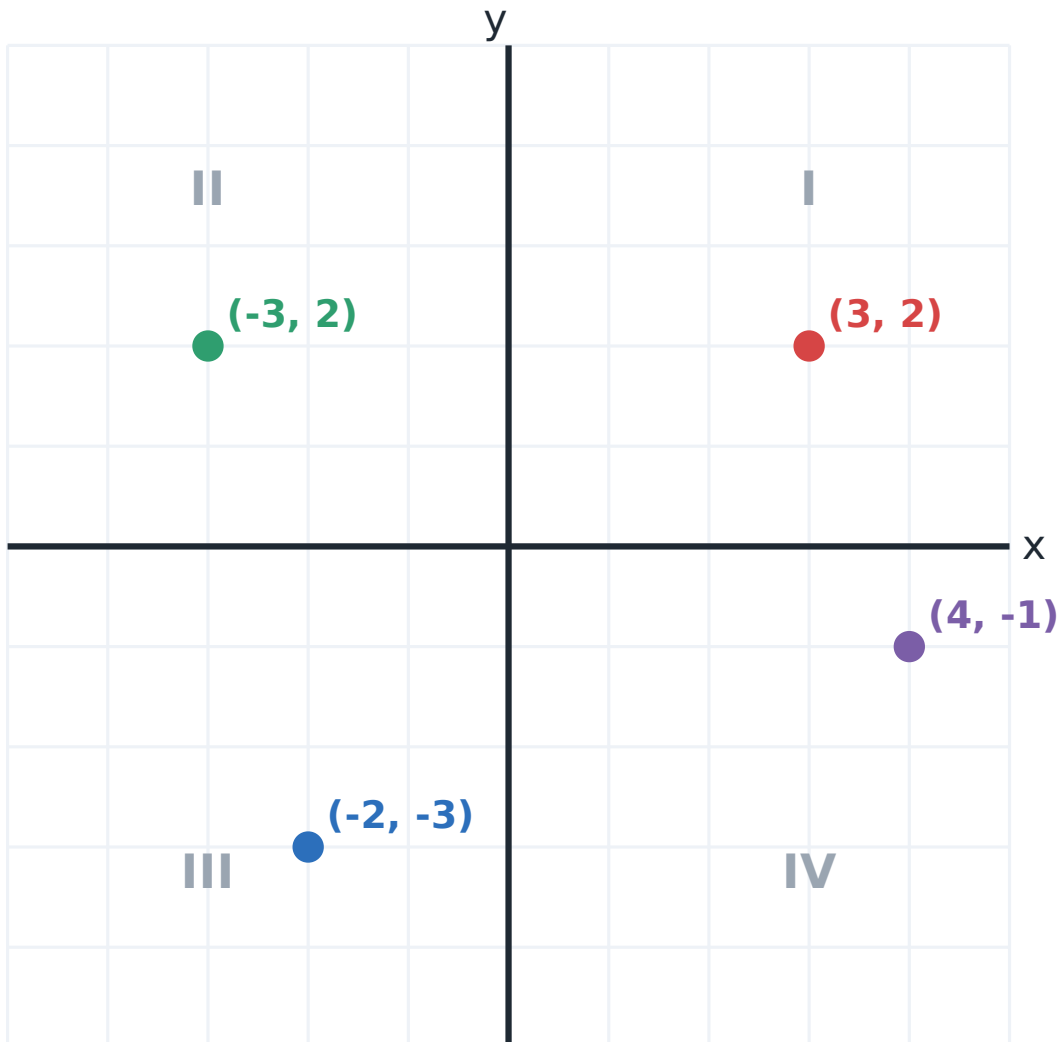


## 2D Space & Structures — Practice Worksheet

### 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  $90^\circ$  clockwise about a point. Does its size change? Does its orientation change?

### Angles

Q6. Two angles sit on a straight line. One is  $115^\circ$ . Find the other. \_\_\_\_\_

Q7. Find the angle vertically opposite a  $47^\circ$  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)  $3\text{ m} =$  \_\_\_\_\_  $\text{cm}$  (b)  $2500\text{ mL} =$  \_\_\_\_\_  $\text{L}$  (c)  $1.5\text{ kg} =$  \_\_\_\_\_  $\text{g}$  (d)  $450\text{ cm} =$  \_\_\_\_\_  $\text{m}$

Q2. A jug holds  $1.2\text{ L}$ . How many  $200\text{ mL}$  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  $9\text{ m}$

**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  $5\text{ m}$  long and  $2\text{ m}$  wide. What is its area? If turf costs  $\$8$  per square metre, what is the total cost?

### Reasoning

**Q6.** Sam converts  $3\text{ m}$  to  $30\text{ cm}$ . Explain his mistake and give the correct value.