Unit 18 · Coordinate Geometry

STUDY NOTES

Key terms

Axes: XX', the **X-axis** (across), and YY', the **Y-axis** (up and down), crossing at right angles.

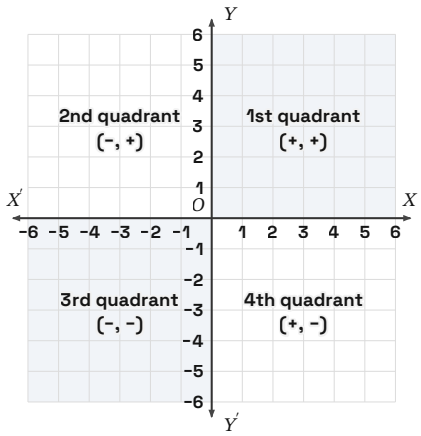
Origin: $O(0, 0)$, where the axes cross; every point is found by starting from it.

Coordinates: the two numbers that place a point: $A(5, 6)$.

Ordered pair: (x, y); the order matters.

x-coordinate, **y-coordinate**: the first and the second number.

The graph board



XX' and YY' cross at the origin O and make four quadrants.

- positive axes OX (right), OY (up); negative OX' (left), OY' (down); X' read "X dash"
- quadrants counted from the top right, the opposite way to a clock's hands
  - XOY 1st
  - $X'OY'$ 3rd
  - YOX' 2nd
  - $Y'OX$ 4th

Reading coordinates

1. start at O
2. count **across** first: right +, left −
3. then **up or down**: up +, down −
4. write (across, up)

- $A(5, 6)$: 5 right, 6 up
- $D(-8, -3)$: 8 left, 3 down
- animals
  - cat (3, 5)
  - monkey (−2, −3)
  - dog (−8, 2)
  - mouse (8, −4)
- treasure: 6 steps left, 2 up from the gate → (−6, 2), 2nd quadrant

Signs and quadrants

From O, go	Signs	Quadrant
right, then up	(+, +)	1st: (5, 6)
left, then up	(−, +)	2nd: (−4, 4)
left, then down	(−, −)	3rd: (−8, −3)
right, then down	(+, −)	4th: (7, −3)

Points on the axes

- on the X-axis: (x, 0), no move up or down: $B(10, 0)$, (−6, 0)
- on the Y-axis: (0, y), no move across: (0, −5)
- the origin is (0, 0), on both axes
- a point on an axis is in **no quadrant**

Plotting

- **plot** = mark: $B(-4, 5)$: from O, 4 left, 5 up, dot, write B
- join in order, back to the first; name the shape; **area by counting squares**: (4, 4), (−4, 4), (−4, −4), (4, −4) → a square 8 by 8 = **64 square units**; (0, 9), (5, 9), (5, −2), (0, −2) → $5 \times 11 = 55$
- a slanting side: count the box round it, take away the half-boxes outside
- the house: agree the origin (bottom left corner) and the unit (one square); join (2, 1), (6, 1), (6, 4), (4, 6), (2, 4) in order, back to the first

Where it is used

- chess: columns a to h, rows 1 to 8; White's king starts on e1
- spreadsheets: "C10" is column C, row 10
- maps: latitude and longitude; Bhaktapur Durbar Square about 27.67° N, 85.43° E

COMMON MISTAKES

✗ (3, 5) and (5, 3) are the same point
✓ across first: 3 right 5 up is not 5 right 3 up.

✗ 3 left, 5 down written (−5, −3)
✓ across first: (−3, −5).

✗ (−4, 7) in the 1st quadrant
✓ left and up: 2nd quadrant.

✗ a point on the Y-axis has y-coordinate 0
✓ its x-coordinate is 0: (0, −5).