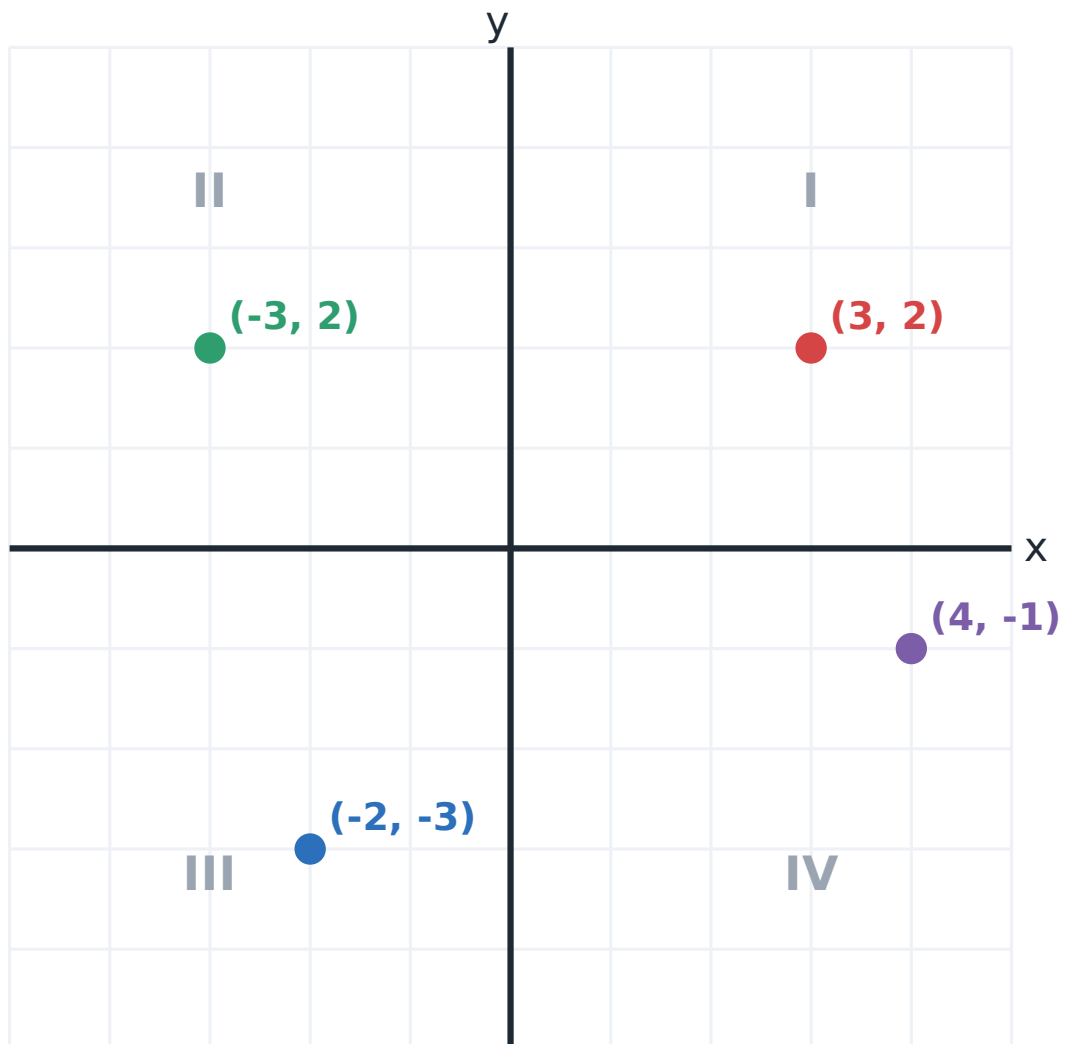


2D Space & Structures — Practice Worksheet

Part A — Cartesian plane, transformations & angles

The Cartesian plane is two number lines crossing at zero (the origin). A coordinate pair (x, y) gives a position: x across first, then y up or down. The axes divide the plane into four quadrants.

The Cartesian Plane - Four Quadrants



Each point is located by its (x, y) coordinates.

Worked example. To plot $(-3, 2)$: go 3 **left** along the x -axis, then 2 **up**. That point sits in Quadrant II (top-left).

Watch out. Coordinates are always (x, y) — across before up. Reading them as (y, x) lands you in the wrong place.

Plotting points (four quadrants)

Q1. Write the coordinates of each plotted point on the diagram: the red, green, blue and purple dots.

Q2. Plot and label these on your own grid: $A(2, 4)$, $B(-3, 1)$, $C(-2, -4)$, $D(5, -2)$. Which quadrant is each in?

Q3. A point is reflected across the y -axis. If it started at $(3, 2)$, where does it land?

Transformations

Q4. Describe the transformation: a shape slides 4 right and 2 down. (translation / reflection / rotation?) _____

Q5. A triangle is rotated 90° clockwise about a point. Does its size change? Does its orientation change?

Angles

Q6. Two angles sit on a straight line. One is 115° . Find the other. _____

Q7. Find the angle vertically opposite a 47° angle. Explain your reasoning.

Part B — Metric conversion & area

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Metric units connect to the **decimal system**: each step ($mm \rightarrow cm \rightarrow m \rightarrow km$) is a multiple of 10, 100 or 1000. The **area** of a rectangle is found by multiplying length $\times$ width, giving an answer in square units.

Worked example — conversion. $2\text{ m} = 200\text{ cm}$ ($\times 100$).

Worked example — area. A rectangle $5\text{ cm} \times 3\text{ cm}$ has area $5 \times 3 = 15\text{ cm}^2$.

To go from a larger unit to a smaller one (m to cm), *multiply*. To go from smaller to larger (cm to m), *divide*.

Converting metric units (length, mass, capacity)

Q1. Convert: (a) $3\text{ m} =$ _____ cm (b) $2500\text{ mL} =$ _____ L (c) $1.5\text{ kg} =$ _____ g (d) $450\text{ cm} =$ _____ m

Q2. A jug holds 1.2 L . How many 200 mL cups can be filled? _____

Area of rectangles

Q3. Find the area: (a) a rectangle $6\text{ cm} \times 4\text{ cm}$ (b) a square of side 9 m

Q4. Describe the sequence of steps you used to find a rectangle's area (test it on a $7\text{ cm} \times 3\text{ cm}$ rectangle).

Q5. A garden bed is 5 m long and 2 m wide. What is its area? If turf costs $\$8$ per square metre, what is the total cost?

Reasoning

Q6. Sam converts 3 m to 30 cm . Explain his mistake and give the correct value.