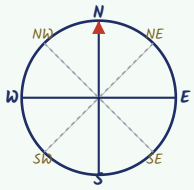
Direction & Distance

~ Reasoning · SSC Exams ~

← circled = key tricks!

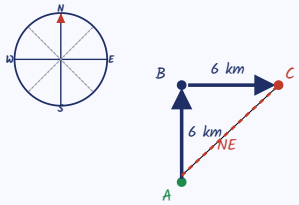
These questions test how well you can trace a person's path on an imaginary compass and find the final direction or shortest distance from the start. Master the 8 directions and the turning rules first — everything else in this notebook builds on them.

① The 8 Directions ⊕



4 main directions: North, South, East, West — 90° apart.
4 ordinal directions: North-East, South-East, South-West, North-West — exactly between two mains, 45° apart.
Clockwise from North: N → NE → E → SE → S → SW → W → NW → back to N.

Worked example — tracing a simple path



Rahul starts at point A, walks 6 km North to B, then turns and walks 6 km East to C. In which direction is C from A?
Step 1 — plot it: A(start), 6 km up to B, 6 km right to C.
Step 2 — East displacement = North displacement = 6 km ∴ the resultant lies exactly on a diagonal.
Answer → C is to the **North-East** of A. ✅

Tip → when the East-West displacement equals the North-South displacement, the final direction is always a pure diagonal (NE/NW/SE/SW) — never say "North" or "East" alone in that case.

✓ This notebook covers **every SSC Direction & Distance type**: turns & the clock method, path tracing, shortest distance (Pythagoras), net-displacement bookkeeping, shadow problems, angle-of-turn/bearing & the classic facing-direction traps — each with a solved example.

② Left / Right Turns — The Clock Trick

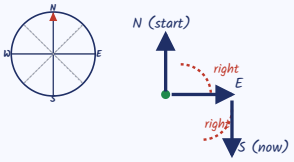
Rule

A **RIGHT** turn = 90° **clockwise**; a **LEFT** turn = 90° **anticlockwise**. Picture yourself as a clock's hour hand — right turn = hand moves forward, left turn = hand moves backward.

Clockwise cycle (right turns): N → E → S → W → N.

Anticlockwise cycle (left turns): N → W → S → E → N.

Worked example — two right turns



A boy faces North. He turns 90° to his right, walks on, then turns 90° to his right again. Which direction does he face now?

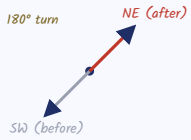
Step 1 — facing N, right turn → E.

Step 2 — facing E, right turn → S.

Answer → he now faces **South**. ✅ (two right turns = 180° reversal)

③ Clockwise / Anticlockwise & 90°/180° Turns

"Turn clockwise" = same as turning right; "turn anticlockwise" = same as turning left. A **180° turn** (either way) always means facing exactly opposite: N↔S, E↔W, NE↔SW, NW↔SE.



Worked example — facing South-West, a girl turns 180°. Which direction does she face now?

Answer → exact opposite of SW is **North-East**. ✅

Try this — opposite-sense turns cancel

Facing East, turn 90° anticlockwise, then 90° clockwise. Final direction?

Anticlockwise from E → N; clockwise from N → E. The two turns cancel ∴ back to **East**. ✅

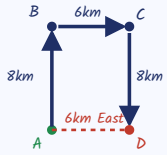
Two turns of the **same size, opposite sense** cancel out; two turns of the **same size, same sense** add up (right+right = 180° reversal).

④ Tracing a Multi-Turn Path

Rule

Draw a rough grid. Start facing **North** (default, unless stated). For each "turn left/right, walk X km", redraw the facing direction FIRST, then draw that leg's arrow. Mark the start (A) and end point; the direction from **START to END** (straight line) is the answer — not the direction you're facing at the end!

Worked example (real SSC pattern)



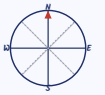
Sourav walks 8 km North from his house. He turns right and walks 6 km. He turns right again and walks 8 km. In which direction and how far is he from his start?

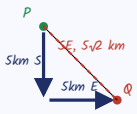
Step 1 — A→North 8→B; facing N, right turn→E, 6km→C; facing E, right turn→S, 8km→D.

Step 2 — the two 8 km legs (North then South) cancel exactly; only the 6 km East leg remains.

Answer → Sourav is **6 km due East** of his starting point. ✅

Try this — a diagonal result





From P, walk 5 km South, turn left, walk 5 km. Find the direction of the final point Q from P.

Facing S, left turn → E ∴ 5 km South then 5 km East — equal legs → Q is **South-East** of P, at distance **5√2 km**. ✅

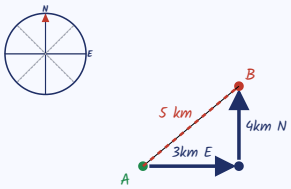
> If two legs in **opposite compass directions** have equal length, they fully cancel — cross them out before working out the final direction.

⑤ Shortest Distance — $\sqrt{(x^2+y^2)}$

Rule

Find the NET East–West displacement (x) and NET North–South displacement (y) — these two are always perpendicular. The straight-line ("as the crow flies") distance from start to end is **Distance = $\sqrt{(x^2 + y^2)}$**. This is **not** the total distance walked.

Worked example — the classic 3-4-5



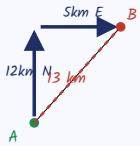
A man walks 3 km East, then 4 km North. How far is he from the starting point?

Step 1 — x = 3 (East), y = 4 (North) — perpendicular legs.

Step 2 — Distance = $\sqrt{(3^2+4^2)}$ = $\sqrt{(9+16)}$ = $\sqrt{25}$.

Answer → **5 km**. ✅

Worked example — a bigger triple



Priya walks 12 km North, then 5 km East. What is the shortest distance back to her starting point?

x = 5, y = 12 → Distance = $\sqrt{(25+144)}$ = $\sqrt{169}$ = **13 km**. ✅

Pythagorean triples worth memorising

3, 4, **5**	6, 8, **10**	5, 12, **13**
8, 15, **17**	7, 24, **25**	9, 12, **15**

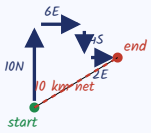
SSC loves these triples — memorise them so you can spot $\sqrt{(x^2+y^2)}$ instantly, without a calculator.

⑥ Net-Displacement Bookkeeping

Rule

For journeys with **many legs**, don't just draw — **tabulate**. Keep two running totals: East(+)/West(−) and North(+)/South(−). Add or subtract each leg into the right column. At the end, the two totals ARE your net x and y — plug into $\sqrt{(x^2+y^2)}$ or read the direction straight off.

Worked example — a 4-leg journey



A cyclist rides 10 km North, 6 km East, 4 km South, then 2 km East. Find his position relative to the start.

North–South: +10 − 4 = **6 N**

East–West: +6 + 2 = **8 E**

Answer → he is 8 km East & 6 km North of start ∴ shortest distance = $\sqrt{(8^2+6^2)}$ = $\sqrt{100}$ = **10 km**. ✅

Ledger cheat-sheet

North & East legs → **add (+)** to their column.

South & West legs → **subtract (−)** from their column — the #1 sign-error spot!

Two legs cancel completely only if same axis, opposite direction, equal length.

Keep a running total AS you read the question, leg by leg — don't wait till the end. This avoids the classic sign error on South/West legs.

⑦ Shadow Problems — Sunrise & Sunset Rules ☼

Rule

At **sunrise**, the sun is in the East → every shadow falls toward the **West**. At **sunset**, the sun is in the West → every shadow falls toward the **East**. Morning shadows shrink and lean West; evening shadows grow and lean East. Shadow is always **opposite** the sun.

Worked example — morning

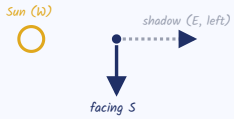
In the morning, Ramesh's shadow falls exactly to his left. Which direction is he facing?

Step 1 — morning → sun in East → shadow falls West.

Step 2 — shadow (West) is on his LEFT. Facing North, left = West ✓.

Answer → Ramesh is facing **North**. ✅

Worked example — evening



In the evening, Sita's shadow falls exactly to her left. Which direction is she facing?

Evening → sun in West → shadow falls East. Shadow (East) on her LEFT. Facing South, left = East ✓.

Answer → Sita is facing **South**. ✅

Facing → Left / Right cheat table

Facing N → right=E, left=W	Facing S → right=W, left=E	Facing E → right=S, left=N	Facing W → right=N, left=S

💡 Shadow direction is always **opposite** the sun's direction, and left/right always depend on the person's own facing — draw a stick figure and mark hands if unsure.

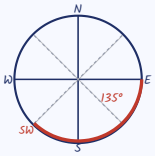
⑧ Angle of Turn & Bearing Between Directions

Rule

The compass is a clock face split into **8 slices of 45°** each. Adjacent directions (N & NE) = 45° apart; one-direction-between (N & E) = 90° apart; opposite directions (N & S) = 180° apart. For multiple turns, simply **add** each turn's degrees (equal opposite-sense turns cancel).

N–NE = **45°**	N–E = **90°**	N–SE = **135°**	N–S = **180°**

Worked example — total turning angle



A man faces East. He turns 45° clockwise, then another 90° clockwise. Total turn, and final direction?

Step 1 — total turn = 45° + 90° = 135° clockwise.

Step 2 — from East, 135° clockwise: E(0)→SE(45)→S(90)→SW(135).

Answer → he now faces **South-West**, having turned **135°**. ✅

Try this — opposite paths

Two friends start from the same point, one walking towards North-West, the other towards South-East. What is the angle between their paths?

NW and SE are exactly opposite ∴ angle = **180°**. ✅

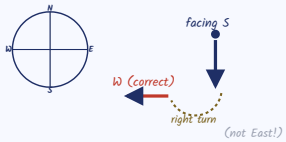
Remember the compass as an 8-slice clock — the angle between any two directions is just (number of slices between them) × 45°.

⑨ Common Traps — When "Left/Right" Flips ∞⊗

Rule

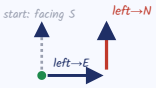
Your LEFT and RIGHT depend entirely on which way **YOU** are facing — they are not fixed compass directions. The #1 SSC trap: assuming "right" always means East. It only means East when you are facing North!

Trap example 1



Ram is facing South and turns to his right. Which direction does he face now?
Wrong guess: students assume "right" = East always. Correct: rotate 90° clockwise from South → West.
Answer → Ram now faces **West**, NOT East. ✅ Always rotate from the CURRENT facing.

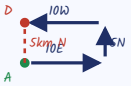
Trap example 2 — two lefts



Walking towards South, a woman turns left, walks on, then turns left again. Which direction is she now walking?
Facing S, left turn → E. Facing E, left turn → N.
Answer → she now walks towards **North** (two lefts = 180° reversal, same rule as page 2). ✅

Trap — "left of West" is South, not North! Write the full facing→left/right table (page 6) in the margin before you start if unsure.

⑩ Mixed Practice — Full SSC-Style Problems



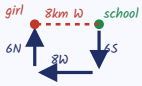
Example A — One morning, Suresh walks towards the sun. After 10 km he turns left and walks 5 km. He turns left again and walks 10 km. In which direction and how far is he from his start?

Step 1 — morning, "towards the sun" = towards East → walk 10 km East.

Step 2 — facing E, left→N, walk 5 km. Facing N, left→W, walk 10 km.

Step 3 — the 10 km East and 10 km West legs cancel; only the 5 km North leg remains.

Answer → Suresh is **5 km due North** of his start. ✅



Example B — A girl leaves school and walks 6 km South. She turns right and walks 8 km. She turns right again and walks 6 km. Find her distance & direction from school.

Step 1 — facing S, right→W, walk 8 km. Facing W, right→N, walk 6 km.

Step 2 — the two 6 km legs (South then North) cancel; only 8 km West remains.

Answer → she is **8 km due West** of school (shortest distance = 8 km). ✅

Try this — ties shadow-timing to Pythagoras

At noon (shadow shortest), Meena walks 3 km East and 4 km South from her office. Shortest distance back?

$\sqrt{(3^2+4^2)} = \sqrt{25} =$ **5 km**. ✅

Always identify: (1) starting facing, (2) each turn's real result, (3) net x/y, (4) Pythagoras only for shortest distance — never the total distance walked.

How to Attack ANY Direction Question ⊕

1→ Assume facing **North** at the very start unless the question states otherwise.

2→ For every "turn left/right" or "clockwise/anticlockwise", recompute the new facing using the compass cycle — never guess.

3→ Sketch a rough grid as you read; mark each stop with a letter (A, B, C...) and label each arrow's length and direction.

4→ For the FINAL answer, look only at the straight line from START to END — ignore the direction you're facing at the end unless specifically asked.

5→ Distance? Use net x, y → $\sqrt{(x^2+y^2)}$. Direction only? Equal x,y → diagonal; one is zero → pure N/S/E/W; unequal → lean towards the bigger one.

Common traps → forgetting South/West legs are NEGATIVE; assuming "right" always = East; mixing up morning/evening shadow rules; answering with the FACING direction instead of the DISPLACEMENT direction.

Quick Pattern Gallery — one-glance revision

Right turn (cw): N→E→S→W→N

Left turn (acw): N→W→S→E→N

180° turn: exact opposite direction

Sunrise: shadow → West

Sunset: shadow → East

Equal x,y: pure diagonal (NE/NW/SE/SW)

x or y = 0: pure N/S/E/W

Distance: $\sqrt{(x^2+y^2)}$

Two same-sense 90°: = 180° reversal

Two opposite-sense equal: cancel out

Triples: 3-4-5, 6-8-10, 5-12-13, 8-15-17

Facing West: right=North, left=South

Exercise — Direction & Distance

Real SSC CGL / CHSL pattern questions — solve, then check the Answer Key on the next page.

Q1. Rahul walks 4 km North, then 3 km East. How far is he from the start?
(1) 5 km (2) 7 km (3) 6 km (4) 4 km

Q2. Facing North, a man turns 90° clockwise, then 180°. Which direction now?
(1) South (2) West (3) North (4) East

Q3. From a point, walk 5 km South, turn left, walk 5 km, turn left, walk 5 km. Distance from start?
(1) 5 km (2) 10 km (3) 15 km (4) 0 km

Q4. In the evening, a man's shadow falls to his left. Which direction is he facing?
(1) North (2) South (3) East (4) West

Q5. A cyclist rides 8 km East and 8 km North. Direction from start?
(1) North (2) North-East (3) East (4) South-East

Q6. Two persons walk from one point, one towards NW, other towards SE. Angle between them?
(1) 90° (2) 135° (3) 180° (4) 45°

Q7. A man walks 5 km North, then 12 km East. Distance from start?
(1) 13 km (2) 17 km (3) 15 km (4) 12 km

Q8. Facing South, a woman turns to her right. Which direction now?
(1) East (2) West (3) North (4) South

Q9. At sunrise, a man's shadow falls in front of him as he walks. Direction of walking?
(1) East (2) West (3) North (4) South

Q10. A man walks 3 km West, 4 km South. Shortest distance & direction from start?
(1) 5 km, SW (2) 7 km, NE (3) 5 km, NW (4) 1 km, SE

Q11. Rita walks East 15 km, turns left, walks 8 km, turns left, walks 15 km. Distance from start?
(1) 8 km (2) 15 km (3) 23 km (4) 30 km

Q12. A man faces West and turns 90° anticlockwise. Which direction is he now walking?
(1) North (2) South (3) East (4) West

✓ *Solve every question on paper first — sketch the grid & write each turn's new facing — then flip the page to check.*

Answer Key

Q1 → 5 km — x=3, y=4 → √(9+16)=√25=5. Classic 3-4-5 triple.

Q2 → West — N, clockwise 90°→E; then 180° from E → opposite = W.

Q3 → 5 km — 5S, left→E5 (net E5,5S→pos (5,-5)), left→N5 (pos (5,0)) → 5 km due East.

Q4 → South — evening→shadow East; shadow on left → facing South (left=East).

Q5 → North-East — equal East & North displacement (8,8) → pure diagonal NE.

Q6 → 180° — NW and SE are exactly opposite directions.

Q7 → 13 km — x=12, y=5 → √(144+25)=√169=13. The 5-12-13 triple.

Q8 → West — facing S, right turn (clockwise) → W.

Q9 → West — sunrise→shadow West; shadow in front = walking towards where shadow points → West.

Q10 → 5 km, South-West — x=−3 (W), y=−4 (S) → √(9+16)=5; both West & South → SW quadrant.

Q11 → 8 km — E15, left→N8 (pos 15,8), left→W15 (pos 0,8) → 8 km due North.

Q12 → South — facing W, anticlockwise (left) turn → S (cycle N→W→S→E→N).

Score yourself

10–12 correct → **excellent**, Direction & Distance is your strength! 6–9 → **good**, revisit pages 2–9.
Below 6 → **redo** the "How to Attack" steps on page 10 slowly, sketching every leg.

Final recap — the whole notebook in 4 lines

1→ Track facing direction turn-by-turn using the clockwise / anticlockwise cycle.

2→ Keep a running East-West / North-South ledger for every leg of the journey.

3→ Shortest distance = √(net x^2 + net y^2); equal x,y = a pure diagonal.

4→ Sunrise→shadow West, Sunset→shadow East; left/right always depends on current facing.

☆ Find your bearing, master every turn! ☆