MATHS

Lesson 11

Year 9

Topic: Linear and non-linear relationships

Calculating the midpoint of a line segment

Today you will:

- calculate the midpoint between two points.

Resources

Find and prepare

Sheet 8 — Map of Queensland (from Lesson 10)

Sheet 9 — What's in the middle?

Key terms

For definitions and explanations of terms, please see the Glossary.

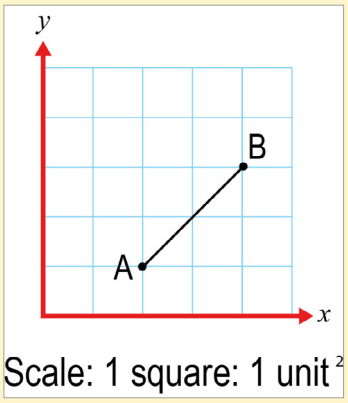
Lesson

Calculate the midpoint between two points

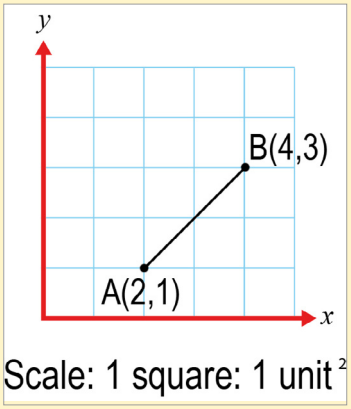


In previous lessons, we have looked at how to calculate the gradient of a line and the distance between two points on the line. In this lesson, we will look at how to calculate the midpoint between two points.

Find the midpoint between points A and B.



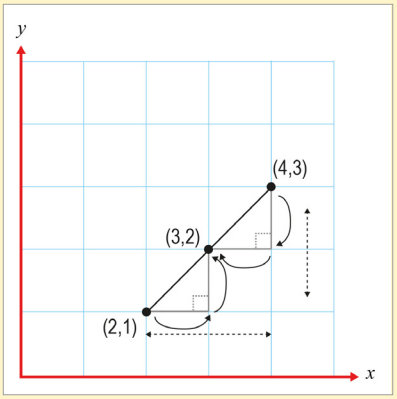
Take note of the scale. In this case, it tells us that the x- and y-increments increase by 1. That is, the x-axis shows values for 0, 1, 2, 3, etc. The y-axis shows the same values. Mark a set of axes on the grid and work out the coordinates of the two points.



Use these coordinates and the line to establish the midpoint.

Find halfway between the two x-coordinates and halfway between the two y-coordinates. This gives the coordinates of the midpoint.

Finding halfway between two values is the same as finding the average of the two numbers.



x midpoint $= \frac{2 + 4}{2} = 3$

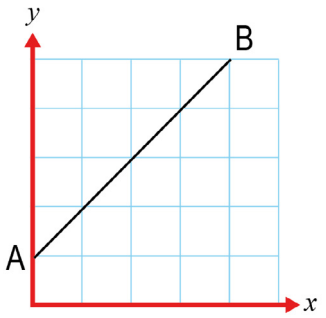
y midpoint $= \frac{1 + 3}{2} = 2$

$\therefore$ midpoint = (3, 2)

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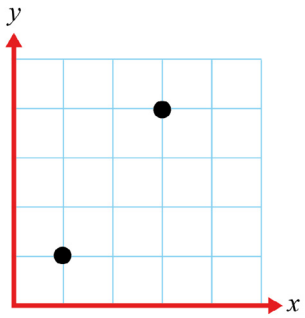
1. Find the midpoint between the following points.

a.



Scale: 1 square: 1 unit^2

b.



Scale: 1 square: 1 unit^2

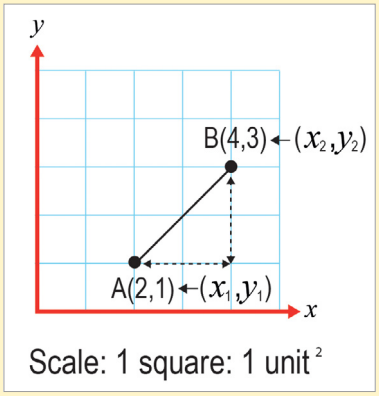
Calculating the midpoint

As the midpoint is similar to finding the average of two numbers, we can say: To find the midpoint, we add the two x-coordinates and then divide by 2. Similarly, we add the two y-coordinates and then divide by 2.

Remember the conventions for writing coordinates from Lesson 8. The first point will have coordinates (x_1, y_1) and the second point will have coordinates (x_2, y_2). Using this same convention, the midpoint can be called (x_m, y_m).

Therefore, the midpoint: $x_m = \dfrac{x_1 + x_2}{2}$, $y_m = \dfrac{y_1 + y_2}{2}$

Example:



Scale: 1 square: 1 unit^2

$x_m = \dfrac{x_1 + x_2}{2}$ $\quad$ $y_m = \dfrac{y_1 + y_2}{2}$

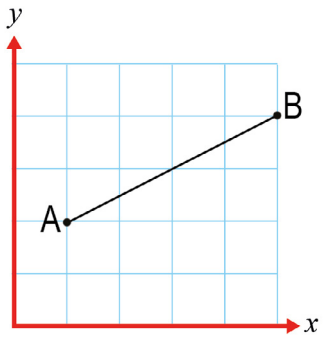
$= \dfrac{2 + 4}{2}$ $\quad$ $= \dfrac{1 + 3}{2}$

$= 3$ $\quad$ $= 2$

Midpoint is (3, 2).

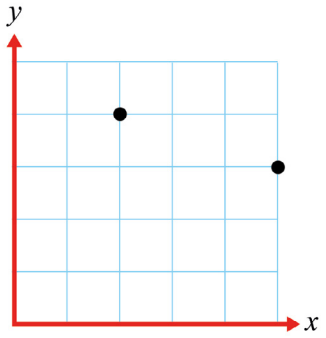
2. Find the midpoint in the following. Use the midpoint rule and correct working.

a.



Scale: 1 square: 1 unit ^{2}

b.



Scale: 1 square: 1 unit ^{2}

3. Open a new copy of **Sheet 8 — Map of Queensland**, and use it to calculate the midpoint between the following towns:
   - Charleville and Cloncurry
   - Mackay and Brisbane
   - Alpha and Rockhampton.

4. You want to build a new truck stop between Mt Isa and Brisbane. What are the coordinates of the halfway point?

5. Complete **Sheet 9 —** What's in the middle?



You will find it easier to keep track of the coordinates in **Sheet 9** if you label the axes. Also make sure you show full working. By showing full working, it makes it easier to go back and check your thinking later.

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