Direction Sense

Understanding direction sense is crucial for reasoning-based exams, navigation, and real-life applications. Below are detailed notes, including concepts of the sunrise and sunset directions.

1. Basic Directions

Primary Directions:

- North (↑)
- South (↓)
- East (→)
- West (←)

Intermediate Directions:

- North-East (NE) (↗) → Between North and East
- North-West (NW) (↖) → Between North and West
- South-East (SE) (↘) → Between South and East
- South-West (SW) (↙) → Between South and West

These directions form a compass-like structure that helps in orientation.

2. Concept of Right & Left Turns

When moving in a certain direction, turning right or left changes the orientation:

Right Turn Rule:

- Facing North → Turn Right → Now facing East
- Facing East → Turn Right → Now facing South
- Facing South → Turn Right → Now facing West
- Facing West → Turn Right → Now facing North

Left Turn Rule:

- Facing North → Turn Left → Now facing West
- Facing West → Turn Left → Now facing South
- Facing South → Turn Left → Now facing East
- Facing East → Turn Left → Now facing North

Shortcut:

- Two consecutive right turns = Equivalent to a U-turn (opposite direction).
- Two consecutive left turns = Equivalent to a U-turn (opposite direction).
- Four right or left turns = Brings back to the original direction.

3. Distance vs. Displacement

- Distance = Total path traveled.
- Displacement = Shortest distance from start to end.

4. Sun's Movement & Shadows

(A) Sunrise & Sunset

- The sun always rises in the East and sets in the West.
- At Noon, the sun is exactly overhead, so no shadows are formed.
- Understanding this helps in direction-based reasoning problems.

(B) Shadow Directions

Shadows are opposite to the sun's position.

- Morning (Sun in the East) → Shadows are towards the West
- Evening (Sun in the West) → Shadows are towards the East
- Afternoon (Sun overhead) → Shadows are very small or directly below

5. Important Tricks for Quick Solving

✔ Draw a diagram to visualize movements.

✔ Track right and left turns carefully.

✔ Use the Pythagorean theorem for displacement-based problems.

✔ Apply sun-shadow logic for direction-based questions.

1. Basic Direction Questions (20 Questions)

Q1-Q10: Finding the Final Direction

- 1. A person walks 5 km North, then turns right and walks 3 km, then turns right again and walks 5 km. Which direction is he facing now?
- 2. A person starts facing East, turns left, walks 10 km, turns left, walks 5 km, and turns right. Which direction is he facing now?
- 3. A car moves 4 km South, then turns right, moves 3 km, and turns left. Which direction is it facing?
- 4. A boy walks 2 km East, turns left, walks 1 km, turns left again, and walks 2 km. Which direction is he facing now?
- 5. A woman moves 6 km North, turns left, walks 4 km, then turns left and walks 6 km. Which direction is she facing?
- 6. If a man is facing West and turns 90° clockwise, then 180° anti-clockwise, and finally 90° clockwise, which direction is he facing?
- 7. A cyclist starts from point A towards South, turns left after 4 km, moves 5 km, turns right, and moves 3 km. Which direction is he facing now?
- 8. A truck moves 8 km North, then turns 90° left and moves 6 km. Which direction is it facing?
- 9. A person walks 12 km towards the East, turns right, walks 5 km, and turns right again for 12 km. Which direction is he facing?
- 10. A dog moves 10 m North, turns right, moves 4 m, turns right again, and moves 10 m. Which direction is it facing?

Q11-Q20: Distance & Displacement

- 11. A person moves 3 km North, 4 km East, then 3 km South. How far is he from the starting point?
- 12. A car moves 10 km West, then 10 km South, and finally 10 km East. What is the displacement?
- 13. A man walks 6 km North, then 8 km East. Find the shortest distance from the starting point.
- 14. A bird flies 5 km East, 5 km North, and 5 km West. What is its final distance

from the start?

- 15. A girl moves 4 km South, 3 km East, 4 km North, and 3 km West. How far is she from her starting point?
- 16. A truck moves 15 km North, then 8 km West. What is the shortest distance back to the starting point?
- 17. A person walks 5 km South, 12 km East. What is the shortest distance from the starting point?
- 18. A delivery boy moves 10 km West, 5 km North, and 10 km East. How far is he from the start?
- 19. A car moves 7 km East, 24 km North. Find its displacement.
- 20. A child runs 3 km West, 4 km South, 3 km East, and 4 km North. How far is he from the starting point?

2. Right & Left Turns (20 Questions)

- **Q21-Q30: Turns in Simple Movement**
- 21. A person is facing North, turns 90° right, then 180° left. Which direction is he facing?
- 22. A dog starts facing East, turns 270° clockwise. What is its final direction?
- 23. A cyclist is facing South, turns 90° left, then 90° left again. Which direction is he facing?
- 24. A person facing West turns 90° right, then 45° left. Which direction is he facing?
- 25. If a man is facing South, turns 180° right, then 90° left, what is his final direction?
- 26. A car is facing North, turns 135° clockwise, then 45° anti-clockwise. What is its final direction?
- 27. A truck facing East turns 90° left, then 90° left again. What is the final direction?
- 28. A child facing North turns 45° right, then 90° left. Which way is he facing?
- 29. A bus moves North, takes a 270° clockwise turn. What is the final direction?

- 30. A boy is walking East, turns 180° left. What is his new direction?

Q31-Q40: Complex Turns with Distances

- 31. A person walks 5 km North, 4 km East, takes a 90° right turn, walks 6 km. Which direction is he facing?
- 32. A cyclist moves 10 km South, turns left, moves 5 km, turns left again for 10 km. What is the final direction?
- 33. A car moves 4 km West, 6 km North, turns right for 5 km. What is its final direction?
- 34. A man walks 7 km East, turns left for 4 km, then right for 3 km. Which direction is he facing?
- 35. A taxi moves 9 km North, turns right for 5 km, then left for 7 km. What is the direction now?
- 36. A person walks 6 km South, turns right for 8 km, turns left for 6 km. What is the final direction?
- 37. A bus travels 10 km North, turns left for 4 km, then left for 3 km. What is the final direction?
- 38. A car moves 3 km South, 2 km East, takes a left for 5 km, and a right for 6 km. Which way is it facing?
- 39. A person moves 6 km West, turns right for 5 km, then right again for 6 km. Final direction?
- 40. A dog moves 7 km East, turns right for 5 km, then right for 4 km. Which direction is it facing?

3. Sunrise, Sunset & Shadow-Based Questions (20 Questions)

- 41. If a person's shadow is towards the left in the morning, which direction is he facing?
- 42. If a shadow falls towards the East, in which direction is the sun?
- 43. In the afternoon, in which direction does a shadow fall?
- 44. If a man is facing his shadow in the morning, which direction is he facing?

- 45. A boy's shadow is to the left in the evening. Which direction is he facing?
- 46. If a tree's shadow is towards the West, in which direction is the sun?
- 47. If a person is facing North, where will his shadow be in the morning?
- 48. If a streetlight is on, which direction will a shadow fall at night?
- 49. In which direction does the sun set?
- 50. If a boy is facing his shadow in the evening, which way is he facing?

4. Advanced Direction-Based Questions (51-80)

Q51-Q60: Complex Movements & Final Position

- 51. A man moves 10 km North, turns right for 5 km, then right for 8 km, and finally left for 3 km. How far is he from the start?
- 52. A boy walks 6 km South, turns left for 4 km, then left for 3 km, and finally right for 2 km. What is the shortest distance from the start?
- 53. A cyclist moves 4 km East, 3 km North, then 4 km West, and 3 km South. What is the displacement?
- 54. A truck moves 8 km South, turns right for 6 km, then right for 8 km, and finally left for 5 km. Find the shortest distance from the start.
- 55. A girl walks 12 km North, 6 km West, 8 km South, and 6 km East. What is her displacement?
- 56. A delivery boy moves 5 km West, 4 km South, 5 km East, and 4 km North. How far is he from his starting position?
- 57. A person walks 9 km North, then 12 km East, then 9 km South. How far is he from the start?
- 58. A bus moves 15 km North, turns left for 8 km, turns left for 15 km. What is the shortest distance to the start?
- 59. A person moves 10 km West, 5 km North, and 10 km East. What is the shortest distance to the start?
- 60. A girl walks 7 km North, then 4 km West, then 7 km South. How far is she from the starting point?

Q61-Q70: Clockwise & Anti-Clockwise Turns

- 61. A person is facing North, turns 90° right, then 180° left. Which direction is he facing?
- 62. A truck is facing South, takes a 90° left turn, then a 180° right turn. What is the final direction?
- 63. A cyclist moves North, takes a 135° clockwise turn. What is the final direction?
- 64. A boy is walking East, turns 180° left. What is his new direction?
- 65. A taxi moves North, takes a 270° clockwise turn. What is the final direction?
- 66. A person facing West turns 45° right, then 90° left. Which way is he facing?
- 67. A bus moves East, takes a 225° clockwise turn. What is the final direction?
- 68. A child facing North turns 45° right, then 90° left. Which way is he facing?
- 69. A person is facing West, turns 135° clockwise. What is the final direction?
- 70. A person is facing North, takes a 90° right turn, then 45° right again. What is the final direction?

Q71-Q80: Real-Life Direction Applications

- 71. A person is standing facing the setting sun. Which direction is to his left?
- 72. A person is facing East, and his shadow is on his right. What time of day is it?
- 73. If a person walks directly towards the rising sun, which direction is he moving in?
- 74. In the evening, a man faces his shadow. Which direction is he facing?
- 75. In which direction will a person's shadow be at 12 PM?
- 76. A person stands facing North, then turns right and walks 5 km. Which direction is he moving?
- 77. A dog is running towards the morning sun. Which direction is it moving?
- 78. If a person is facing the North Pole, in which direction does the sun rise?
- 79. A house's front door faces South. If a person enters and turns left, which

direction is he facing?

- 80. If you face East and turn 90° right, then 90° right again, which direction are you facing?

5. Challenge Questions (Difficult Level) (81-100)

- 81. A person moves 5 km North, then 3 km East, then 4 km South, then 6 km West. How far is he from the starting point?
- 82. A girl walks 10 km South, 6 km West, 3 km North, and 6 km East. What is her final displacement?
- 83. A person moves 8 km North, then 6 km West, then 8 km South. What is the shortest distance to the starting point?
- 84. A car moves 12 km South, then 5 km East, then 3 km South, and finally 5 km West. Find the shortest distance to the start.
- 85. A cyclist moves 10 km North, turns right for 8 km, then right for 10 km. What is the shortest distance back to the start?
- 86. A delivery boy moves 7 km West, 5 km South, 7 km East, and 5 km North. What is his final displacement?
- 87. A person moves 9 km East, then 12 km South, then 9 km West. How far is he from the start?
- 88. A dog moves 10 km North, then 5 km West, then 10 km South. What is the shortest distance to the start?
- 89. A person moves 6 km West, then 5 km North, then 6 km East. What is the shortest distance to the start?
- 90. A bus moves 7 km North, then 4 km West, then 7 km South. What is the shortest distance to the starting point?
- 91. A person is facing North, turns 90° left, then 45° right. What is his final direction?
- 92. A car moves 10 km North, then 10 km East, then 10 km South, then 10 km West. What is the displacement?
- 93. A person moves 7 km South, then 3 km West, then 7 km North. How far is he from the start?

- 94. A person walks 5 km North, then 4 km East, then 3 km South. What is the shortest distance to the start?
- 95. A man moves 15 km North, then 8 km West. What is the shortest distance back to the starting point?
- 96. A person walks 10 km West, 5 km North, and 10 km East. How far is he from the start?
- 97. A person moves 7 km East, 24 km North. Find the shortest distance to the starting point.
- 98. A child runs 3 km West, 4 km South, 3 km East, and 4 km North. How far is he from the start?
- 99. A person moves 6 km West, then 5 km North, then 6 km East. What is the shortest distance back to the start?
- 100. A truck moves 7 km North, then 4 km West, then 7 km South. What is the shortest distance back to the starting point?