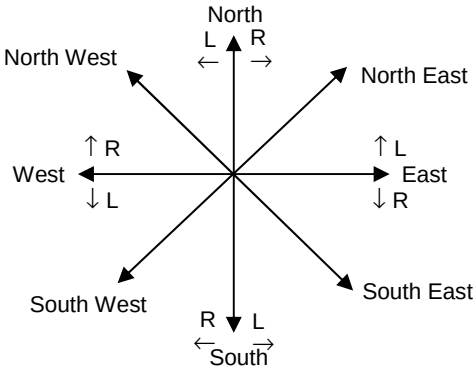
CHAPTER – 8
DIRECTION SENSE

The questions on direction sense typically involve a person moving certain distances in specified directions. Then, the student is asked to find out the distance between the initial and the final points. The easiest way of solving these problems is to draw a diagram as you read the information given in the problem and ensure that the diagram reflects all the information given in the problem.

To solve these types of problems, the student should be aware of the directions. The student should also recognize the left and right of a person walking in a particular direction. The following diagram shows all the directions and left (L) and right (R) of a person walking in that direction and the student should memorise the diagram.

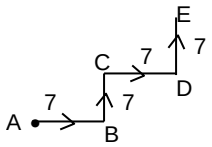


NOTE: The distance from a particular point after travelling a distance of x metres in the horizontal direction and a distance of y metres in the vertical direction is equal to $\sqrt{x^2+y^2}$ (Please note that in common usage, North South direction is referred to as "vertical" direction and the East West direction is referred to as the "horizontal" direction).

Worked out examples:

1. A person travels a distance of 7 km towards east from his house, then travels 7 km towards north and then a distance of 7 km towards east and finally 7 km towards north. What is the vertical distance traveled by him?

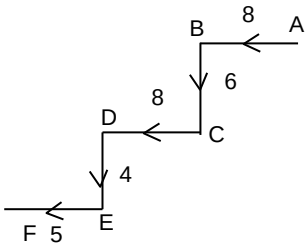
Sol:



Let A and E be the initial and the final positions.
The vertical distance travelled = BC + ED
= (7 + 7) km = 14 km.

2. A person starts from his house and travels 8 m towards west; then he travels 6 m towards his left, then 8 m towards west and then 4 m towards south. Finally, he turns right and travels 5 m. What is the horizontal distance traveled by him?

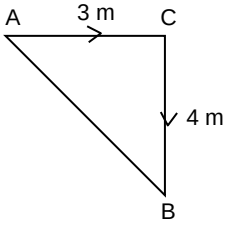
Sol:



Let A and F be the initial and the final positions.
∴ Horizontal distance traveled
= FE + DC + BA = 5 + 8 + 8 = 21 m.

3. Surya travels 3 m towards east and then turns right and travels 4 m. What is the distance between the initial and the final positions of Surya?

Sol:



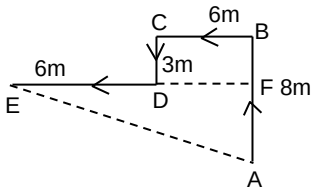
Let A and B the initial and the final positions of Surya.

AB = $\sqrt{AC^2+BC^2}$

= $\sqrt{3^2+4^2}$ = 5 m.

4. Starting from his house, Sachin walks a distance of 8m towards north, then he turns left and walks 6 m, then walks 3 m towards south and finally travels 6 m towards west. to reach his office. What is the distance between his house and office and also find in which direction is his office situated with respect to his house.

Sol:



Let A be the Sachin's house and E his office.
The distance between A and E

= $\sqrt{(EF)^2+(AF)^2}$

= $\sqrt{(ED+CB)^2+(AB-FB)^2}$

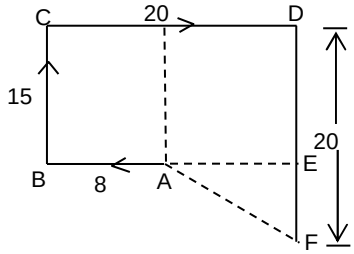
= $\sqrt{(ED+CB)^2+(AB-CD)^2}$

= $\sqrt{12^2+5^2}$ = 13 m.

His office is towards northwest of his house.

5. Starting from her house, Nisha traveled 8 m towards west, then turned right and travelled 15 m. She then traveled 20 m towards east, followed by 20 m to south to reach a hostel. How far is her house from the hostel and in which direction?

Sol:



Let A and F be the initial and final positions.

Now AF = $\sqrt{AE^2 + EF^2}$

AE = CD – BA = 20 – 8 = 12 m

EF = DF – DE = DF – CB = 20 – 15 = 5m

$\therefore$ AF = $\sqrt{144 + 25}$ = $\sqrt{169}$ = 13 m

Her house is towards north-west from the hostel.

Exercise – 8

Directions for questions 1 to 37: Select the correct alternative from the given choices.

1. A person walks 4 km towards west, then turns to his right to travel 9 km. He turns towards east and travels 12 km. Finally, he travels 3 km towards south. How far is he from the initial position (in km)?
(A) 15 (B) 23 (C) 18
(D) 10 (E) 28

2. Laxman travels 7 km towards south and then 5 km towards his left. He further travels 5 km towards south. How far is he from the starting point?
(A) 13 km (B) 9 km (C) $\sqrt{149}$ km
(D) $\sqrt{119}$ km (E) 22 km

3. Mr. Kale travels 5 km towards west, turns left and travels 3 km and then travels another 5 km towards south. He then turns right and travels 1 km to reach a church. How far is the church from his starting position, in kilometers?
(A) 8 (B) 10 (C) 12 (D) 14 (E) 16

4. Rahul traveled 6 km towards north and then turned left and moved a distance of 3 km. From there, he turned left and moved a further distance of 2 km. How far is he from the starting point?
(A) 3 km (B) 4 km (C) 5 km
(D) 6 km (E) 8 km

5. Rakesh traveled 500 m from his house towards North. Then he took left turn and traveled 80 m, then 260 m towards his left and again 400 m towards his left. How far (in m) is he from the starting point?
(A) 400 (B) 100 (C) 200
(D) 300 (E) 250

6. Mamatha travels towards north for 10 km and then towards west for 4 km. She then travels a distance of 5 km towards her right and again 12 km towards right. What is the distance between the initial and the final positions?
(A) 16 km (B) 10 km (C) 15 km
(D) 17 km (E) 22 km

7. Madhan travels 14 km towards east from his house. He turns left and travels 19 km. Again, he turns to his left and travels 10 km further. Finally, he walks 9 km towards north and then stops. At what vertical distance (in km) is he from his house?
(A) 19 (B) 9 (C) 24
(D) 26 (E) 28

8. Patel starts from his house and travels 8 km toward north. Then he turns right, travels 2 km, then turns right again and travels 3 km and then travels 3 km towards east. Finally, he turns left and travels 7 km. How far is he from the starting point, in kilometers?
(A) 12 (B) 13 (C) 5 (D) 0 (E) 24

9. A person starts from a point A, travels 3 km towards north, then turns right and travels 4 km and then travels 6 km towards south. He then turns right and travels 4 km. Finally, he travels 3 km towards north. How far is he from the starting point, in kilometers?
(A) 12 (B) 13 (C) 5 (D) 0 (E) 26

10. Sruthi travels 7 km towards east then travels 25 km south. She then travels 10 km towards east and then travels 6 km towards her right. After this she travels 3 km towards west and stops. How far is she from starting point in vertical direction, in kilometers?
(A) 30 (B) 31 (C) 32 (D) 33 (E) 37

11. Mr. Thakare starts jogging from his home to the nearby park. He jogs 7 m towards east and then jogs 9 m to his left. He then jogs 6 m to his right and then jogs 11 m towards north. He then jogs 13 m towards west. How far is he from the starting point, in meters?
(A) 16 (B) 25 (C) 20 (D) 18 (E) 28

12. From her house, Shriya travels 8 km towards south. She then turns right and travels 12 km. She again travels 8 km to her left. How far is she from the house (in km)?
(A) 25 (B) 20 (C) > 30
(D) ≥ 40 (E) Cannot be determined.

13. Rajesh travelled in the following path.12 km towards south-west of house followed by 12 km towards north-west, then 12 km towards north-east followed by 12 km towards south-east. How far is he now from his starting point?
(A) 33 km (B) 12 km (C) 18 km
(D) 8 km (E) 0 km

14. Pavan went to station which is 12 km towards north of his house. His wife Renu went to a shop which is 5 km towards west from their house. Then, they both started walking towards each other at the same time and at the same speed. At what distance (in km) from the station do they meet?
(A) 13 (B) 7 (C) 10 (D) 6.5 (E) 5

15. Two friends P and Q started walking towards each starting from points A and B respectively, which are 200 km apart. On a straight road P traveled for 30 km on road and stopped. Q travelled for 70 km, and took a left turn and traveled 20 km. Then he took a right turn and traveled 45 km and then turned to the main road and reached it. What is the distance, in km, between the friends now?
(A) 45 (B) 55 (C) 65 (D) 75 (E) 85

16. Mr. Bachchan started from his house and walked for 20 m towards east, where his friend Kiran joined him. They together walked for 10 m in the same direction. Then Mr. Bachchan turned left while Kiran turned right and travelled 2 m and 8 m respectively. Kiran turned left to travel 4 m followed by 5 m to his right to reach his office. Mr. Bachchan turned right and traveled 12 m to reach his office. What is the shortest distance between the two offices?
(A) 17 m (B) 18 m (C) 20 m
(D) 16 m (E) 30 m

17. My dog Bunty, runs 30 m towards west, turns left and runs 10 m, then turns right, and runs 5 m, then turns left and runs 2 m and again turns right, runs 12 m. Finally it turns left and runs 7 m. In which direction is it running now.
(A) East (B) West
(C) North (D) South
(E) Cannot be determined

18. Sachin travels 16 km towards west and from there, he travels 8 km towards the east. Now, he goes 4 km towards the north. In which direction is he with respect to the starting point?
(A) North-west (B) West (C) South-east
(D) North (E) None of these

19. My office is to the east of my house. My sister's office is to the south-east of my office. A park is to the south of my office. In which direction is my house located with respect to the park?
(A) North-east (B) South-west
(C) North-west (D) South-east
(E) None of these

20. Saurav walks 80 m to the east of post-office. He turns right and walks for 30 m and then walks 50 m towards north. Finally, he again starts walking towards the post-office along the straight line connecting the final point and the post-office. In which direction is he walking now?
(A) North (B) West (C) North-east
(D) East (E) South-west

21. After travelling 8 km, I turned right and travelled 3 km, then turned right and covered a distance of 2 km, now I am moving towards west. In which direction did I start my journey?
(A) North (B) South
(C) East (D) West
(E) North-east

22. Lalitha started from her house and walked 6 km towards north, then 3 km towards east, then 7 km towards her left, and then 4 km to her right, then 10 km towards south and finally 3 km to her right. In which direction is she from her house?
(A) South-east (B) South-west
(C) North-east (D) North-west
(E) South

23. Mr. Powar travels 10 km towards west and turns right to travel 4 km. Now he turns right and travels 7 km. In which direction is he now with respect to the starting position?
(A) South-east (B) South-west
(C) North-east (D) North-west
(E) North

24. After walking for 7 m, I turned left and jogged 12 m. After this I turned left and walked for 3 m, then turned right and continued jogging. Now, I am moving towards east. In which direction did I start my journey?
(A) East (B) West
(C) North (D) South
(E) South-east

25. Starting from his house Rahul walks 40 m towards south. Then he turns right and walks 20 m then turns right again and walks 15 m. He now travels 10 m towards east to reach the park. In which direction is the park with respect to his house?
(A) South-west
(B) North-east
(C) East
(D) West
(E) North-west

26. Mr. Deshmukh starts from his school, travels a distance of 2 km southwards, and then travels a distance of 4 km towards east, then a distance of 3 km to his right, and then he turned right and traveled 4 km and 2 km after the first and second turns respectively. Finally he traveled 4 km towards east. How far is he from his school and in which direction?
(A) 5 km and South-east
(B) 5 km and North-west
(C) 7 km and South
(D) 7 km and South-east
(E) 12 km and North

27. Mr. Gaykwad walks 20 km towards north. Then he turns right and walks further 21 km. How far is he from the starting point and in which direction?
(A) 29 km and North-east
(B) $29\sqrt{2}$ km and South-west
(C) 10 km and North-east
(D) 20 km and North-west
(E) 28 km and South-west

28. Harry Potter hit the magic ball that can change directions on its own. It travelled 5 km towards east, turned left and travelled 20 km. Then, it turned right, travelled 11 km and then 5 km southwards. Then it further travelled 4 km towards east. How far is the ball from Harry Potter and in which direction?
(A) 21 km and North
(B) 12 km and South-west
(C) 12 km and North-east
(D) 32 km and South
(E) None of these

29. Mr. Thakre travels 12 km towards east, then 8 km towards north and finally 6 km towards west. How far is he from the starting point and in which direction?
(A) 10 km and North-east
(B) 10 km and North-west
(C) 18 km and North-west
(D) 24 km and North-east
(E) 32 km and North-west

30. Kalpana travels 3 km eastwards and then turns left and travels 6 km. She then turns right, and travels 2 km and then travels 3 km northwards. She finally travels 5 km westwards. How far is she from the starting position and in which direction?
(A) 9 km and North-east
(B) 9 km and North-west
(C) 13 km and North-east
(D) 9 km and North
(E) 12 km and South

31. Mr. Dabolkar starts from his house and travels 14 km towards north and then turns left and travels 30 km. He then turns right to travel 2 km followed by another right to travel 6 km. Finally, he travels 9 km southwards. Approximately, how far is the starting point from the final point and in which direction?
(A) 85 km and North-east
(B) 9 km and North-west
(C) 25 km and South-east
(D) 9 km and South-west
(E) 16 km and North-east

32. Aryan starts from point P and walks 50 m towards east. He then walks 10 m towards south and then walks 20 m to his right. Finally, he walks 50 m towards north to reach Q. How far and in which direction is P with respect to Q?
(A) 50 km and South-west
(B) 30 km and North
(C) 36 km and North
(D) 36 km and North-east
(E) 40 km and South

33. Mr. Tendulkar travels a distance of 10 km towards north, 7 km towards east and finally 14 km towards his left. How far is the initial position from the final position and in which direction?
(A) 25 km and North-east
(B) 24 km and North-east
(C) 25 km and South-west
(D) 31 km and South-east
(E) 35 km and South-west

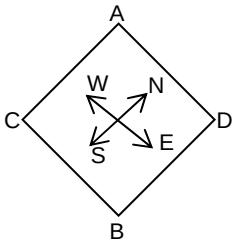
34. Sohil travels 18 km southwards, and then travels 4 km to his left. Again, he travels 4 km southwards. He travels another 11 km to his right. Now he turns to his right and travels 5 km. What is his position from the starting point?
(A) 22 km south, 15 km West
(B) 19 km south, 15 km West
(C) 17 km south, 7 km West
(D) 23 km south, 15 km West
(E) 29 km south, 17 km West

35. Mr. Patekar traveled a distance of 60 m towards south. Now, he turns right and travels 45 m. He then travels 30 m towards north and further travels by turning 45° in clockwise direction. In which direction is he traveling now?
(A) East (B) South-west
(C) North-east (D) North
(E) None of these

36. Sristi started walking towards north to reach his school. After reaching the school she turned 180° in clockwise direction and 45° in anticlockwise direction. Which direction is she facing now?
(A) North-west (B) North-east
(C) South-west (D) North
(E) South-east

37. Surabhi, who is facing north, turns 90° in clockwise and then 135° in anticlockwise direction. Which direction is she facing now?
(A) North-east (B) North-west
(C) South-east (D) South-west
(E) North

Directions for questions 38 and 39: The following questions are based on the diagram given below, showing four persons at four corners. A, B, C, and D of a square piece.



38. Rohan started walking from A towards B along the shortest distance and midway turns left and after covering half the distance he covered in the previous direction, he turned 90° in clockwise. Which direction is he facing now?
(A) North-west (B) South-east
(C) North-east (D) South-west
(E) South

39. Mr. Vaidya started walking from C to A and in the midway takes 90° turn in clockwise direction and after covering half the distance covered in previous direction, he turns right. Which direction is he facing now?
(A) South-west (B) South (C) North
(D) West (E) East

Directions for questions 40 to 50: Select the correct alternative from the given choices.

40. A clock is so placed that at 9 a.m. the minute hand points towards north-east. Which direction does the hour hand point at 3 p.m.?
(A) North-west (B) South (C) North-east
(D) South-east (E) North

41. When a watch shows 7:45, the minute hand points towards east. When the watch shows 3'Oclock, which direction does the hour hand point?
(A) North (B) East
(C) West (D) South
(E) North-west

42. A clock is placed in such a way, that at 12'Oclock, the hands point towards north-east. In which direction does the hour hand point at 6 p.m.?
(A) South-west (B) South-east
(C) East (D) South
(E) North-east

43. When watch shows 5:15. if the minute hand points towards the east, then in which direction will the hour hand point at 6:00?
(A) North (B) South
(C) North-west (D) South-west
(E) East

44. A compass was damaged and its needle turned in such a manner that the pointer, which was showing east, is now showing south. One person went towards west as per above compass. In which direction did he actually go?
(A) North (B) South
(C) East (D) West
(E) North-east

45. One evening, Dileep was facing a tree. The shadow of the tree fell to his right. Which direction was he facing?
(A) North (B) South (C) East
(D) South-east (E) West

46. One evening Dinesh and Swetha sat in a park such that their backs are towards each other. If Dinesh's shadow is falling to his left then which direction is Swetha facing?
(A) North-east (B) North (C) East
(D) South (E) South-east

47. One morning, Ram and Shyam were talking, facing each other. It is observed that Ram's shadow fell to his left. Then which direction was Shyam facing?
(A) East (B) South (C) North-east
(D) North (E) West

48. One morning Ravi observed that his shadow is falling to his right, which direction is he facing?
(A) North (B) South (C) East
(D) West (E) Cannot be determined

49. One evening Avinash and Abhinav are talking to each other while sitting at either ends of See-Saw facing each other. Avinash observed that his shadow is falling to his left. Which direction is Abhinav facing?
(A) North (B) East (C) West
(D) South (E) Cannot be determined

50. One evening Prajay and Pranav are sitting in a park. Prajay's shadow is falling on Pranav, then which direction is Prajay facing?
(A) South (B) East (C) West
(D) North (E) Cannot be determined

Key

1.	D	6.	D	11.	C	16.	A	21.	C	26.	A	31.	C	36.	E	41.	C	46.	B
2.	A	7.	E	12.	B	17.	D	22.	C	27.	A	32.	A	37.	B	42.	A	47.	B
3.	B	8.	B	13.	E	18.	A	23.	D	28.	E	33.	C	38.	B	43.	B	48.	B
4.	C	9.	D	14.	D	19.	C	24.	D	29.	A	34.	C	39.	B	44.	A	49.	A
5.	A	10.	B	15.	B	20.	E	25.	A	30.	D	35.	C	40.	D	45.	A	50.	E