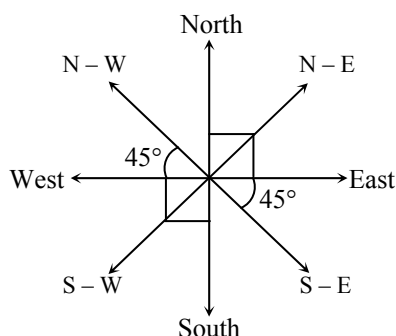


In this type of questions a successive follow-up of directions and/or distance is formulated and on the basis of given information you are required to ascertain the final direction with respect to the starting point or the shortest distance between the starting point and the final point.

Sometimes both the final direction and the distance covered are asked.

The diagram given below shows the four main directions and the four cardinals directions on a plane of paper:

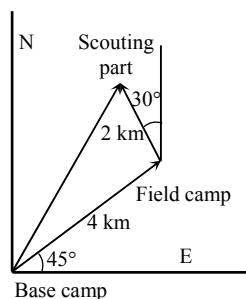


## Note

In studying the motion and distance travelled by body from origin to the destination need direction with respect to position to analysis of the track.

Let a scouting party has become trapped in a forest away from their field camp; based on their explorations, the scouts know that they are 2 km from the field camp in a direction  $30^\circ$  west of north.

They also know that the field camp is located 4 km from the base camp in a direction  $45^\circ$  North of East. They wish to radio their position to base camp so that food and supplies can be dropped by air as close to their position as possible. How can they pinpoint their location relative to the base camp?



**Example 1.** Amit started walking positioning his back towards the sun. After some time, he turned left, then turned right and towards the left again. In which direction is he going now?

- a. North      b. East      c. West      d. South

**Solution: (d)**

**Example 2.** Ram starts from his house and goes 15 km northwards, then travels 4 km to the left, then travels 5 km towards the left, then again travels 10 km towards the left, then travels 18 km towards the right, now far and in what direction is he from his house?

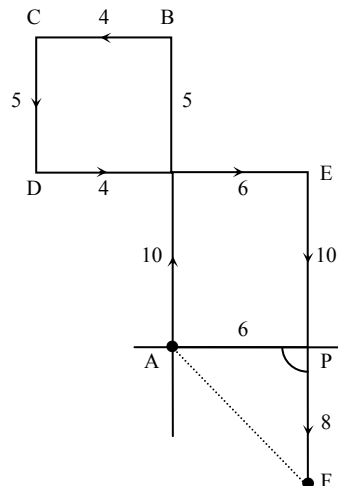
- a. 10 km, South-East      b. 10 km, North-East  
c. 9 km, South-West      d. 9 km, North-West

**Solution: (a)** Ram's house is at A. His movement is:

$A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$

The final position of Ram is at F.

Clearly, F is now in South-East from his house at A. Further, in  $\triangle APF$ ,  $\angle APF = 90^\circ$



So, by Pythagoras theorem, we have  $AF^2 = AP^2 + PF^2$

$$\Rightarrow AF = \sqrt{36 + 64} = \sqrt{100} = 10 \text{ km}$$

Thus, Ram is 10 km away from his house and in South-East direction.

**Example 3.** Sanjay walks 7 km towards North and turns towards left and covers 3 km. Again he turns towards left and walks 11 km. How far is he from the starting point?

- a. 16 km      b. 21 km  
c. 12 km      d. 5 km

**Solution: (d)** Sanjay started from A and walks 7 km North up to B, turns towards left (West) and goes 3 km to C and walks towards left (South) and 11 km and reaches point E.

Now  $DA = CA = 3 \text{ km}$

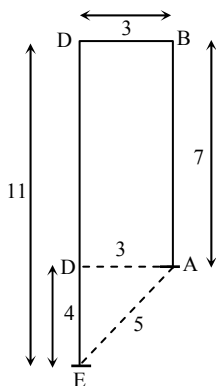
$$DC = AB = 7 \text{ km}$$

$$DE = 11 - DC = 4 \text{ km}$$

$$DA = 3 \text{ km}$$

$$DE = 4 \text{ km}$$

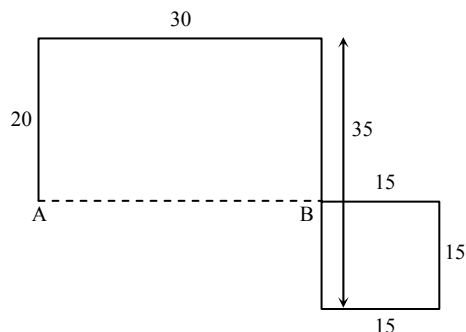
$$EA = \sqrt{DE^2 + DA^2} \\ = \sqrt{16 + 9} = 5$$



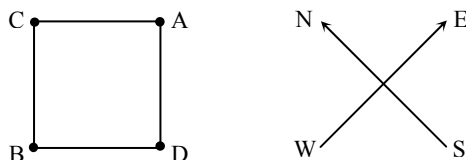
**Example 4.** Sushma walks 20 metres towards North. Then she turns right and walks 30 metres. Now, she turns right and walks 35 metres. Now turning left, she walks 15 metres. Again she turns left and moves 15 metres. Finally, she turns left and walks 15 metres. In which direction and how far is she from her original position?

- a. 15 metres East                      b. 30 metres East  
c. 15 metres West                      d. 45 metres West

**Solution: (b)** Sushma starts from A and after all the movements as per the directions given in the problem, she finally reaches the destination B. Now she is at distance of 30 metres in the eastern direction from her starting point.



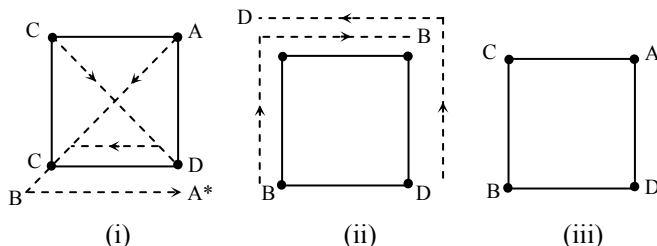
**Example 5.** In the figure given below, A, B, C and D are four persons stationed at the four corners of a square piece of plot. From the position shown in the figure, C and A move diagonally to opposite corners and then walk one side each in the clockwise direction (c wd) and anticlockwise direction (acwd), respectively along the sides. B and D move two sides, each clockwise and anticlockwise, respectively.



What is the new position A ?

- a. Northern corner                      b. Western corner  
c. Southern corner                      d. Eastern corner

**Solution: (c)** The movements of A and C and their final position is shown in Figure (i). The movements of B and D and their final positions are shown in Figure (ii) Now, the final positions of A, B, C and D are shown in Figure (iii).

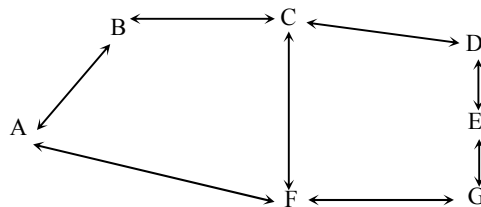


Now, you can deduce that A is in the southern corner.

**Example 6.** A, B, C, D, E, F and G are seven places on a map. The following places are connected by two-way roads: A and B, A and F, C and F, C and D, F and G, D and E, B and C, E and G. No other roads prevail.

- Which is the shortest route (route with least number of intermediate places) from A to G?  
a. A – C – G                      b. A – E – G  
c. A – F – G                      d. A – B – G
- If F to G and D to C are only one-way routes, then which of the following places loses contact with A?  
a. G                      b. E  
c. D                      d. No place loses contact with A
- How many distinct routes exist from D to F (without touching any place more than once)?  
a. 2                      b. 4                      c. 1                      d. 3
- Which of the following does the route covering the maximum number of places and going from A to C does not pass through?  
a. E                      b. D                      c. B                      d. F
- If the number of places to which a place is connected directly is considered to measure of importance, then which of the following places is of the highest importance?  
a. D                      b. B                      c. C                      d. A

**Solution (1-5):** Based on the conditions given in the problem, then route map of the places is as follows:



**Solution 1: (c)** As we see A – F–G is the shortest way (with only one intermediate point) from A to G.

**Solution 2: (d)** If F to G and D to C are only one-way routes, from the above figure, we see that from all places one can still reach A. Hence, none of the places loses contact with A.

**Solution 3: (d)** To travel from D to F, the routes available are: D – C – F; D – E – G – F and D – C – B – A – F. So, three routes exist.

**Solution 4: (c)** First, let us try to find out a route from A to C with the maximum number of intermediate points. By observation, we find that it is A – F– G – E – D – C. It does not touch B.

**Solution 5: (c)** For each of the places given in the alternative B, A, C and D, let us observe how many places are directly connected.

B is directly connected to two places.

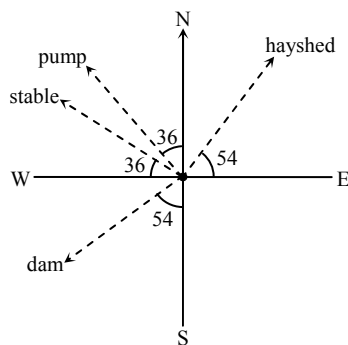
A is directly connected to two places.

C is directly connected to three places.

D is directly connected to two places.

### Multiple Choice Questions

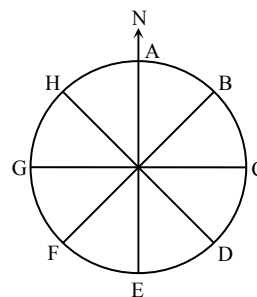
- A man is facing towards east and turns through  $45^\circ$  clockwise, again  $180^\circ$  clockwise and then turns through  $270^\circ$  anticlockwise. In which direction is he facing now?
  - West
  - North-east
  - South
  - South-east
- Gajra's position on her farm is shown by the dot on this diagram.



When Gajra walks in the direction  $N 54^\circ W$ , she will be heading towards the

- dam
  - pump
  - stable
  - hayshed
- A child is looking for his father. He went 90 metres in the west before turning to his left. He went 20 metres before turning to his left again to look for his father at his uncle's place 30 metres from this point. His father was not there. From there, he went 100 metres to his north before meeting his father in a street. How far from the starting point did the son meet his father?
    - 80 metres
    - 100 metres
    - 140 metres
    - 260 metres
  - P is to the east of Q, R is to the south of Q and T is to the west of R. P is in which direction with respect to T?
    - North-east
    - North-west
    - South-east
    - South-west

- A, B, C, D, E, F, G and H are sitting around a round table for group discussion at equal distances. Their positions are clockwise. If G sits in the north, then what will be the position of D?
  - East
  - South-east
  - South
  - South-west
- Eight people A, B, C, D, E, F, G and H are seated as shown in the diagram. All are facing in the outward direction, with their backs towards the centre. If all of them move anticlockwise to three places then



- A is facing South
  - B is facing West
  - E is facing East
  - H is facing North-west
- Hitesh was standing one morning in a field after sunrise. His father was coming from the opposite direction. His father's shadow was falling exactly behind him. Which direction was Hitesh facing?
    - East
    - West
    - North-East
    - North-West
  - I stand with my right hand extended sideways towards south. Towards which direction will my back be?
    - North
    - West
    - East
    - South
  - A man is performing yoga with his head down and legs up. His face is towards the west. In which direction will his left hand be?
    - North
    - South
    - East
    - West

10. At 1.45 pm, the hour hand will be in the direction of  
a. North-west    b. South-east  
c. West    d. North-east
11. Two squads A and B of soldiers, moving towards East and West respectively, received the following commands- Left Turn, Left Turn, Left Turn, Right Turn, Left Turn. Which directions would the squads A and B face at the end respectively?  
a. East, West    b. South, North  
c. North, South    d. West, East
12. Mohit starts from A and walks 2 km East upto B and turns southwards and walks 1 km upto C. At C he turns to East and walks 2 km upto D. He turns northwards and walks 4 km to E. How far is he from his starting point?  
a. 3 km    b. 4 km    c. 5 km    d. 6 km
13. A man is standing facing South. He turns  $135^\circ$  in the anticlockwise direction and after that  $180^\circ$  in the clockwise direction. Which direction is facing now?  
a. South-West    b. North-West  
c. North-East    d. South-East
14. A clock strikes 4:30 and its hour hand points to North, then in which direction will minute hand point at 11:15?  
a. South-West    b. North-West  
c. East    d. West
15. M is to the South-West of N, O is to the East of M and South-East of N and P is to the North of O on the line with MN, In which direction of direction of N is P located?  
a. South    b. South-West  
c. North-East    d. North
16. Kangana travelled from point A to point B which is 5 feet. He then travelled 6 feet to his right and then turned to left and went 4 feet. Finally she again went 6 feet to his left. How far is he form the point B now?  
a. 10 feet    b. 6 feet    c. 5 feet    d. 4 feet
17. A man starts from his house and walked straight for 10 metres towards North and turned left and walked 25 metres. He then turned right and walked 5 metres and again turned right and walked 25 metres. Which direction is he facing now?  
a. North    b. East  
c. South    d. West
18. Daily in the morning the shadow of Gol Gumbaz falls on Bara Kaman and in the evening the shadow of Bara Kaman falls on Gol Gumbaz exactly. So in which direction is Gol Gumbaz to Bara Kaman?  
a. Eastern side    b. Western side  
c. Northern side    d. Southern side
19. A and B standing at a distance of 20 km from each other on a straight East-West rod. 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 at the same speed. Then both turn to their left and cover distance of 5 km at the same speed. What will be the distance between them?  
a. 10 km    b. 30 km    c. 20 km    d. 25 km
20. From my house I walked 5 km towards North, I turned right and walked 3 km. again I went 1 km to the South. How far am I form my house?  
a. 7 km    b. 6 km    c. 4 km    d. 5 km
21. If a man on a moped starts form a point and rides 4 km South, then turns left and rides 2 km to turn again to the right to rise 4 km more, towards which direction is he moving?  
a. North    b. West    c. East    d. South
22. One evening, Raja started to walk toward the Sun. after walking a while, he turned to his right and again to his right. After walking a while, he again turned right. In, which direction is he facing?  
a. South    b. East    c. West    d. North
23. A man started walking West. He turned right, then right again and finally turned left. Towards which direction was he walking now?  
a. North    b. South    c. West    d. East
24. Vijit walks 10 metres westward, then turns left and walks 10 metres. He then again turns left and walks 10 metres. He takes a 45 degree turn rightwards and walks straight. In which direction is he walling now?  
a. South    b. West  
c. South-East    d. South-West
25. Sanmitra walked 8 m towards the North. He turned to his right and walked 16 m, then turned to his left and walked 5 m and again he turned to his left and walked 16 m. now how far is he from his starting point?  
a. 32 m    b. 23 m    c. 13 m    d. 16 m
26. Ankit travelled westwards 5 kms, turned left and travelled 3 km, turned right and travelled 9 km. he then travelled North 3 km. How far he is from the starting point?  
a. 5 kms    b. 3 kms    c. 6 kms    d. 14 kms

- 27.** K is a place which is located 2 km away in the North-West direction from the capital P, R is another place that is located 2 km away in the South–West direction from K. M is another place and that is located 2 km away in the North–West direction from R. T is yet another place that is located 2 km away in the South–West direction from M. In which direction is T located in relation to P?
- a.** South–West    **b.** North–West  
**c.** West                      **d.** North
- 28.** Deepak facing North and moves 20 km, then he turned to his right and moves 20 km and then he moves 10 km in North – East, then he turned to his right and moves 20 km and then he turned to his right and moves 20, and again he turned to his left and moves 20 km.

- Now in which direction Deepak is facing?
- a. South-East                      b. North-East
- c. South-West   d. North-West

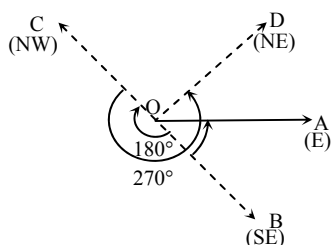
- 29.** A man starts walking from a point and walks 12 kms towards North. He, turns  $90^\circ$  left and walks a distance and stopped. If the distance between initial point and final positions is 13 kms, how much distance he travelled after turning from the North?
- a.** 1 km                      **b.** 5 kms                      **c.** 7 kms                      **d.** 2 kms
- 30.** Prateek travelled from a point A to B, a distance of 12 km. He turned right and travelled 8 km and reached point C. From that point took right turn and travelled 6 km, and reached point D. How far is he away from the starting point?
- a.** 10 km                      **b.** 12 km                      **c.** 13 km                      **d.** 14 km

## ANSWERS

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1.  | 2.  | 3.  | 4.  | 5.  | 6.  | 7.  | 8.  | 9.  | 10. |
| b   | c   | b   | a   | d   | b   | b   | b   | a   | d   |
| 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. |
| b   | c   | a   | b   | c   | d   | b   | b   | a   | d   |
| 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. |
| d   | a   | a   | d   | c   | d   | c   | a   | b   | d   |

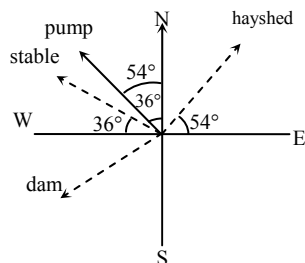
## SOLUTIONS

1. (b) The man initially faces direction OA (east). He then turns  $45^\circ$  clockwise to face direction OB (SE). He then turns  $180^\circ$  clockwise to face direction OC (NW).

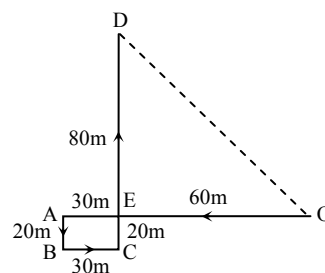


He finally turns  $270^\circ$  anticlockwise to face direction OD (NE).

2. (c) N  $54^\circ$  W means at an angle of  $54^\circ$  from north, westwards. Clearly, Gajra will be heading towards the stable as shown.



3. (b) Clearly, the child's movements are as shown in the figure (OA, AB, BC, CD).


$$OA = 90 \text{ m}, AE = BC = 30 \text{ m},$$
$$OE = OA - AE = (90 - 30) \text{ m} = 60 \text{ m}.$$
$$CD = 100 \text{ m}, CE = AB = 20 \text{ m}.$$
$$DE = CD - CE = (100 - 20) \text{ m} = 80 \text{ m}.$$

Distance of D from starting point O

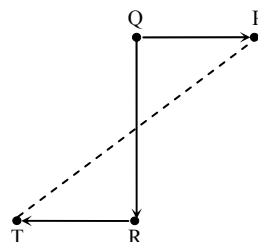
$$= OD = \sqrt{(OE)^2 + (DE)^2}$$

$$= \sqrt{(60)^2 (80)^2} \text{ m}$$

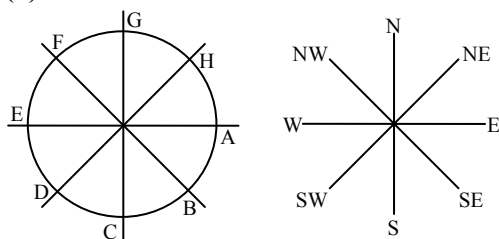
$$= \sqrt{3600 + 6400}$$

$$m = \sqrt{10000} \quad m = 100 \text{ m.}$$

4. (a) Clearly, P is to the north-east of T.

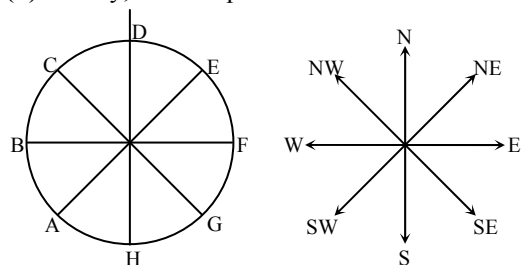


**5. (d)**



Clearly, D sits in the south-west.

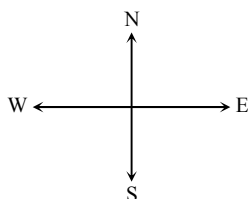
6. (b) Clearly, the new positions are as shown below:



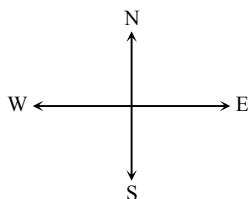
Clearly, A faces south-west, B faces west, E faces north-east and H faces south.

7. (b) Father's shadow was behind him. This means that he was facing the sun. At sunrise, the sun is in the east. So, Hitesh's father is facing east and Hitesh is facing west.

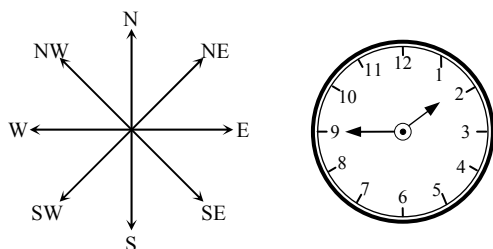
8. (b) If the right hand points towards south, the left hand points towards north, the face is towards east and the back is towards west.



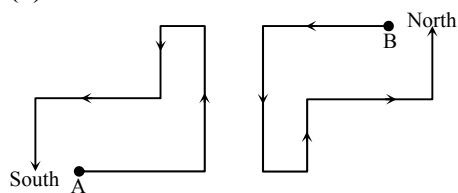
9. (a) Clearly, since the man is upside down and his face is towards west, his right hand will be towards south and left hand towards north.



**10. (d)** Clearly, as shown here, the hour hand points towards north-east.

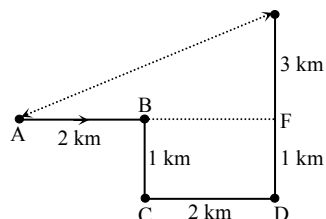


**11. (b)**



Now, A and B facing South and North respectively.

**12. (c)**

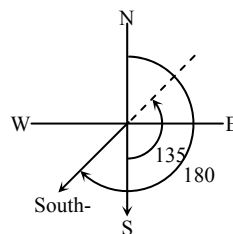


We are required the length of AE.

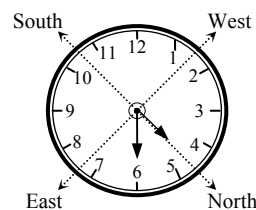
We know,  $AE^2 = AF^2 + EF^2 = 4^2 + 3^2 = 25$

$$\therefore AE = 5 \text{ km}$$

**13. (a)**

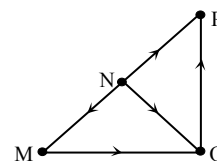


**14. (b)**



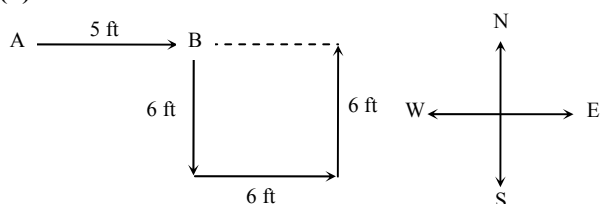
At 11:15, minute hand will be at 3 which is between North and West.

**15. (c)**

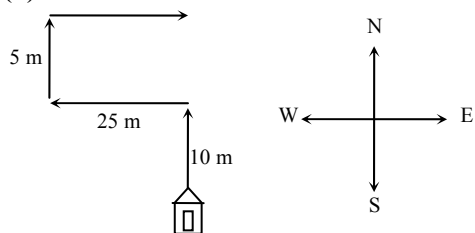


Clearly, P is located to the North-East of N.

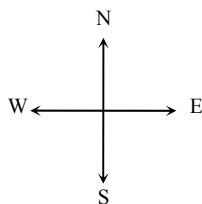
**16. (d)**



17. (b)

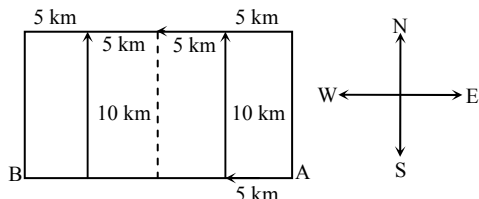


18. (b) Morning shadow is to the West. in evening shadow is in the East.

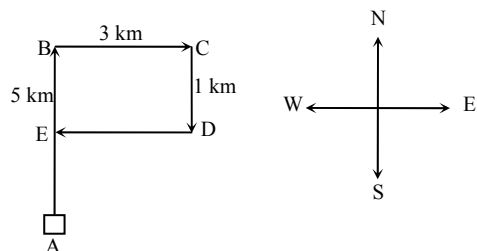


Therefore Gol Gumbaz is to the eastern side of Bara Kaman.

19. (a)

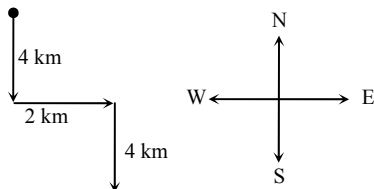


20. (d)

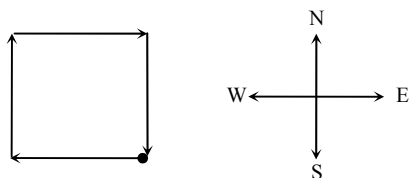


Required distance,  
 $= \sqrt{(AE)^2 + (DE)^2} = \sqrt{(4)^2 + (3)^2} = \sqrt{25} = 5 \text{ km}$

21. (d)

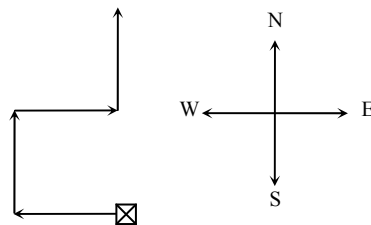


22. (a)



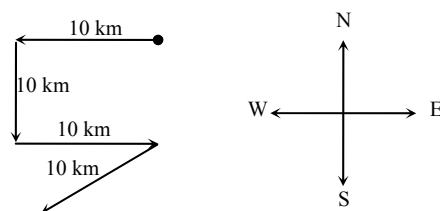
He is facing towards South.

23. (a)

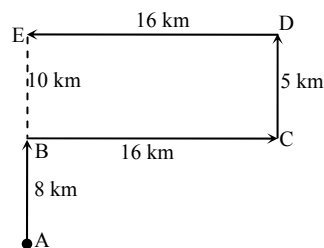


He is walking towards North

24. (d)

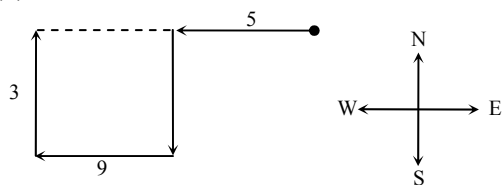


25. (c)



Required distance  
 $= AE = AB + BE = 8 + 5 = 13 \text{ m}$

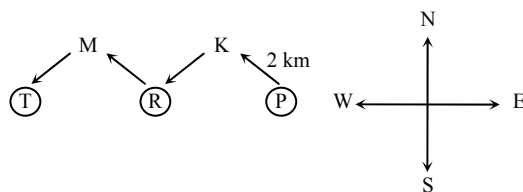
26. (d)



AD

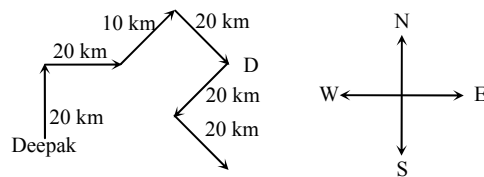
Ankit is  $(5 + 9)$  kms away from his starting point.

27. (c)



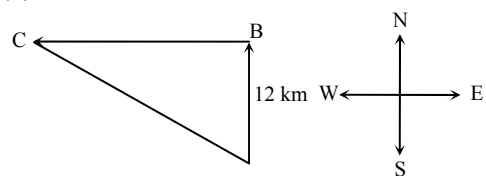
T is in west of P

28. (a)



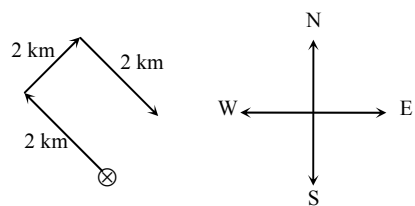
Deepak is facing towards South – East.

29. (b)



$$\begin{aligned} BC &= \sqrt{(13)^2 - (12)^2} \\ &= \sqrt{169 - 144} \\ &= \sqrt{25} = 5 \text{ km} \end{aligned}$$

30. (b)



He is the North – East direction from his starting point.

□ □ □