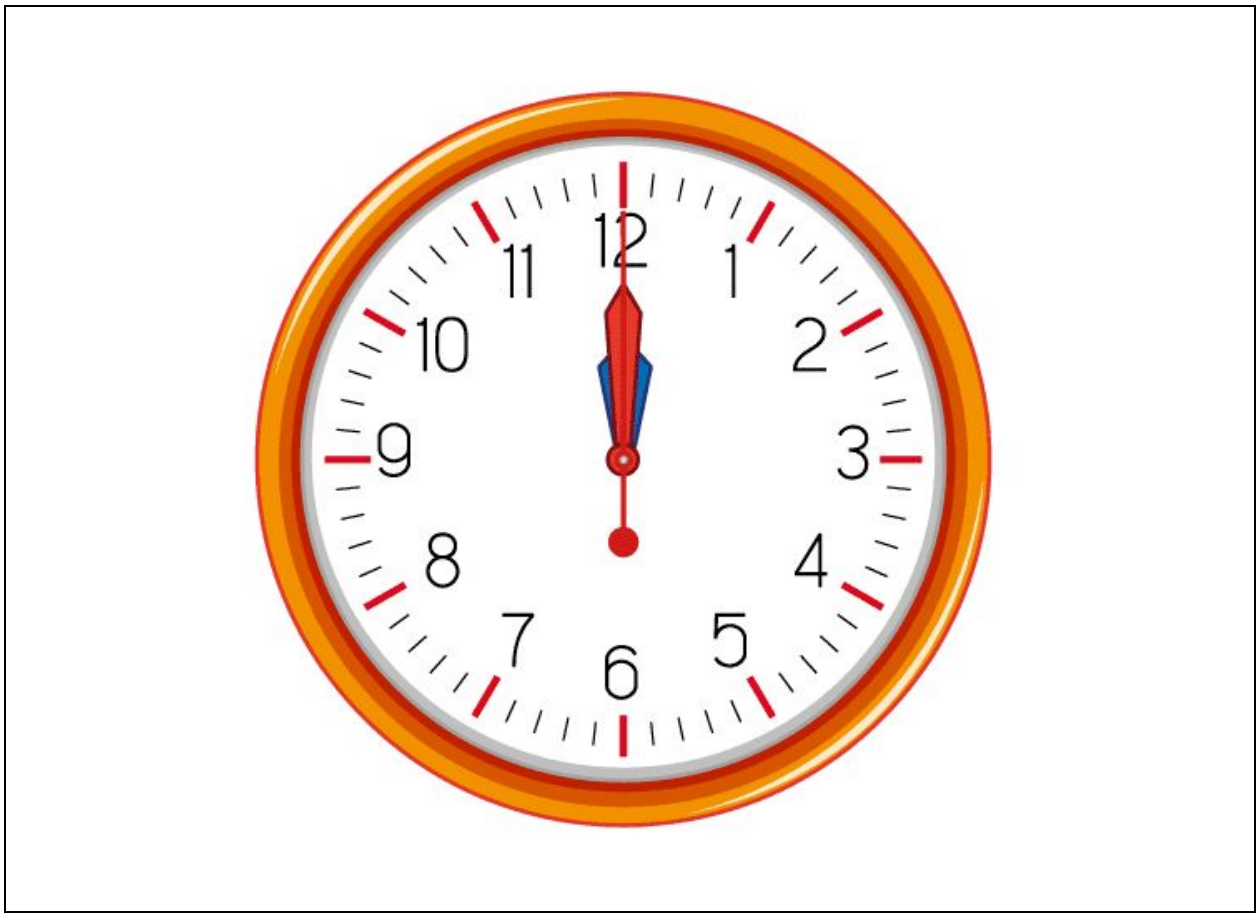


Topic 5: Directions in Clocks

All the pirates and travellers during the 16th and 17th Centuries used the compass as a navigation device which helped them in the discovery of the land that was unknown to mankind. The clocks were lacking the directional information as the main task of the clock was just to tell the time.

Adding the directions to the clock paved the way to the invention of many ideas in the future. The direction at which the number ‘12’ exists was considered as the North for the reference. And all the remaining directions were marked accordingly. Hence, the numbers ‘3’, ‘6’ and ‘9’ was considered to be at East, South, and West respectively.

North



South

Pictorial representation of clocks with all the directions

Example 6:

A clock is so placed that at 2:00 p.m. the minute hand points towards North-west. In which direction does the hour hand point at 6:00 p.m.?

A. North-West

B. West

C. North-East

D. South-East

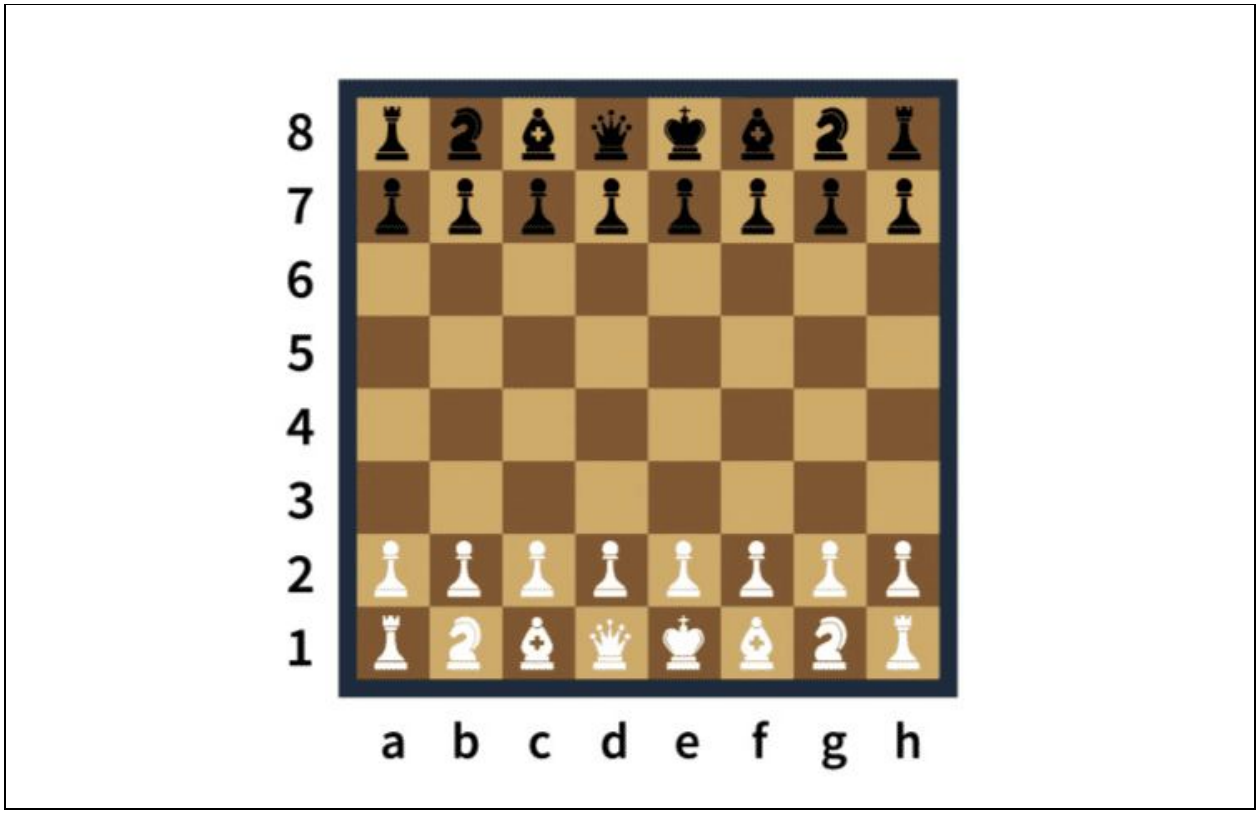
Solution:

If the Minute hand is 12 which is North-West, then at 6.00 p.m. the hour hand will be pointing at the number 6. Since the number 12 and 6 are exactly the opposite. The opposite of North-West should be South-East. Hence option D is the correct answer.

Topic 6: Directions in board games

In this section, the directional concepts are applied to the popular board games like Chess and Carrom board or Snake and ladder to solve the questions.

Example 7:



General placement of the chessboard

A chess piece undergoes following motion during the game. It starts from D-8, and reaches H-5, from there it reaches A-3, finally, it moves to the position H-8 and dies. In what direction the piece was when it died if chess board is assumed to be placed in front of you?

Solution:

The H-8 is the position where the chess piece died. If the chessboard is assumed to be placed in front of us, then the position H-8 will lie in between North and east. Hence the answer is North-East.

Example 8:

General placement of carrom board

P, Q, R, and S are playing a game of carrom. P, R, and S, Q are partners. S is to the right of R who is facing west. Then Q is facing?

A. North

B. South

C. East

D. West

Solution:

Since R is facing West and P is the partner of R P is facing East. Also, S is to the right of R, so S will be facing South and Q is the partner of S. Therefore Q will face North. Hence, option A is the correct answer.

Topic 7: Directions of Seating arrangement

This section involves the combination of directional logics with the seating arrangement.

Example 9:

J,K,L,M,N,O,P and R are eight huts. L is 2 km east of K. J is 1 km north of K and Q is 2 km south of J. P is 1 km west of Q while M is 3 km east of P and O is 2 km north of P. R is situated right in the middle of K and L while N is just in the middle of Q and M.

Distance between K and P is

A. 1.0km

B. 1.23 km

C. 1.41 km

D. 1.5 km

Solution:

Since K and p forms the diagonal of the right angle triangle KQP the distance between KP is 1.41 km. Hence, option C is the correct answer.

Distance between K and R is:

A. 1.41 km

B. 3 km

C. 2 km

D. 1 km

Solution:

Since R is in the middle of K and L which are 2 km apart. The distance between K and r is 1km. Hence, option D is the correct answer.

Q.10. Sohan walks 10 km towards North. From there he walks 6 Km towards South. Then, he walks 3 Km towards east. How far and in which direction is he with reference to his starting point?

(A) 5 Km North

(B) 5 Km South

(C) 5 Km East

(D) 5 Km North-East

Answer

Ans . D

Q.11. Two motorcycles start from the opposite places of a main road, 150 km apart. The first motorcycle runs for 25 km and takes a right turn and then runs 15 km. It then turns left and then runs for another 25 km and then takes the direction back to reach the main road. In the meantime, due to minor break down the other motorcycle has run only 35 km along the main road. What would be the distance between two motorcycles at this point?

(A) 65 km

(B) 75 km

(C) 80 km

(D) 85 km

Answer Ans . A

Q.12. Rishabh walks 20 metres towards North. He then turns left and walks 40 metres. He again turns left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his original position?

(A) 40 metres

(B) 50 metres

(C) 60 metres

(D) 70 metres

Answer

Ans . C

Q.13. Ram walked 20 m towards north. Then he turned right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Finally, he turns left and walks 15 m. In which direction and how many metres is he from the starting position?

(A) 15 m West

(B) 30 m East

(C) 30 m West

(D) 45 m East

Answer Ans . D

Q.14. A Cat runs 20 metre towards East and turns Right, runs 10 metre and turns to right, runs 9 metre and again turns to left, runs 5 metre and then turns to left, runs 12 metre and finally turns to left and runs 6 metre. Now which direction Cat is facing?

(A) East

(B) North

(C) West

(D) South

Answer

Ans . B

Q.15. Ram is 40 m South-West of Shyam. If Ashok is 40 m South-East of Shyam, then Ashok is in which direction of Ram?

(A) East

(B) West

(C) North-East

(D) South

Answer

Ans . A

Q.16. Ramlal walked 25 metres towards South. Then he turned to his left and walked 20 metres. He then turned to his left and walked 25 metres. He again turned to his right and walked 15 metres. At what distance is he from the starting point and in which direction?

(A) 35 metre, North

(B) 30 metre, South

(C) 35 metre, East

(D) 30 metre, North

Answer

Ans . C

Q.17. Mohan is facing north-west. He turns 90o in the clockwise direction, then 180o in the anticlockwise direction and then another 90o in the same direction. Which direction is he facing now?

(A) South

(B) South-west

(C) South-east

(D) East

Answer

Ans . C

Q.18. Sita goes towards East 5 km then she takes a turn to South-West and goes 5 km. She again takes a turn towards North-West and goes 5 km with respect to the point from where she started, where is she now ?

(A) In the South-West

(B) In the North-West

(C) In the East

(D) At the starting Point

Answer

Ans . D

Q.19. Sandeep put his timepiece on the table in such a way that at 6 P.M. hour hand points to North. In which direction the minute hand will point at 9.15 P.M.?

(A) South-East

(B) South

(C) North

(D) West

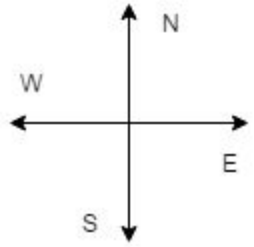
Answer Ans . D

Direction

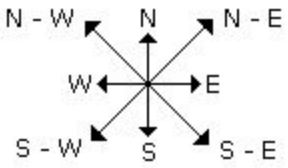
This type of reasoning question is intended to test a candidate's ability to determine the direction of a person or any other object relative to some point, object, etc. You can draw a diagram based on the data provided to solve such questions.

Points to remember:

1. There are four cardinal directions; East, West, North, and South as shown in the following image.



2. The cardinal directions are divided into four primary inter-cardinal directions; Northeast, Southeast, Southwest, and Northwest as shown in the following image.



3. At the time of sunrise, if a man stands facing the East, his shadow will form to the west.

4. At the time of sunrise, if a man stands facing the North, his shadow will form to his left.

5. At the time of sunrise, if a man stands facing the South, the shadow will form to his right.

6. At the time of sunrise, if a man stands facing the West, the shadow will form to the West.

7. At the time of sunset, if a man stands facing the North, his shadow will form to his right.

8. At the time of sunset, if a man stands facing the East, his shadow will form to the East.

9. At the time of sunset, if a man stands facing the sun, towards West, his shadow will form to the East.

10. At the time of sunset, if a man stands facing the South, his shadow will form to his left.

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1) Peter is in the East of Tom and Tom is in the North of John. Mike is in the South of John then in which direction of Peter is Mike?

A. South-East

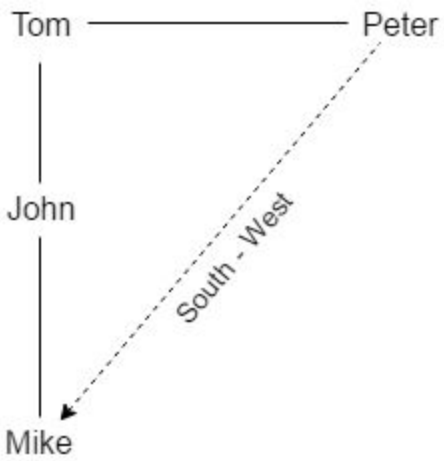
B. South-West

C. South

D. North-East

Answer: B

Explanation:



2) Mukesh walks 6 km toward the South and then walks 3 km to his left. Finally, he turns to his right and walks 6 km. In which direction is he from the starting point?

A. South

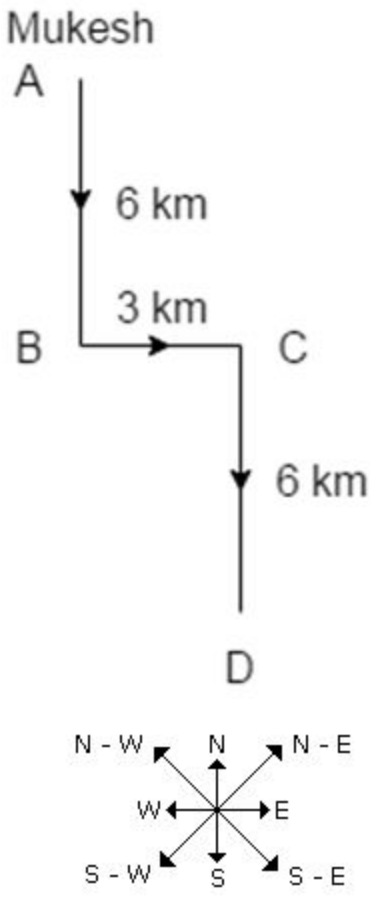
B. South-West

C. South-East

D. West

Answer: C

Explanation:



3) Deepak placed his watch on the table in such a way that at 6 pm the hour hand points to the South. In which direction the minute hand will point at 9 pm?

A. North

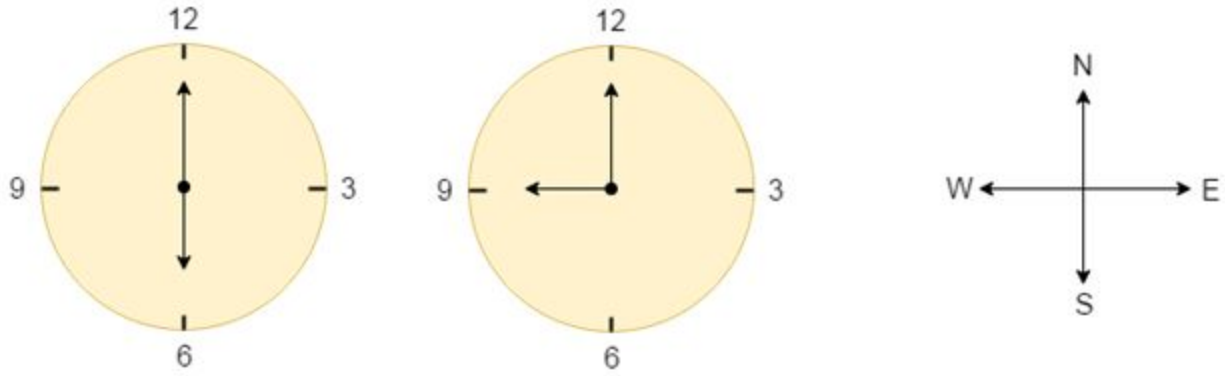
B. West

C. South

D. East

Answer: A

Explanation:



4) Tom walked 10 m towards north then turned right and walked 25 m. Then he turned right and walked 30 m. Now he turned left and walked 10 m. Finally, he turned left and walked 20 m. How far and in which direction is he from the starting point?

A. 50 m East

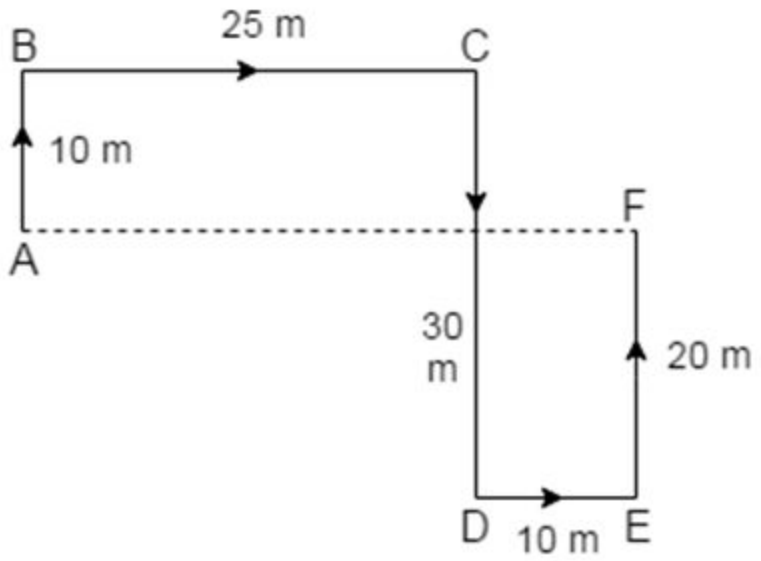
B. 30 m North

C. 40 m North

D. 35 m East

Answer: D

Explanation:



Distance between the initial and final position = AF = BC + DE

AF = 25+ 10 = 35 m

Tom is in the east direction from the starting point.

5) Peter is facing north. He turns to his right and walks 20 m and then turns to his left and walks 25 m. He then walks 25 m to his right. Next, he walks 50 m to his right. Finally, he turns to his right and walks 30 m. In which direction is he from the starting point?

A. South-East

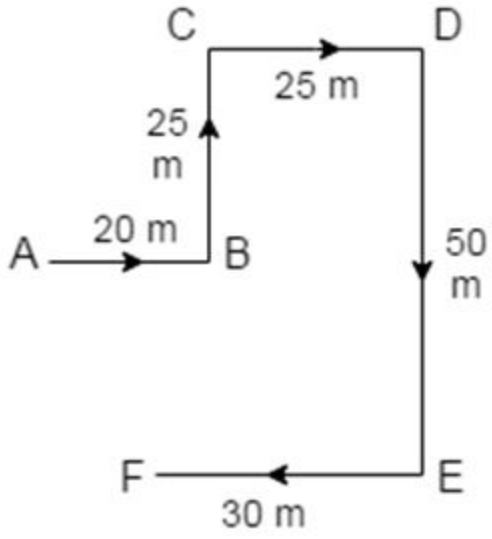
B. South

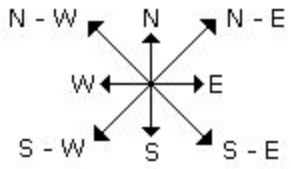
C. South-West

D. West

Answer: A

Explanation:





The point F is towards South-East of the starting point A.

6) Manoj covered a distance of 50 m towards the North. He then turned to his left and walked 20 m. He again turned left and walked 60m. Finally, he turned to his right at an angle of 45°. In which direction is he moving finally?

A. South-East

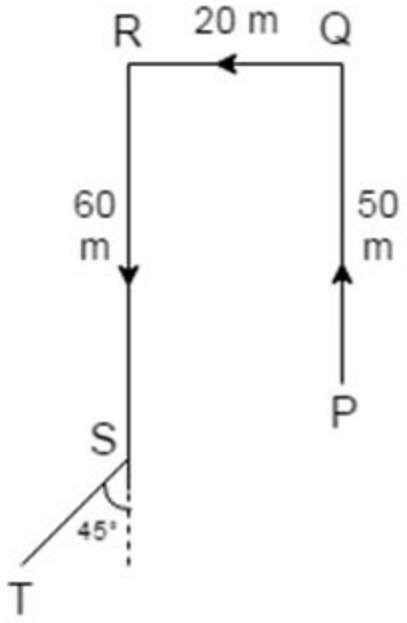
B. South-West

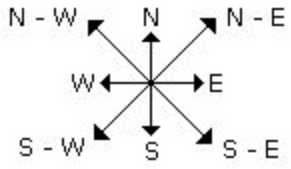
C. North-West

D. North-East

Answer: B

Explanation:





The point T is towards South-West of the starting point P.

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7) Geeta walks 20 m towards north then she walks 12 m towards the South. Now, she walks 6 m towards east. How far and in which direction is she from the starting point?

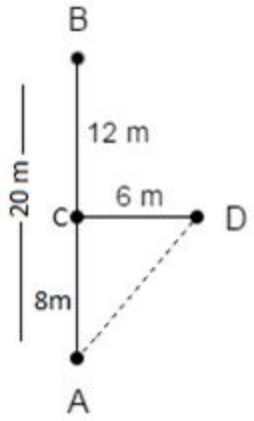
A. 10 m North-East

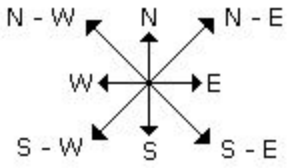
B. 10 m North

C. 6 m East

D. 6 m South-West

Answer: A **Explanation:**





AC = 20 - 12 = 8 km

CD = 6 m

$AD^2 = 8^2 + 6^2$

$AD^2 = 64 + 36$

$AD^2 = 100$

AD = 10 m

D is towards North-East of the starting point A.

8) Mohan is facing north-east. He turns 90 degrees in the anticlockwise direction then he turns 135 degrees in the clockwise direction. Which direction is Mohan facing now?

A. East

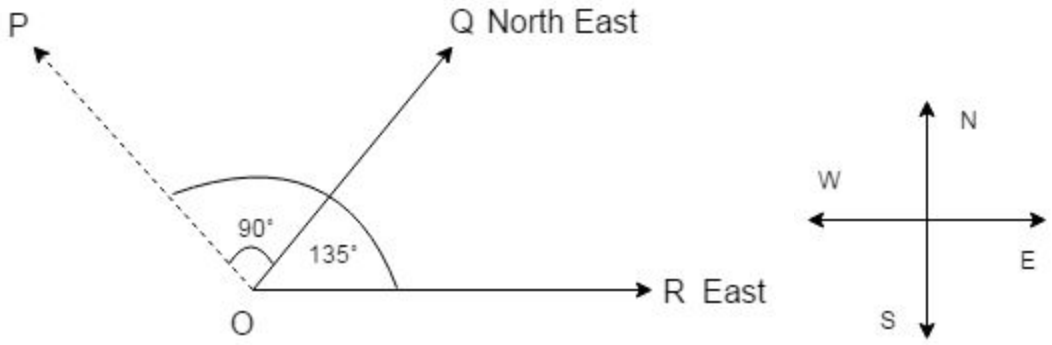
B. South

C. North

D. East

Answer: A

Explanation:



The image shows that Mohan is facing the East after he turns 135 degree in the clockwise direction.

9) Tom left for his office in his car. He travelled 5 km towards the North and then 10 km towards the East. He then travelled 3 km towards the South. Further, he turned to the West and travelled 2 km. Finally, he turned towards the South and travelled 2 km. How far and in which direction is he from the starting point?

A. 8 km South

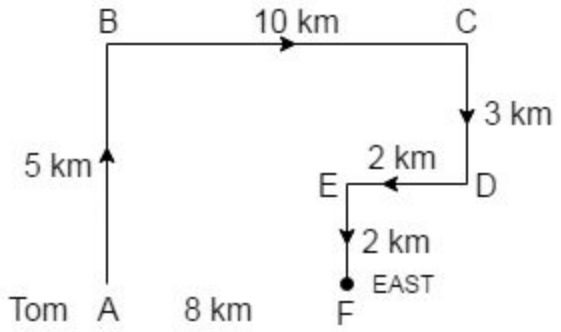
B. 7 km East

C. 8 km East

D. 2 km South

Answer: C

Explanation:



A and F are in the same line, and F lies to the East of A.

Distance from the starting point = A F = BC - DE

AF = 10 - 2 = 8 km

So, Tom is 8 km East from the starting point A.

10) Deepak walked 20 m towards the South. Then he turned to his left and walked 15 m. He again turned to his left and walked 20 m. Finally, he turned to his right and walked 10m. How far and in which direction is he from the starting point?

A. 15 m East

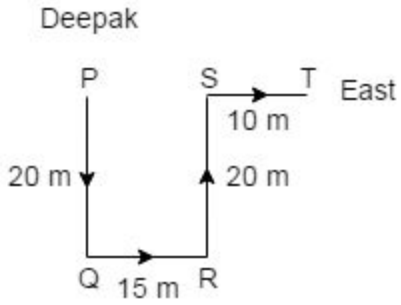
B. 15 m North

C. 25 m North

D. 25 m East

Answer: D

Explanation:



The distance between Deepak and starting point = PT

PT = PS+ST

PT = 15m + 10 m

PT = 25 m

And, T is to the East of P.

11) Ramesh is driving towards the North. After travelling 2 km, he turns to his right and covers 5 km. Then he turns to his left and covers 2 km. Finally, he turns to his left and covers 5 km. How far is he from the starting point and in which direction he is driving?

A. 2 km West

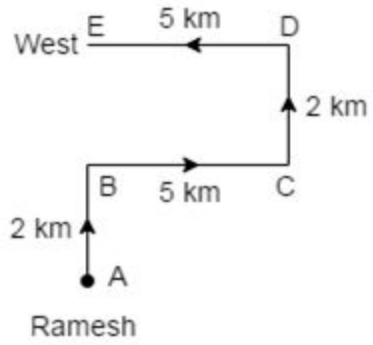
B. 2 Km East

C. 4 km West

D. 4 km North

Answer: C

Explanation:



The distance between the initial and final position of Ramesh = AE = AB+CD.

So, AE = 2+2 = 4 km and It is clear from the diagram that Ramesh is driving in the West direction.

---

12) Suresh walks 18 km from his house to the North. Then he turns towards the East and covers 12 km. He then turns towards the South and covers 6 km. Finally, he turns towards the West and covers 12 km. In which direction is he from his house?

A. South

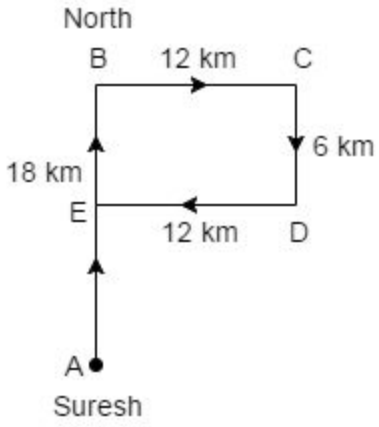
B. North

C. East

D. West

Answer: B

Explanation:



It is clear from the diagram that finally Suresh is to the North of his house.

13) If North-East becomes North and North-West becomes the West. What will the East become?

A. north-east

B. north-west

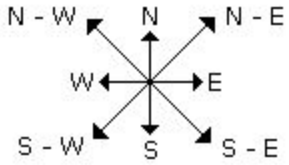
C. south-east

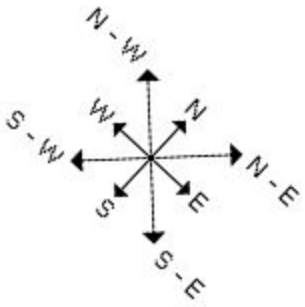
D. south-west

Answer: A

Explanation:

It is clear from the diagram that the east becomes north-east.





14) Mahesh was standing facing a pole in the morning after sunrise. The shadow of the pole fell exactly to his left. Which direction is he facing?

A. west

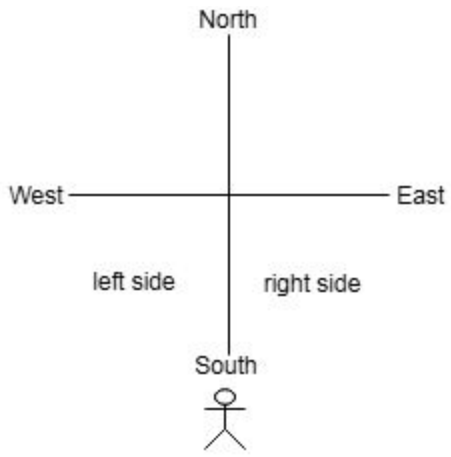
B. east

C. north

D. data is inadequate

Answer: C

Explanation:



Sun rises in the east in the morning. As the shadow of the pole falls to his left, so he is facing north.

---

15) Ram is facing north and turns 45 degrees in the clockwise direction and then again turns 180 degrees in the same direction and then turns 45 degrees in the anticlockwise direction. Find the direction he is facing now?

A. East

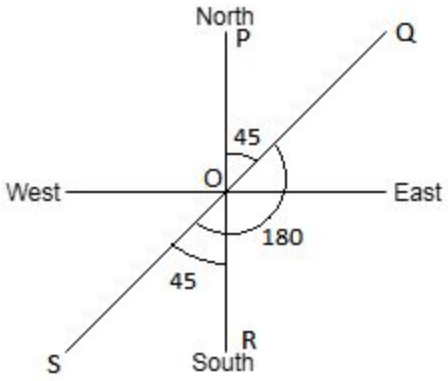
B. West

C. North

D. South

Answer: D

Explanation:



As per the image, in the beginning, Ram is facing in the direction OP. On turning 45 degrees clockwise, he is facing the direction OQ. Now again he moves 180 degrees clockwise and faces the direction OS. From this point, he turns 45 degrees anticlockwise. At this point, he is facing OR, which is the south direction.

16) Suresh left home and walked 5 km towards the south; turned right and walked 2.5 km and turned right and walked 5 km and turned left and cycled 5 km. How many kilometers will he have to walk to reach his home straight?

A. 15 km

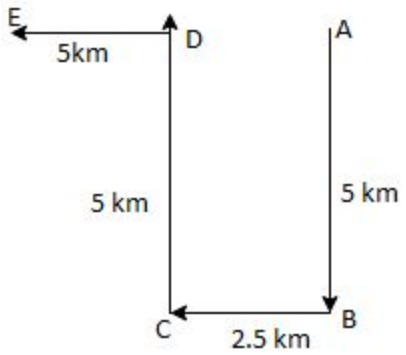
B. 10 km

C. 5 km

D. 7.5 km

Answer: D

Explanation:



The image shows that to reach home straight, he has to cover a distance which is equal to the sum of ED + DA. DA = BC = 2.5

So, he will have to walk a distance of 5+2.5 = 7.5 km

---

17) Ramesh put his timepiece on the table in a way so that its minute hand points to south at 6 pm. What will be the direction of the hour hand at 9:15 pm?

A. South

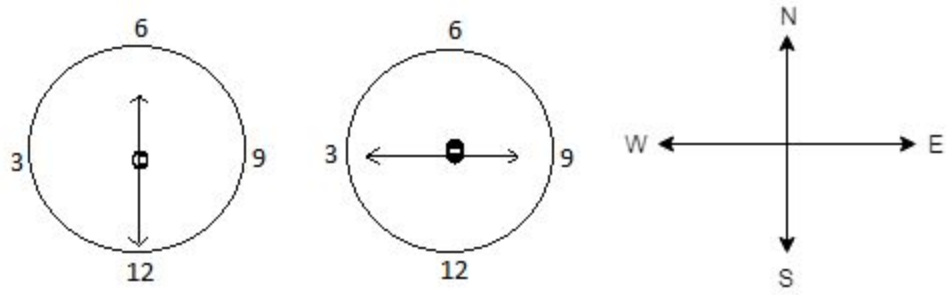
B. East

C. West

D. North

Answer: B

Explanation:



After seeing the image, it is clear that at 9.15 pm, the hour hand will point towards the east.

---

18) Q is 50 m south-west of P. If R is 50 m south-east of P, the Q is in which direction of R?

A. North-East

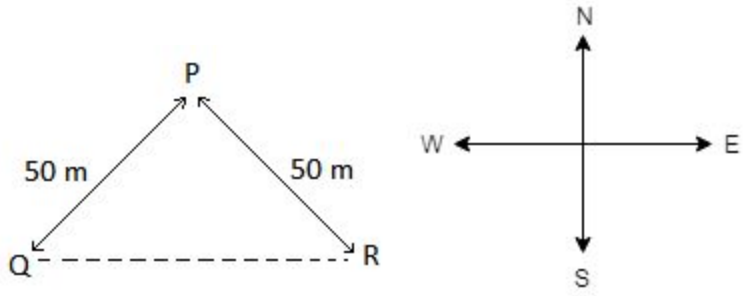
B. West

C. South-West

D. South

Answer: B

Explanation:



From the image, it is clear that Q is in the west of R.

---

19) Tom started walking keeping his back toward the Sun. After walking for few meters, he turned left, and then turned right. In which direction, is he waking now?

A. north or west

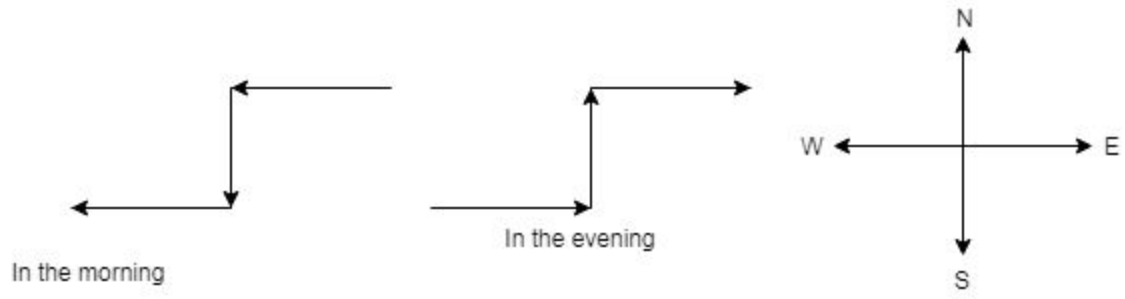
B. west or east

C. north or south

D. south or west

Answer: B

Explanation:



From the image, it is clear that if he starts walking in the morning, he would be walking towards the west. If he starts walking in the evening, he would be walking towards the east.

---

20) In the morning, after sunrise, Ramesh and Suresh were talking to each other face to face at Rajnigandha crossing. If Suresh's shadow was exactly to the right of Ramesh, which direction Suresh was facing?

A. north

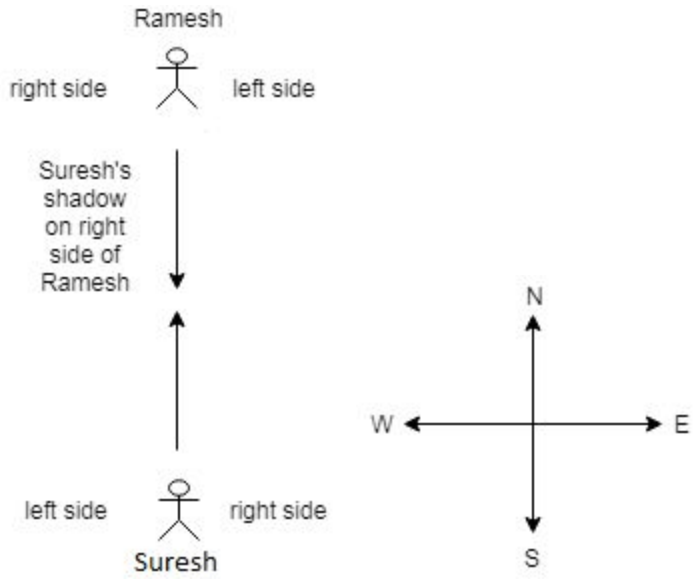
B. east

C. south

D. data is inadequate

Answer: A

Explanation:



In the morning, Sun rises in the east, so shadow falls in the west. Since Suresh's shadow falls to the right-side of Ramesh, he is facing north.

21):- A man walks point A to north direction. He take right turn then he take left turn he takes again left turn. Which direction is he facing now?

(a)East

(b)West

(c)south

(d)none of these

Answer

Answer: West

22):- Seeta stars from her house toward north. After walking a distance of 40m, she turned toward right and walk 20 . She then turned left and moving a distance of 10m turned to her left again and walked 50m. she now turns to the left and walk 5m.Finally she turns to his left. In which direction is she walking now?

(a)west

(b)south

(c)north

(d)east-south

Answer: West

23):-Geeta went 25m to the east from her house, then turned left and walked 30m. She then turned left and walks 25m. how far was she from her house?

(a)70m

(b)55m

(c)30m

(d)50m

Answer

Answer: 30 m

24):-A man walks 20m toward south. He then turned left and walks 40m. He again turned left and walks 20m. Further he moves 20m after turning to the right. How far is he from his original position?

(a)40 m

(b)60m

(c)50m

(d)none of these

Answer: 60 m

25):- A man is facing north. He turned 1000 in the clockwise direction and then 1450 in the anticlockwise direction. Which direction is he facing?

(a)east

(b)west

(c)east-south

(d) north-west

Answer

Answer: North-West

26):- A boys is walking 8m point O to point P in north side. He takes he takes right turn an after walking 2m he reach point B. He then takes left and again walks 2m. Finally he left turn and walk 8m and reach point C. Find the distance between point O to point C.

(a)10m

(b)16m

(c)15m

(d) none of these

Answer: 10m

27):- A man is facing east. He turns 300 in the clockwise direction and then another 1800 in the same direction and then 900 in the anticlockwise direction. Which direction is he facing now?

(a)east-north

(b)west

(c)south-west

(d)south

Answer

Answer: East-North

28):-Suman walks 25 km towards north. From there he walks 10km toward south. Then he walks 8km toward east. How far in which direction is he with reference to his starting point?

(a)10km

(b)15km

(c)17km

(d)25km

Answer: 17KM

29):- A girl walks 10 km front and 15km right. Then every time turning her right, she walks 5,10,10 km respectively. How far is she now from her starting point?

(a)5km

(b)10km

(c)15km

(d)20km

Answer

Answer: 5km

30):-If A is to the north of B and C is to the west of B, in which direction is A with respect to C?

(a)north-east

(b)north

(c)west

(d)south-west

Answer

Answer: North-East