# Direction & Distance

INTRODUCTION

This part of reasoning comes under the category of common sense reasoning. In fact, this segment gauges the sense of direction of a candidate. In every objective competitive examinations, these type of questions are asked. Particularly, in banking exams, these questions can be seen in every question papers. This is the reason, examinees are required to pay special attention towards such questions.

CONCEPT OF DIRECTION

In our day to day life, we make our concept of direction after seeing the position of sun. In fact, this is a truth that sun rises in the East and goes down in the West. Thus when we stand facing sunrise, then our front is called East while our back is called West. At this position our left hand is in the Northward and the right hand is in the Southward. Let us see the following direction map that will make your concept more clear:
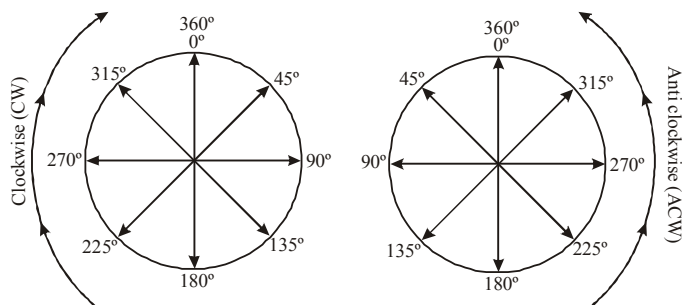
Direction Map
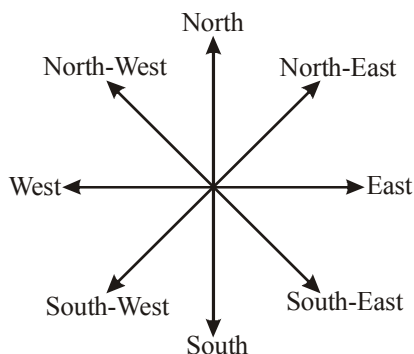
Note: *On paper North is always on top be while South is always in bottom.*

CONCEPT OF DEGREE
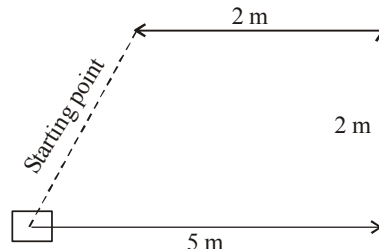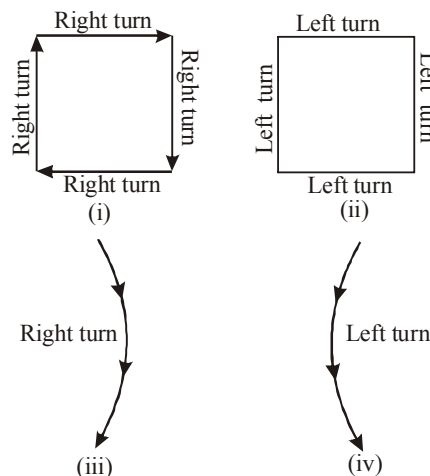
Let us see the following picture:

CONCEPT OF TURN

Right turn = Clockwise turn
Left turn = Anticlockwise turn
Let us understand it through pictorial representation:

IMPORTANT POINTS REGARDING DIRECTION

- If our face is towards North, than after left turn our face will be towards West while after right turn, it will be towards East.
- If our face is towards South, then after left turn our face will be towards East and after right turn it will be towards West.
- If our face is towards East, then after left turn our face will be forwards North and after right turn it will be towards South.
- If our face is towards West, then after left turn our face will be towards South and after right turn it will be towards North.
- If our face is towards North-West, then after left turn our face will be towards South-West and after right turn it will be towards North-East.
- If our face is towards South-West, then after left turn our face will be towards South-East and after right turn it will be towards North-West.
- If our face is towards South-East, then after left turn our face will be towards North-East and after right turn it will be towards South-West.
- If our face is towards North-East, then after left turn our face will be towards North-West and after right-turn it will be towards South-East.

CONCEPT OF MINIMUM DISTANCE
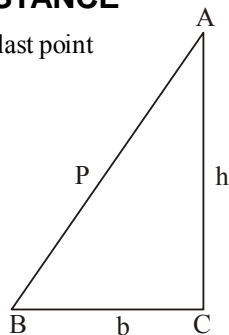
Minimum distance between initial and last point

$h^2 = b^2 + p^2$, where

h = Hypotenuse

b = Base

P = Perpendicular

Remember this important rule is
known as '**Pythogoras Theorem**'

SHADOW CASE

In Morning/Sunrise Time

(a) If a person facing towards Sun, the shadow will be towards his back or in West.

(b) If a person facing towards South, the shadow will be towards his right.

(c) If a person facing towards West, the shadow will be towards his front.

(d) If a person facing towards North, the shadow will be towards his left.

In Evening/Sunset Time

(a) If a person facing towards Sun, the shadow will be towards his back or in East.

(b) If a person facing towards North, the shadow will be towards his right.

(c) If a person facing towards East, the shadow will be towards his front.

(e) If a person facing towards South, the shadow will be towards his left.

Note : At 12:00 noon there is no shadow because the rays of the sun are vertically downward.

EXAMPLE 1. Raman walked 2 km West from his office and then turned South covering 4 km. Finally, he waked 3 km towards East and again move 1 km West. How far is Raman from his initial position.

(a) 4 km (b) 8 km

(c) 10 km (d) 7 km

(e) None of these

Sol. Raman starts from his office A, moves 2 km West upto B, then 4 km to the South upto C, 3 km East upto D and finally 1 km West upto E, Thus his distance from the initial position A = AE = BC = 4 km.

Hence option (a) is the correct answer.
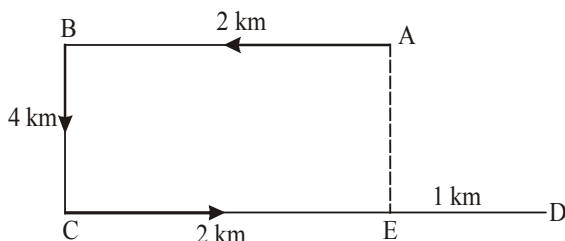
EXAMPLE 2. Rashmi walks 10 km towards North. She walks 6 km towards South then. From here she moves 3 km towards East. How far and in which direction is she with reference to her starting point?

(a) 6 km West (b) 7 km East

(c) 8 km North (d) 5 km North-East.

(e) None of these.

Sol. It is clear, Rashmi moves from A 10 km Northwards upto B, then moves 6 km Southwards upto C, then turns towards East and walks 3 km upto D.

Then, AC = (AB − BC) = 10 − 6 = 4 km

CD = 3km.
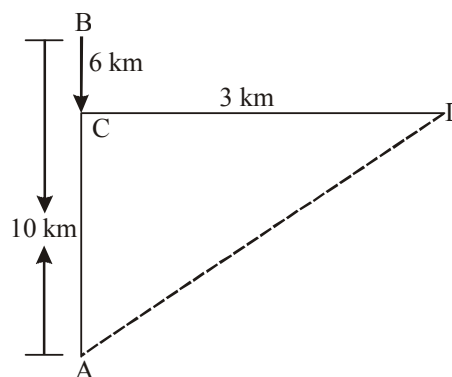
∴ Rashmi's distance from starting point A

$= AD = \sqrt{AC^2 + CD^2} = \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5\,km.$

From figure, D is to the North-East of A, Hence (d) is the correct option

EXAMPLE 3. Early morning after sunrise, Rajesh was standing infront of his house in such a way that his shadow as falling exactly behind him. He starts walking straight and walks 5 m. He turns to his left and walks 3 m and again turning to his left walks 2m. Now in which direction is he from his starting point?

Sol. The shadow of Rajesh was falling exactly behind him. So he was facing towards East. Diagram clearly shows that Rajesh was in North-East with reference to the starting point.
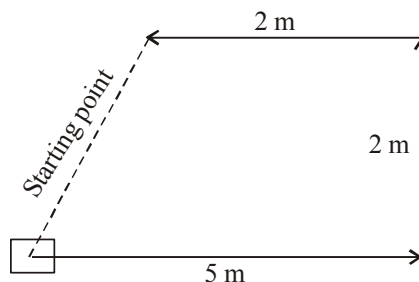
EXERCISE

1. Q travels towards East. M travels towards North. S and T travel in opposite directions. T travels towards right of Q. Which of the following is **definitely true**?
   (a) M and S travel in the opposite directions.
   (b) S travels towards West.
   (c) T travels towards North.
   (d) M and S travel in the same direction.
   (e) None of these

2. P, Q, R, S and T are sitting around a circular table. *R* is to the right of *P* and is second to the left of *S*. *T* is not between *P* and *S*. Who is second to the left of *R*?
   (a) S
   (b) T
   (c) Q
   (d) Data inadequate
   (e) None of these

3. Of the five villages P, Q, R, S and T situated close to each other, P is to west of Q, R is to the south of P, T is to the north of Q, and S is to the east of T. Then, R is in which direction with respect to S?
   (a) North-West
   (b) South-East
   (c) South-West
   (d) Data Inadequate
   (e) None of these

4. M is to the East of D, F is to the South of D and K is to the West of F. M is in which direction with respect to K?
   (a) South-West
   (b) North-West
   (c) North-East
   (d) South-East
   (e) None of these

5. After 4 pm on a sunny day when Ramesh was returning from his school, he saw his uncle coming in the opposite direction. His uncle talked to him for some time. Ramesh saw that the shadow of his uncle was to his right side. Which direction was his uncle facing during their talk?
   (a) North
   (b) South
   (c) East
   (d) Data inadequate
   (e) None of these

6. A and B are standing at a distance of 20 km from each other on a straight East-West road. A and B start walking simultaneously, eastwards and westwards respectively, and both cover a distance of 5 km. Then A turns to his left and walks 10 km. 'B' turns to his right and walks 10 km and at the same speed. Then both turn to their left and cover a distance of 5 km at the same speed. What will be the distance between them?
   (a) 10 km
   (b) 5 km
   (c) 20 km
   (d) 25 km
   (e) None of these

7. Alok walked 30 metres towards east and took a right turn and walked 40 metres. He again took a right turn and walked 50 metres. Towards which direction is he from his starting point?
   (a) South
   (b) West
   (c) South-West
   (d) South-East
   (e) None of these

8. Ten boys are standing in a row facing the same direction. Abhijit, who is seventh from the left end of the row, is to the immediate right of Sushant, who is fifth from the right end of the row. Sushant is third to the right of Rupin. How many children are there between Abhijit and Rupin?
   (a) One
   (b) Two
   (c) Three
   (d) Data inadequate
   (e) None of these

9. Y is to the East of X, which is to the North of Z. If P is to the South of Z, then P is in which direction with respect to Y?
   (a) North
   (b) South
   (c) South-East
   (d) North-East
   (e) None of these

10. One afternoon, Manisha and Madhuri were talking to each other face to face in Bhopal on M.G. Road. If Manisha's shadow was exactly to the left of Madhuri, which direction was Manisha facing?
    (a) North
    (b) South
    (c) East
    (d) Data inadequate
    (e) None of these

11. 'X' started walking straight towards South. He walked a distance of 5 metres and then took a left turn and walked a distance of 3 metres. Then he took a right turn and walked a distance of 5 metres again. 'X' is facing which direction now?
    (a) North-East
    (b) South
    (c) North
    (d) South-West
    (e) None of these

Directions (Qs. 12-13) : Kiran walks 20m North, she turns right and walks 30m, then she turns right and walks 35m, then she turns left and walks 15m, then she again turns left and walks 15m. Once again she turns left and walks 15m.

12. How far is Kiran from her starting point ?
    (a) 25 m
    (b) 15 m
    (c) 45 m
    (d) 30 m
    (e) None of these

13. In which direction is Kiran facing now ?
    (a) East
    (b) West
    (c) North
    (d) South
    (e) None of these

14. A boy rode his bicycle northwards, then turned left and rode one km and again turned left and rode 2 km. He found himself exactly one km west of his starting point. How far did he ride northwards initially?
    (a) 1 km
    (b) 2 km
    (c) 3 km
    (d) 5 km
    (e) None of these

15. Ravi wants to go to the university. He starts from his home which is in the East and come to a crossing. The road to the left ends is a theatre, straight ahead is the hospital. In which direction is the university?
    (a) North
    (b) South
    (c) East
    (d) West
    (e) None of these

16. A rat runs 20' towards east and turns to right, runs 10' and turns to right, runs 9' and again turns to left, runs 5' and then to left, runs 12' and finally turns to left and runs 6'. Now, which direction is the rat facing?
    (a) East (b) West
    (c) North (d) South
    (e) None of these

17. If South-east becomes North, North-east becomes West and so on, what will West become?
    (a) North-east (b) North-west
    (c) South-east (d) South-west
    (e) None of these

18. 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
    (e) None of these

19. A and B start walking, from a point, in opposite directions. A covers 3 km and B covers 4 km. Then A turns right and walks 4 km while B turns left and walks 3 km. How far is each from the starting point ?
    (a) 5km (b) 4km
    (c) 10km (d) 8km
    (e) None of these

20. Anuj started walking positioning his back towards the sun. After sometime, he turned left, then turned right and then towards the left again. In which direction is he going now?
    (a) North or South (b) East or West
    (c) North or West (d) South or West
    (e) None of these

21. From her home, Prerna wishes to go to school. From home, she goes towards North and then turns left and then turns right, and finally she turns left and reaches school. In which direction her school is situated with respect to her home?
    (a) North - East (b) North - West
    (c) South - East (d) South - West
    (e) None of these

22. One day, Ravi left home and cycled 10 km southwards, turned right and cycled 5 km and turned right and cycled 10 km and turned left and cycled 10 km. How many kilometres will he have to cycle to reach his home straight?
    (a) 10km (b) 15km
    (c) 20km (d) 25km
    (e) None of these

23. Rasik walks 20 m North. Then, he turns right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Then he again turns left and walks 15 m. In which direction and how many metres away is he from his original position?
    (a) 15 metres West (b) 30 metres East
    (c) 30 metres West (d) 45 metres East
    (e) None of these

24. From his house, Lokesh went 15 km to the North. Then he turned West and covered 10 km. Then, he turned South and covered 5 km. Finally , turning to East, he covered 10 km. In which direction is he from his house?
    (a) East (b) West
    (c) North (d) South
    (e) None of these

25. Kailash faces towards north. Turnings to his right, he walks 25 metres. He then turns to his left and walks 30 metres. Next, he moves 25 metres to his right. He then turns to the right again and walks 55 metres. Finally, he turns to the right and moves 40 metres. In which direction is he now from his starting point ?
    (a) South-West (b) South
    (c) North-West (d) South-East
    (e) None of these

26. One evening before sunset two friends Sumit and Mohit were talking to each other face to face. If Mohit's shadow was exactly to his right side, which direction was Sumit facing?
    (a) North (b) South
    (c) West (d) Data inadequate
    (e) None of these

27. Rohit 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 metres East (b) 35 metres North
    (c) 40 metres East (d) 60 metres East
    (e) None of these

28. One morning after sunrise, Reeta and Kavita were talking to each other face to face at Tilak Square. If Kavita's shadow was exactly to the right to Reeta, which direction Kavita was facing?
    (a) North (b) South
    (c) East (d) Data inadequate
    (e) None of these

29. I am facing east. I turn 100° in the clockwise direction and then 145° in the anticlockwise direction. Which direction am I facing now?
    (a) East (b) North-east
    (c) North (d) South-west
    (e) None of these

30. A man is facing north-west. He turns 90° in the clockwise direction, then 180° in the anticlockwise direction and then another 90° in the same direction. Which direction is he facing now?
    (a) South (b) South-west
    (c) West (d) South-east
    (e) None of these

31. A tourist drives 10 km towards East and turns to right side and takes a drive of another 3 km. He, then drives towards West (turning to his right) another 3 km. He, then turns to his left and walks another 2 km afterwards, he turns to his right and travels 7 km. How far is he from his starting point and in which direction ?
    (a) 10 km, East (b) 9 km, North
    (c) 8 km, West (d) 5 km, South
    (d) None of these

Directions (Qs. 32-34) : Study the following information and answer the questions given below.

Seven villages A, B, C, D, E, F and G are situated as follow

E is 2 km to the West of B.

F is 2 km to the North of A.

C is 1 km to the West of A.

D is 2 km to the South of G.

G is 2 km to the East of C.

D is exactly in the middle of B and E.

32. Which two villages are the farther from one another?
    - (a) F and E
    - (b) G and E
    - (c) D and C
    - (d) F and B
    - (e) None of these
33. How far is E and F (in km)?
    - (a) 5
    - (b) $\sqrt{26}$
    - (c) 4
    - (d) $\sqrt{20}$
    - (e) None of these
34. A is in the middle of
    - (a) E and G
    - (b) E and C
    - (c) G and C
    - (d) F and G
    - (e) None of the above
35. There is a ring road connecting points X, Y, Z and W. The road is in a complete circular form but having several approach roads leading to the centre. Exactly in the centre of the ring road there is a tree which is 20 km from point X on the cicular road. You have taken a round of circular road starting from point A and finish at the same point after touching points Y, Z and W. You then drive 20 km interior towards the tree from point X and from there reach somewhere in between Y and Z on the ring road. How much distance you have to travel from the tree to reach the point between Y and Z on the ring road?
    - (a) 20 km
    - (b) 15 km
    - (c) 80 km
    - (d) 40 km
    - (e) None of these

Directions (Qs. 36-37) : Study the following information to answer the given questions.

Point A is 9 m towards the East of point B. Point C is 5 m towards the South of point A. Pont D is 3 m towards the West of point C. Point E is 5 m towards the North of point D. Point F is 7 towards the South of point S.

36. If a person walks in a straight line for 8 m towards West from point C, which of the following points would he cross the first ?
    - (a) F
    - (b) B
    - (c) E
    - (d) D
    - (e) Cannot be determined
37. Which of the following points are in a straight line ?
    - (a) A, C, F
    - (b) D, E, B
    - (c) A, E, F
    - (d) F, E, C
    - (d) D, F, E

Directions (Qs. 38-40) : Answer the following questions on the basis of the information given below :
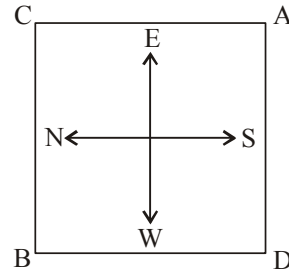
Four security guards A, B, C nad D have been posted at the four corners of a huge cashew plantations farm.

38. Given the condition that none of the corners should be unmanned and both A and C start moving towards diagonally opposite corners, in which direction should D start moving so that he occupies a corners by travelling the minimum possible distance ?
    - (a) Clockwise
    - (b) Anti-clockwise
    - (c) Either (a) or (b)
    - (d) Cannot be determined
    - (e) None of the above
39. From the original position, A and B move diagonally to opposite corners and then one side each in the clockwise direction. Which of the corners is unmanned at the movement?
    - (a) South-West
    - (b) South-East
    - (c) North-East
    - (d) North-West
    - (d) None of the above
40. After the movement on above question, who is at the North-West corner?
    - I. A
    - II. C
    - III. B
    - (a) Only I
    - (b) I and II
    - (c) II and III
    - (d) I and III
    - (e) None of these
41. From the original position A and B move one arm length clockwise and then cross over to the corner diagonally opposite, C and D move one arm length anti – clockwise and cross over to the corner diagonally opposite. The original setting ADBC has now changed to
    - (a) CDAB
    - (b) DCAB
    - (c) CBDA
   - (d) None of the above
    - (e) Can't determined

ANSWER KEY

| 1	(d)	6	(a)	11	(b)	16	(c)	21	(b)	26	(b)	31	(d)	36	(d)	41	(c)
2	(c)	7	(c)	12	(d)	17	(c)	22	(b)	27	(a)	32	(d)	37	(e)		
3	(c)	8	(c)	13	(b)	18	(a)	23	(d)	28	(a)	33	(c)	38	(b)		
4	(c)	9	(e)	14	(b)	19	(a)	24	(c)	29	(b)	34	(c)	39	(b)		
5	(b)	10	(a)	15	(a)	20	(a)	25	(d)	30	(d)	35	(a)	40	(c)		

Hints & Explanations

1. **(d)** We have been given that Q travels towards East and M travels towards North. Now, T travels towards right of Q implies that T travels towards South. Hence, S travels towards North (because S and T travel in opposite directions). Therefore, it is definitely true that M and S travel in the same direction i.e., North.
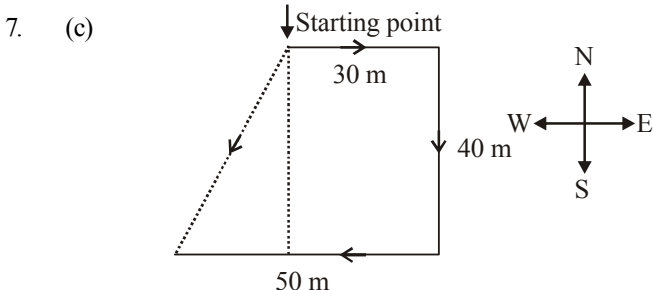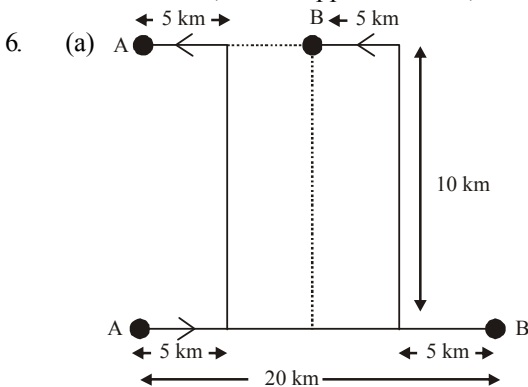
2. **(c)**
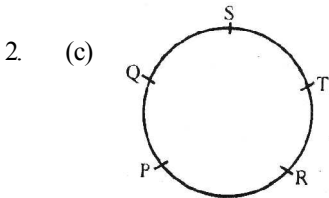
   Q is second to the left of R.

3. **(c)**
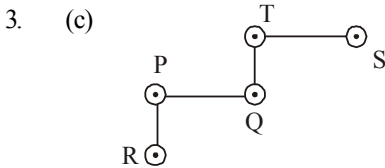
   Hence, R is to the South-West with respect to S.
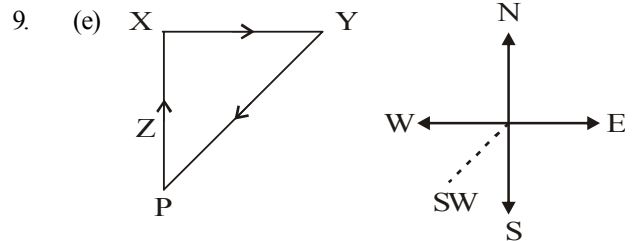
4. **(c)**
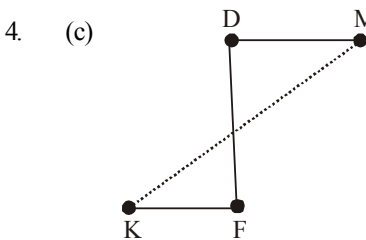
   M is to the North-East of K.

5. **(b)** After 4 pm the shadow will be towards East. Now, East is to the right of Ramesh. So Ramesh faces North. And his uncle, who is opposite to him, faces South.

6. **(a)**

7. **(c)**


8. **(c)** Only three students

9. **(e)**

10. **(a)** In the afternoon the sun is in the west. Hence the shadow is in the east. Now, east is to the left of Madhuri. So, Madhuri is facing south. Therefore, Manisha, who is face to face with Madhuri, is facing north.
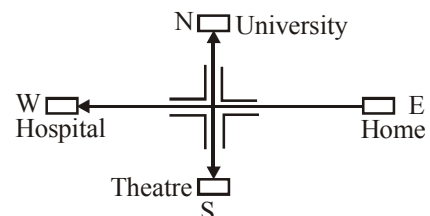
11. **(b)**

12. **(d)**
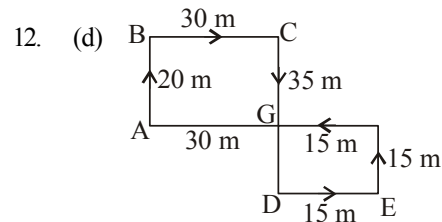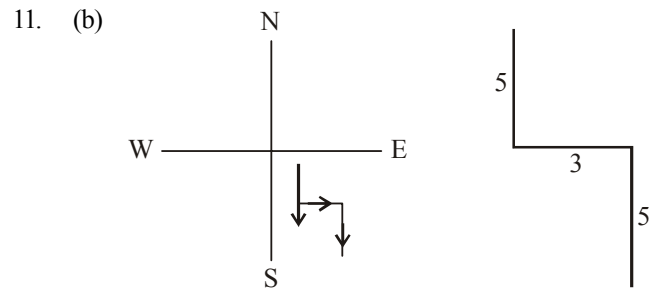
   Obviously, AG = BC = 30 m

13. **(b)** West

14. **(b)** Clearly, the boy rode from A to B, then to C and finally up to D. Since D lies to the west of A, so required distance = AB = CD = 2 km.
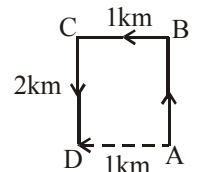
15. **(a)** Starting from his house in the East, Ravi moves westwards. Then, the theatre, which is to the left, will be in the South. The hospital, which is straight ahead, will be to the West. So, the University will be to the North.


16. **(c)** The movements of rat are as shown in figure. Clearly, it is finally walking in the direction FG i.e. North.

17. (c) Here, each direction moves $90° + 45° = 135°$

18. (a) Here, R faces towards West. S is to the right of R. So, S is facing towards South. Thus, Q who is the partner of S, will face towards North.

19. (a) Here, O is the starting point.

Both A and B are $\sqrt{3^2 + 4^2}$ = 5 km from the starting point.

20. (a) Clearly, there are two possible movements of Anuj as shown below:

21. (b)

It is clear from the diagram that school is in North-west direction with respect to home.

22. (b) Here, Ravi starts from home at A, moves 10 km southwards up to B, turns right and moves 10 km up to C, turns right again and moves 10 km up to D and finally turns left and moves 10 km up to E.
Thus, his distance from initial position A = AE
$= AD + DE$
$= BC + DE = (5 + 10)$ km $= 15$ km.

23. (d) The movements of Rasik from A to F are as shown in figure.
Since CD = AB + EF, so F lies in line with A.
Rasik's distance from original position A = AF
$= (AG + GF) = (BC + DE) = (30 + 15)$ m $= 45$m.
Also, F lies to the East of A.

24. (c) The movements of Lokesh are as shown in figure. (A to B, B to C, C to D to E). Clearly, his final position is E which is to the North of his house A.

25. (d)

26. (b) In the evening, sun is in the west and so the shadows fall towards east. So, Mohit's shadow fell towards east. Now, since Mohit's shadow fell towards right, therefore, Mohit is facing North. So Sumit, standing face to face with Mohit, was facing South.

27. (a) The movements of Rohit are as shown in figure.
Rohit's distance from starting point A = AE
$= (AD + DE) = (BC + DE) = (20 + 15)$ m $= 35$ m.
Also, E is to the East of A.

28. (a) In morning, sun rises in the east so shadow of a object falls towards the West. Now, Kavita's shadow falls to the right of Reeta. Hence, Reeta is facing South and Kavita is facing North.
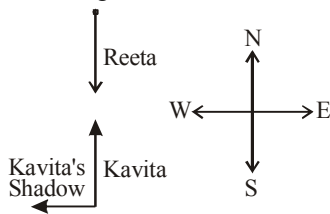

29. (b) As shown in figure, the man initially faces towards east i.e., in the direction OA. On moving 100° clockwise, he faces in the direction OB. On further moving 145° anticlockwise, he facings the direction OC. Clearly, OC makes an angle of (145° – 100°) i.e. 45° with OA and so, the man faces in the direction North-east.

30. (d) As shown in figure, the man initially faces in the direction OP. On moving 90° clockwise, he faces in the direction OX. On further moving 180° anticlockwise, he faces in the direction OY. Finally, on moving 90° anticlockwise, he faces in the direction OZ, which is South-east.

31. (d) According to the question,

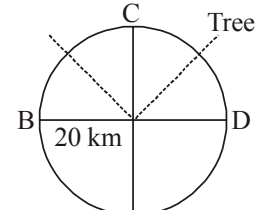Hence, he is 5 km to the South of his starting point.
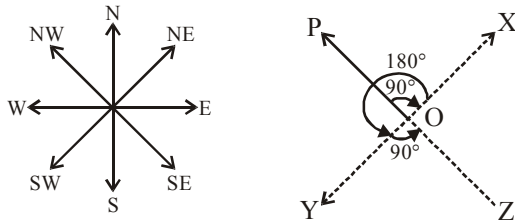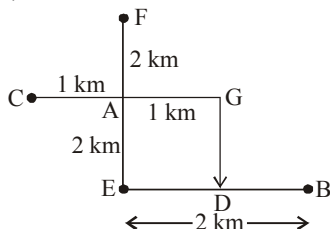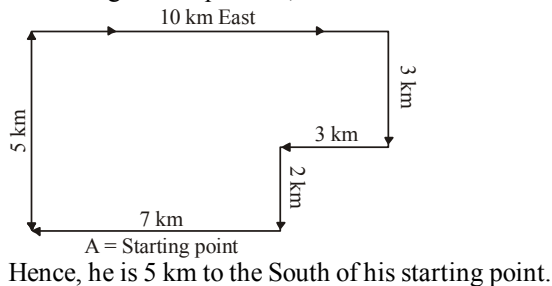
Sol. (32-34) :
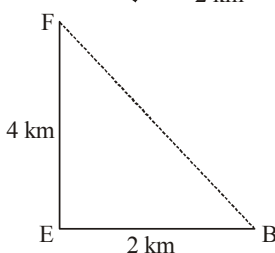
32. (d) Required distance $(FB)^2 = (FE)^2 + (EB)^2$
$$= 4^2 + 2^2$$
$$= 16 + 4 = \sqrt{20}$$
$$= 4.47 \, km$$

It is clear from the figure that the village F and B farthest from one another.
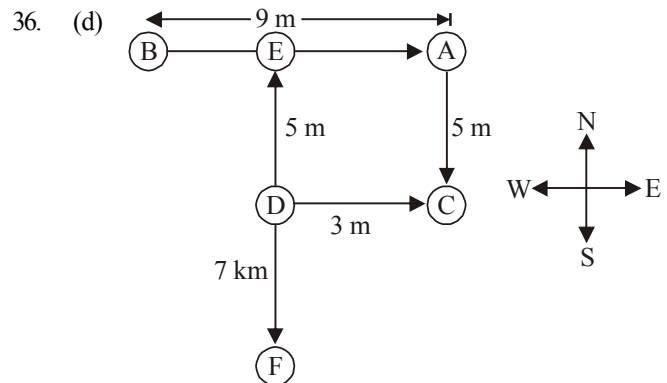
33. (c) It is clear from the figure that distance between E and F = EA + AF = 2 + 2 = 4 km

34. (c) It is clear from the figure that A is in the middle of G and C.

35. (a) According to the question,

A= Starting point +
Ending point

Clearly, 20 km is the distance to reach any of the point on the circle.

Solutions (Qs. 36 and 37):

36. (d)

If a person walks in a straight line for 8 km towards West from point C, then he would be cross D.

37. (e) D, F, E are in straight line.

38. (b) When, A and B move diagonally opposite the two top positions become vacant. Hence, in order D should travel minimum distance, he should move anti-clockwise to occupy A's position.

39. (b)
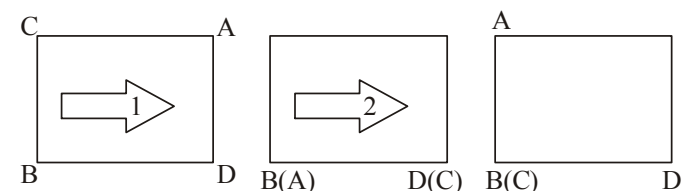
Only one corner is vacant which is South East. You can take help from diagram in the question.

40. (c)

41. (c)

◈ ◈ ◈