

ANGLES AND LINES

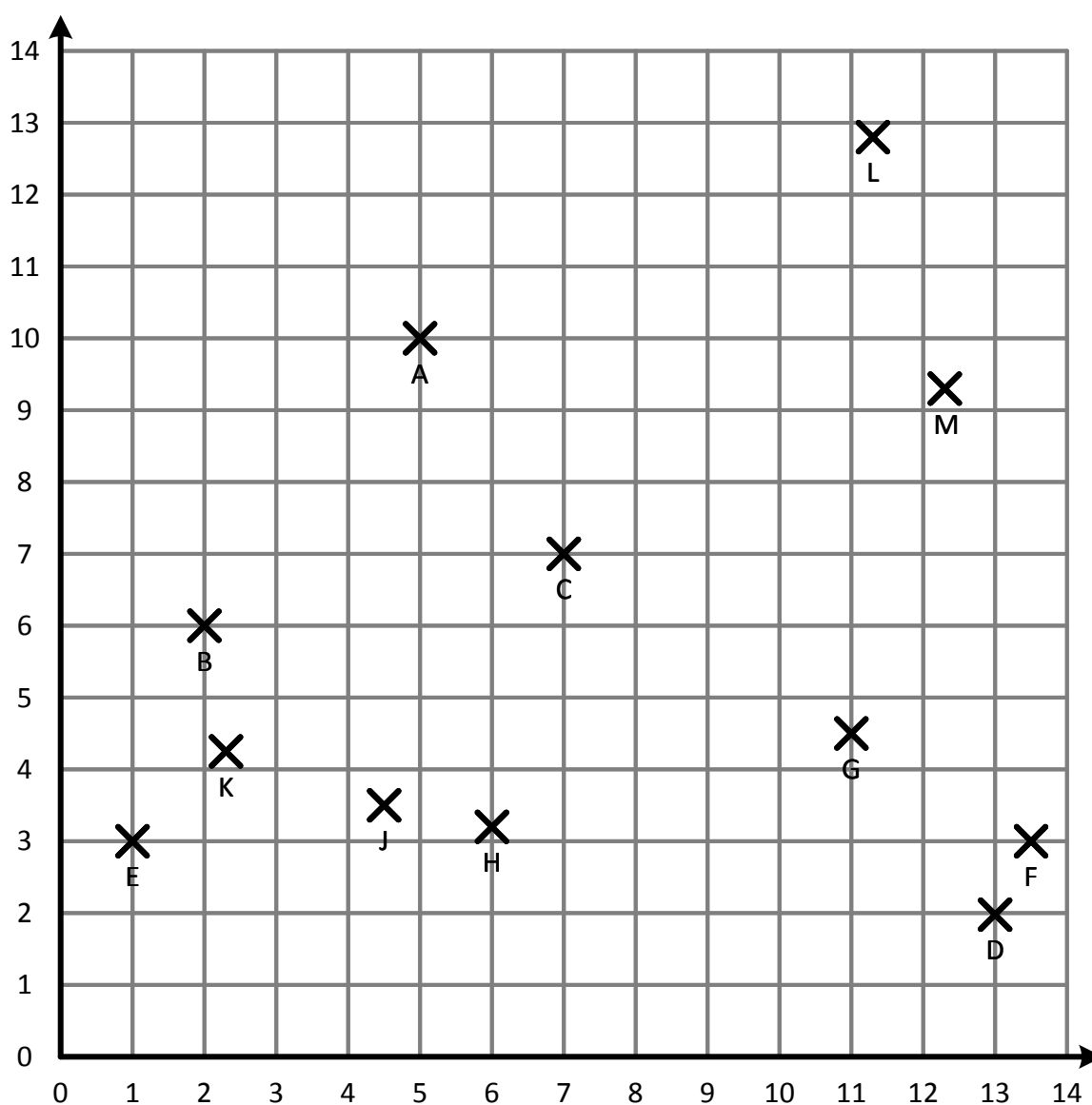
THIS WORK COVERS CO-ORDINATES IN ALL FOUR QUADRANTS, MIDPOINTS, ENDPOINTS, MARKINGS ON SHAPES.

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Co-ordinates and Midpoints

1. Below is a grid with Xs marked upon it. Write the co-ordinates of each X on the grid.

Remember that co-ordinates are given in the form: (x,y) . Be careful to write the points neatly as you will need the information later.



2. Calculating a mid-point requires you splitting a co-ordinate into x and y.

Eg: To find the midpoint of A \rightarrow B:

$$x_{Midpoint}: \frac{\Sigma x}{2} = \frac{x_1 + x_2}{2} = \frac{5 + 2}{2} = \frac{7}{2} = 3\frac{1}{2}$$

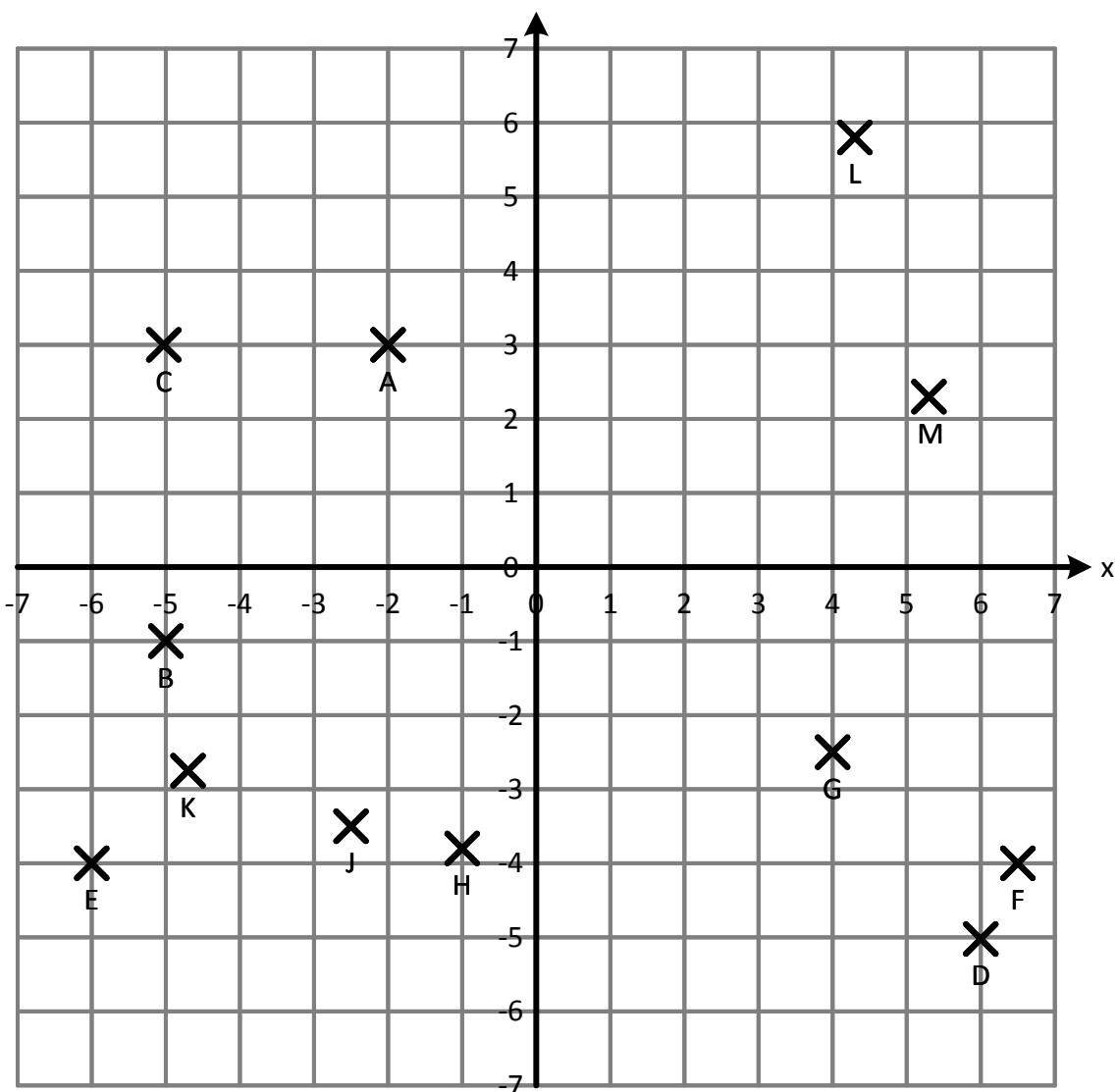
$$y_{Midpoint}: \frac{\Sigma y}{2} = \frac{y_1 + y_2}{2} = \frac{10 + 6}{2} = \frac{16}{2} = 8$$

So the co-ordinates of the midpoint of A \rightarrow B are (3½,8).

Referring to your solutions for question 1, find the mid-points of the following lines. Set each question out like the example above:

- a. A \rightarrow G
- b. D \rightarrow H
- c. E \rightarrow C
- d. M \rightarrow J
- e. G \rightarrow K

3.



a) Write down the co-ordinates of each of the crosses on the grid.

b) Write the midpoints of each of the following:

i) $A \rightarrow G$

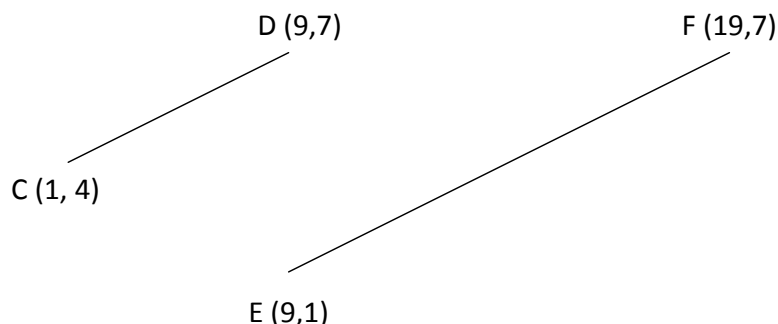
ii) $D \rightarrow H$

iii) $E \rightarrow C$

iv) $M \rightarrow J$

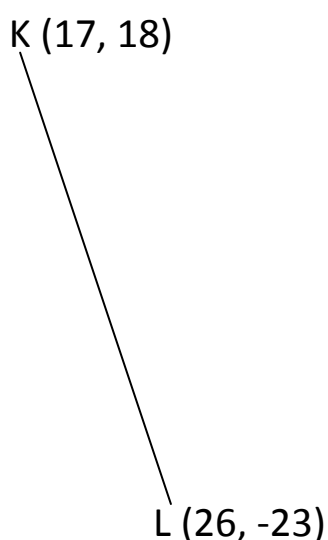
v) $G \rightarrow K$

4. Below are two lines: CD and EF.



- Find the midpoint of line CD.
- Find the midpoint of line EF.
- The midpoints of CD and EF are labelled G (on line CD) and H (on line EF). Calculate the co-ordinates of the midpoint of GH.
- Draw a diagram in your book to show the lines CD, EF, GH. Draw a line from F to D. Calculate the midpoint of DF.
- Another line connects E to J. The midpoint of this line is at (14,2). What are the co-ordinates of point J?

5. Look at the line KL. It runs from (17,18) to (26,-23).



- What is the midpoint of line KL?
- It turns out that KL is only a partially drawn line. L is actually the midpoint of a longer line called KM. What are the co-ordinates of M?
- Line NP runs from the midpoint of LM to (3,2). What is the midpoint of this new line (called QR)?

6. Line AQ runs from point A (5, 7) to point Q (15,-23). A circle is drawn with the midpoint of AQ at the centre. What is the diameter of the circle?
7. Line RS has an endpoint at (5,6) and a midpoint at (20,39).
- What is the length of the line?
 - Line TU attaches itself to the midpoint of RS and (7,7). What is the midpoint of TU?
 - If a line was drawn from R to U, what would be the midpoint of line RU?
8. A square with horizontal and vertical sides has a midpoint at (6,6) and another midpoint on a different side at (-1, -1). What are the co-ordinates of the vertices of the square?
9. The co-ordinates (1,5), (3,10), (9,20), (27,40), (81,80) are marked on a graph.

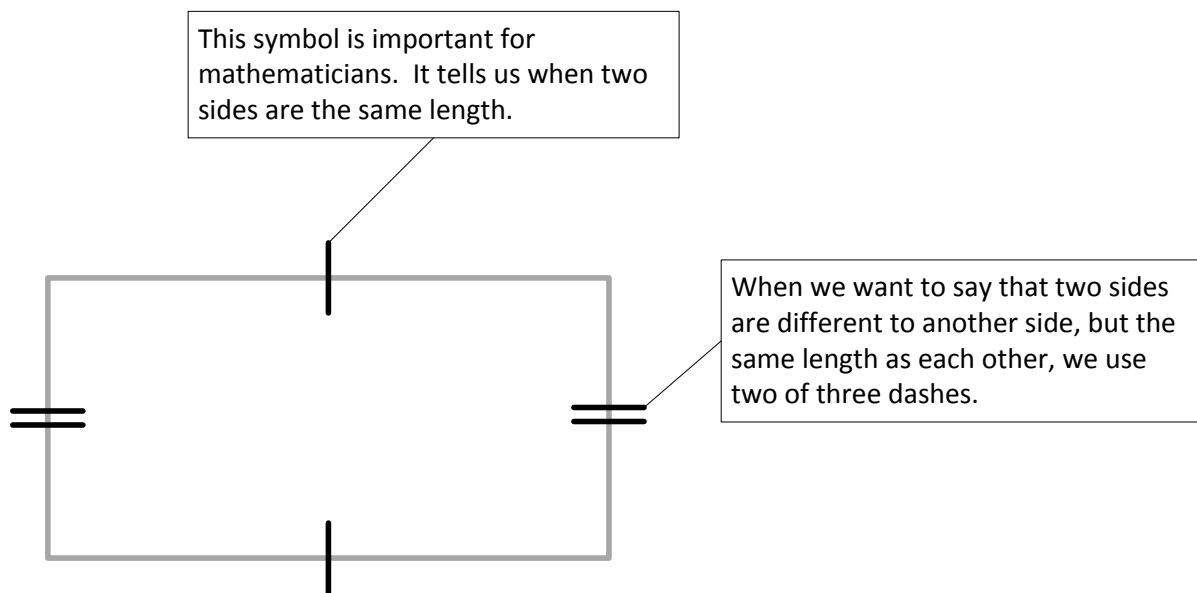
Alan decides that it would be fun to join each of these points up with a straight line.

His sister, Annabel, decides to measure half way along each of the lines that Alan has drawn and join these halfway points to each other.

Calculate the midpoints of each of the lines that Annabel draws. (HINT: There are three midpoints to calculate here. You may need to calculate a total of seven midpoints though.)

Shapes, Lines and Angles

Look at the oblong below. Notice the lines around the edge that cross the sides of the oblong.



10. What type of triangle is this? Explain how you know.

