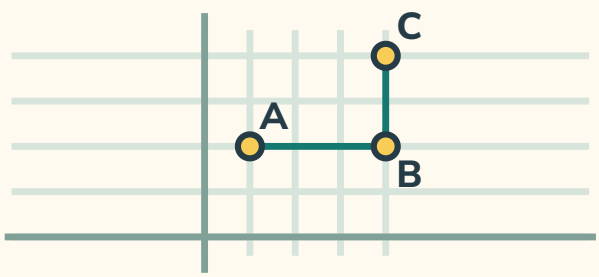
MATHS FIELD GUIDE · GRADE 6

Building and understanding the coordinate plane

OPENING PROBLEM

Describe A to C via B.



A (1, 2)
B (4, 2)
C (4, 4)

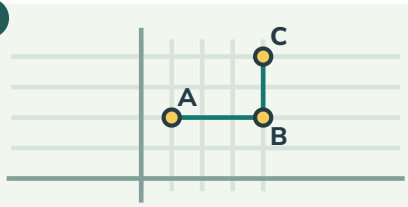
02 Read a point, a route and its image
03 Rules and worked cases
04 Map the bird hide
05 Locate a mirror by equal distances
06 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Read a point, a route and its image

Read horizontal position first and vertical position second.

1

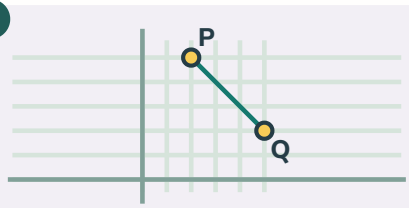


A (1, 2)
B (4, 2)
C (4, 4)

Describe A to C via B.

Go three right, then two up. The total route length is five grid units.

2

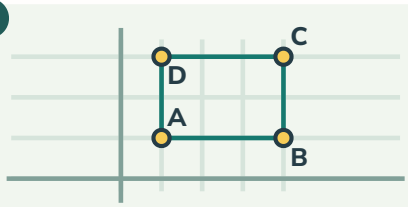


P (2, 5)
Q (5, 2)

Are the points the same if the coordinates swap?

No. Each has its horizontal and vertical distances exchanged.

3

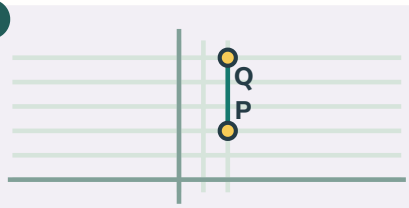


A (1, 1)
B (4, 1)
C (4, 3)
D (1, 3)

How can you recognise this rectangle?

Opposite sides have the same lengths. Horizontal and vertical neighbours meet at right angles.

4



P (2, 2)
Q (2, 5)

Must both coordinates change when a point moves?

No. A vertical move keeps x fixed and adds three to y.

All points on x = 3
a vertical line.

All points on y = 3
a horizontal line.

CHAPTER PROBLEM

Where is (0, −5)? Explain why it is not in Quadrant III or IV.

It lies on the y-axis, five units below the origin. The quadrants exclude their boundary axes.

MATHS REFERENCE · GRADE 6

Building and understanding the coordinate plane

Coordinates provide a numerical description of position. One number locates a point on a line. A point on a plane needs two independent coordinates.

A Cartesian coordinate plane uses two perpendicular number lines. Their crossing is the origin, (0, 0). The horizontal reference is the x-axis and the vertical reference is the y-axis.

Four cases to recognise

Situation	What to do and why
Locate (−4,3)	Move four west and three north of the origin.
From (−4,3) to (−4,−2)	Five units down. The horizontal coordinate stays fixed.
Point (0,−3)	It lies on the y-axis. An axis point belongs to no quadrant.
Reflect (−2,−5) in x-axis	Keep x; reverse y. Image (−2,5).

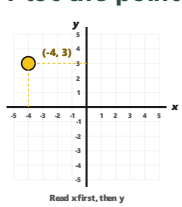
Read the model

Build the idea

Choose a unit scale on each axis. For (−4, 3), move to x = −4 and then to height y = 3. Equivalently, draw a vertical guide through −4 and a horizontal guide through 3; their intersection locates the point.

The first coordinate gives horizontal position relative to the y-axis. The second gives vertical position relative to the x-axis. These are signed positions; the corresponding distances are their absolute values.

Plot the point



Plotting a point

Why it works

The pair is ordered because the two numbers have different roles. (2, 5) and (5, 2) generally differ. Swapping gives the same point only when the coordinates are equal.

The axes split the plane into four quadrants. Starting at the upper right and moving anticlockwise, their sign patterns are (+,+), (−,+), (−,−), (+,−). A point on an axis is in no quadrant.

coordinate A value specifying position relative to an axis.
ordered pair A horizontal value followed by a vertical value.
origin The intersection with coordinates (0, 0).
quadrant One of the four regions between the axes.



A (1, 1)
A' (4, 3)

What translation takes A to A'?

Three units right and two up. Apply that same displacement to every point.

WORKED INVESTIGATION

Map the bird hide

> Use the visitor centre as (0, 0). East is positive x and north is positive y. A hide three blocks west and two north is at (−3, 2).

Look at this part	What it tells you
Visitor centre	(0, 0)
Hide	(−3, 2)
Pond due south of hide	(−3, −1)

Work it through

The hide and pond have the same x-coordinate. Their vertical separation is 2 − (−1) = 3 blocks, even though their y signs differ.

Catch the mistake

The point (2, −3) is southeast of the centre. Swapping the coordinates moves the point into a different quadrant.

Compare the cases

Follow an example

Point A(−4, 3) is in Quadrant II: its x-value is negative and its y-value positive. Point B(5, −2) is in Quadrant IV.

Point C(6, 0) lies on the x-axis; its vertical position is zero. Point D(0, −3) lies on the y-axis; its horizontal position is zero. The origin belongs to both axes.

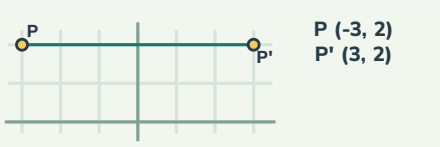
What changes? What stays true?

To read a point, follow its horizontal and vertical guides back to the labelled axes. Read values using the actual scale, then write x first and y second.

Two points with equal y-values make a horizontal segment. For (−2, 3) and (4, 3), its length is 4 − (−2) = 6 units. Their positions may be signed, but the length is non-negative. Slanted distance needs another idea, taught with Pythagoras later.

Change one condition

Reflect the hide across the vertical axis. Its distance from that axis stays three blocks and its image is at (3, 2).



Where is the mirror line?

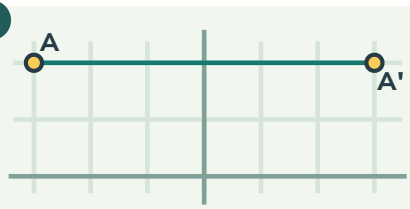
The y-axis. It bisects the horizontal segment between the two points at right angles.

ILLUSTRATED PROBLEM SHEET

Locate a mirror by equal distances

A point on the mirror stays fixed. For any other point, the mirror crosses the segment to its image halfway, at a right angle.

1

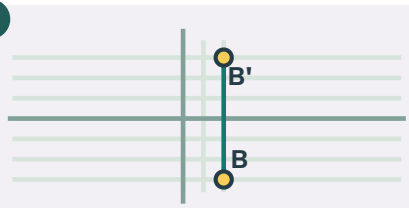


A (-3, 2)
A' (3, 2)

Reflect A(–3,2) in the y-axis.

The height stays two. Three units left becomes three units right, so A' = (3,2).

2

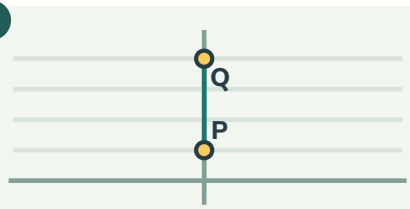


B (2, -3)
B' (2, 3)

Reflect B(2,–3) in the x-axis.

The horizontal position stays two. The sign of the vertical coordinate changes.

3

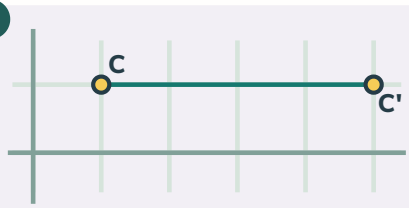


P (0, 1)
Q (0, 4)

What happens to P and Q in the y-axis mirror?

Both are on the mirror line. Each maps to itself.

4



C (1, 1)
C' (5, 1)

Find the vertical mirror taking (1,1) to (5,1).

Halfway from x = 1 to x = 5 is x = 3. Each point is two units from that line.

Mirror in y-axis
(x,y) goes to (–x,y).

Mirror in x-axis
(x,y) goes to (x,–y).

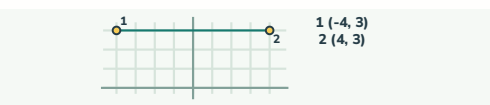
CHAPTER PROBLEM

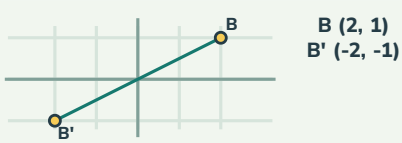
Start at (–2, 3). Move 4 units right and 5 down. Where do you finish?

At (2, –2). Right increases the first coordinate by 4. Down decreases the second by 5.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 What point is five right and two down from (1, 4)?	(6, 2). Add five to x and subtract two from y.
02 Does a mirror image preserve the distances between a shape's vertices?	Yes. Its size and angles stay the same even though orientation reverses.
03 A gate lies four blocks east of the pond. What are its coordinates and which quadrant is it in?	Moving east adds four to x: −3 + 4 = 1. The gate is (1, −1), in quadrant IV.
04 Give a second point with the same x-coordinate as (−2,5) but six units lower.	Subtract six from y to get (−2,−1).
05 Which axis contains the midpoint of (−4,3) and (4,3)? 	Halfway horizontally is x = 0. The midpoint (0,3) lies on the y-axis.



Which turn about the origin works?

A half-turn. Both coordinates change sign.

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