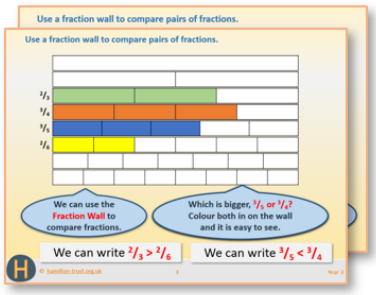
Week 9, Day 5

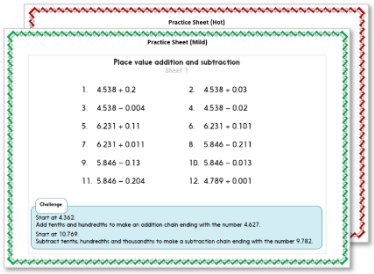
Reflect a shape and write the new co-ordinates

Each day covers one maths topic. It should take you about 1 hour or just a little more.

1. Start by reading through the **Learning Reminders**. They come from our *PowerPoint* slides.

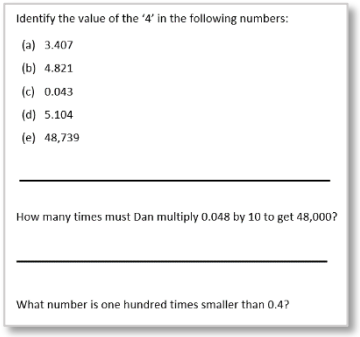


2. Tackle the questions on the **Practice Sheet**.
There might be a choice of either Mild (easier) or Hot (harder)!
Check the answers.



3. Finding it tricky? That's OK… have a go with a grown-up at **A Bit Stuck?**

4. Have I mastered the topic? A few questions to **Check your understanding**.
Fold the page to hide the answers!

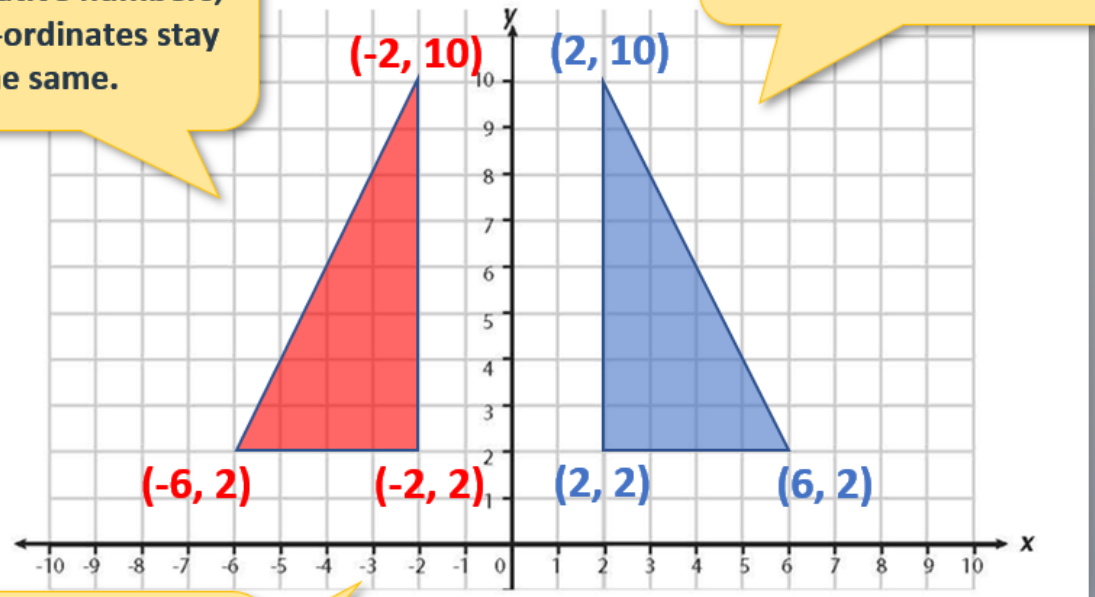


Learning Reminders

Reflect a shape and write the new co-ordinates.

The x-coordinates are now negative numbers, the y-co-ordinates stay the same.

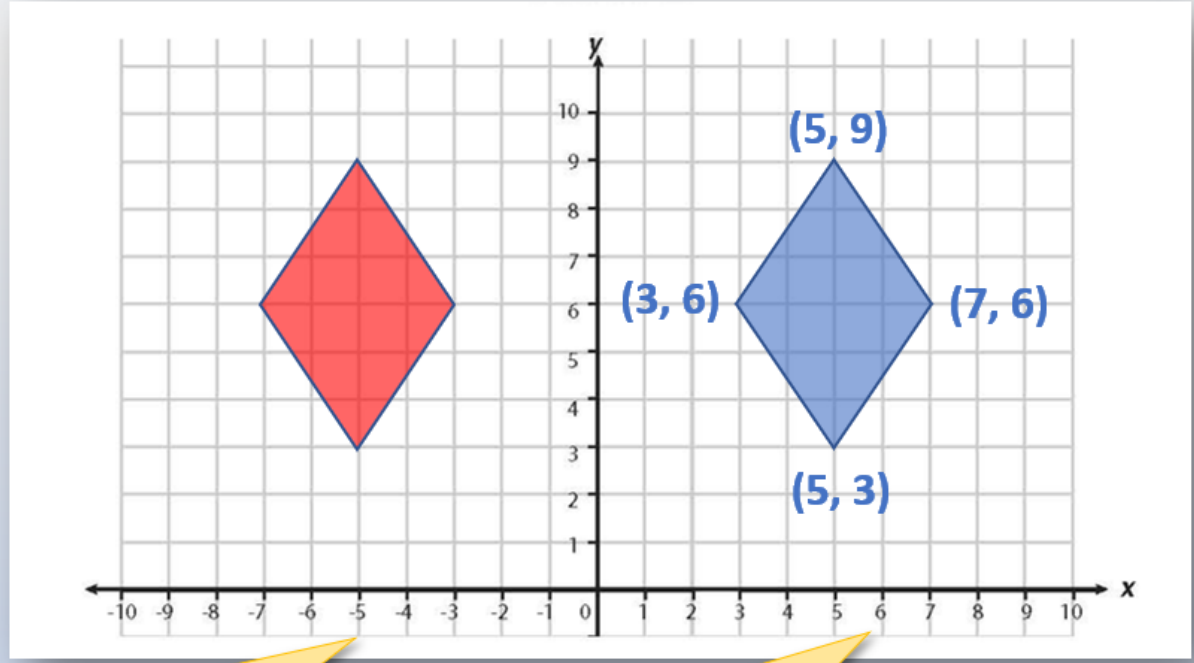
We can pretend that there is a mirror on the y-axis to reflect this triangle.



Checking carefully that each point is the same distance away from the y-axis as it was originally, and that it looks to be the same shape.

Learning Reminders

Reflect a shape and write the new co-ordinates.



You can check with a small mirror on the y axis to check the rhombus is in the right place.

Write down the co-ordinates of the reflected shape.

Answers

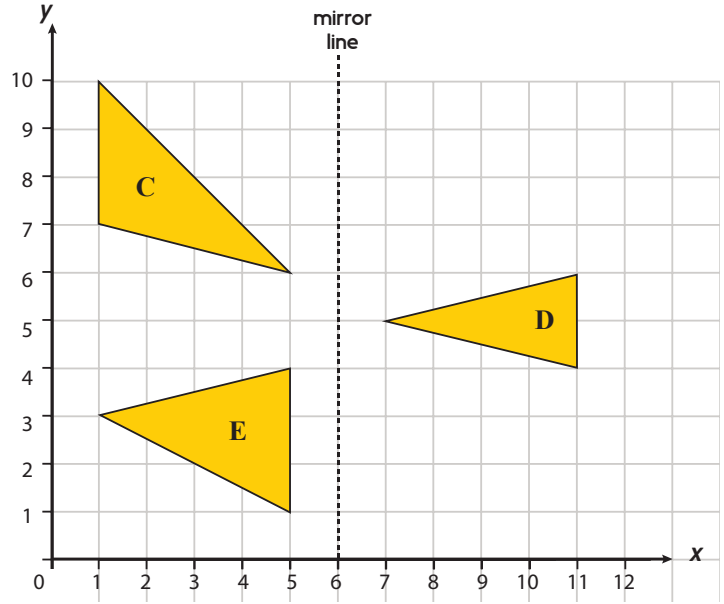
(-5, 9) (-5, 3)

(-7, 6) (-3, 6)

Practice Sheet Mild

Pattern of reflections

Look at triangles C, D and E.



1. Draw the reflection of each triangle, across the mirror line shown, to give triangles C1, D1 and E1.
2. Mark pairs of vertices (corners) that are reflections of each other. Use crosses, and a different colour for each pair. You should be able to find 9 pairs.
3. In the table, write the co-ordinates of the pairs of vertices you marked.

Colour of the two crosses	Vertex in shape on left	Vertex in shape on right
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)

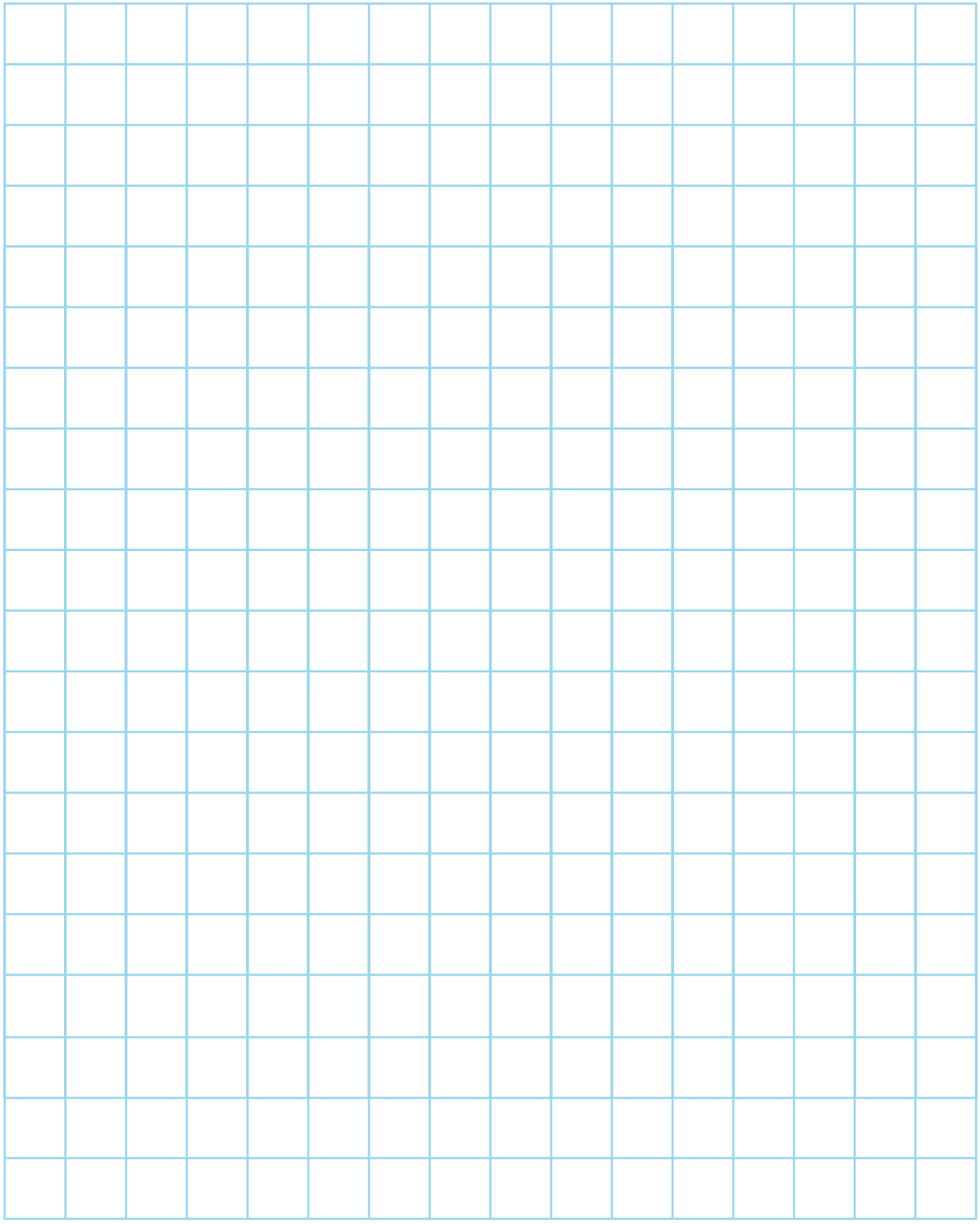
Did you notice anything interesting about each pair of co-ordinates?
Explain any ideas carefully...

Challenge

Triangle F has vertices at (8, 0), (6, 3) and (9, 4).
Can you predict where its reflection, F1 will be? Draw it to check.

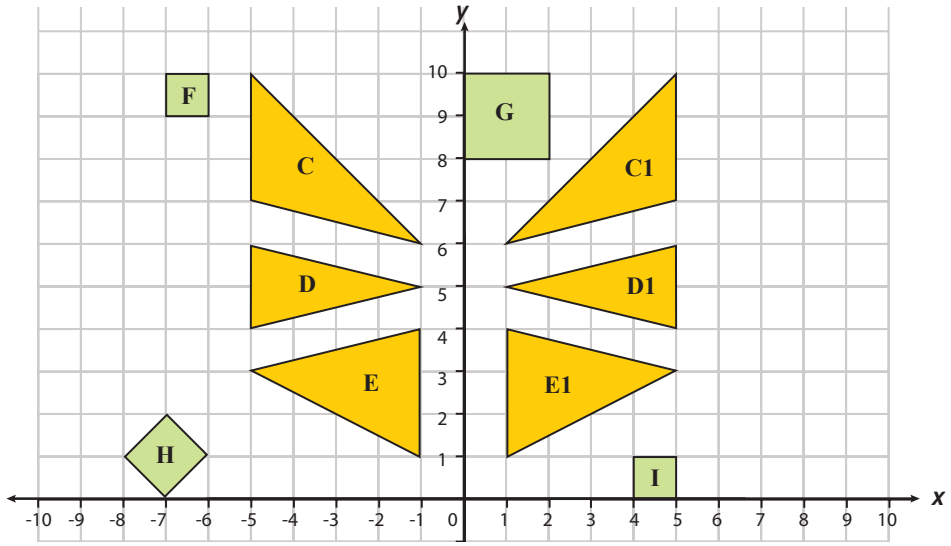
Practice Sheet Mild

Pattern of reflections



Practice Sheet Hot

Pattern of reflections



1. Look at triangles: C, D and E. They have been reflected across the *y*-axis to give triangles C1, D1 and E1. Mark the pairs of vertices (corners) which are reflections of each other. Use crosses, and a different colour for each pair. How many pairs should there be?

2. In the table, write the co-ordinates of the pairs of vertices you marked.

Colour of the two crosses	Vertex in shape on left	Vertex in shape on right
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)
	(,)	(,)

What do you notice about each co-ordinate and its reflection?

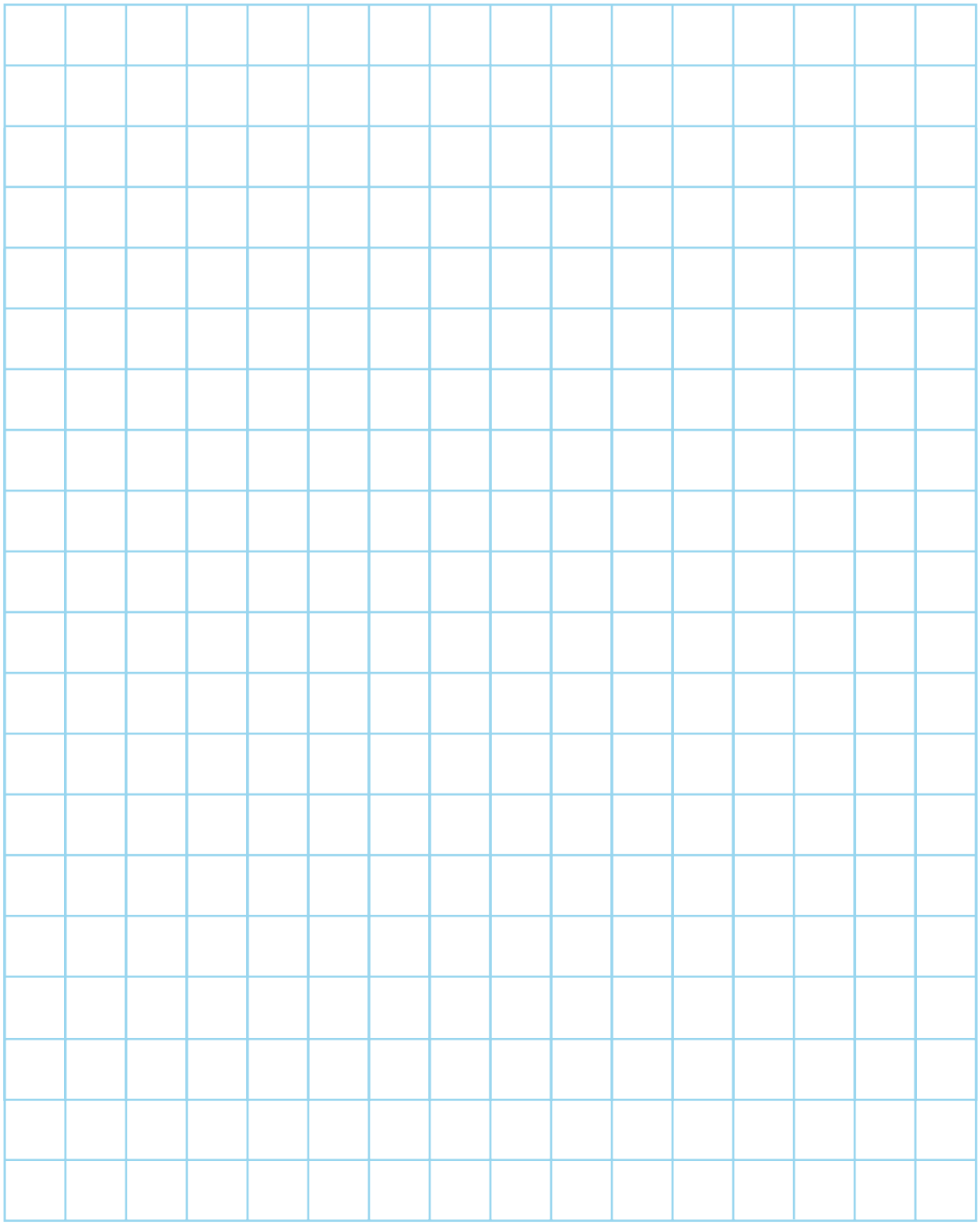
3. Look at squares F, G, H and I. Can you predict the co-ordinates of their reflections across the *y*-axis?

Challenge

- Draw two more polygons and their reflections. Use the spare space on the grid.
- Name your pairs of polygons with letters, J and J1 and K and K1.
- Write down the co-ordinate pairs for each matching pair of vertices.

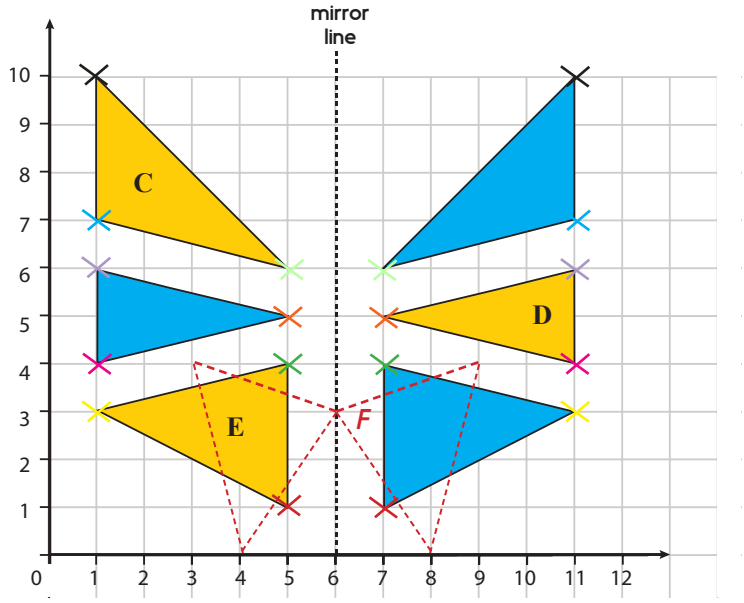
Practice Sheet Hot

Pattern of reflections



Practice Sheets Answers

Pattern of reflections (mild)



Colour of the two crosses *(note that the children will have used different colours)*	**Vertex in shape on the left**	**Vertex in shape on the right**
Red	*(5, 1)*	*(7, 1)*
Yellow	*(1, 3)*	*(11, 3)*
Green	*(5, 4)*	*(7, 4)*
Pink	*(1, 4)*	*(11, 4)*
Orange	*(5, 5)*	*(7, 5)*
Purple	*(1, 6)*	*(11, 6)*
Light green	*(5, 6)*	*(7, 6)*
Blue	*(1, 7)*	*(11, 7)*
Black	*(1, 10)*	*(11, 10)*

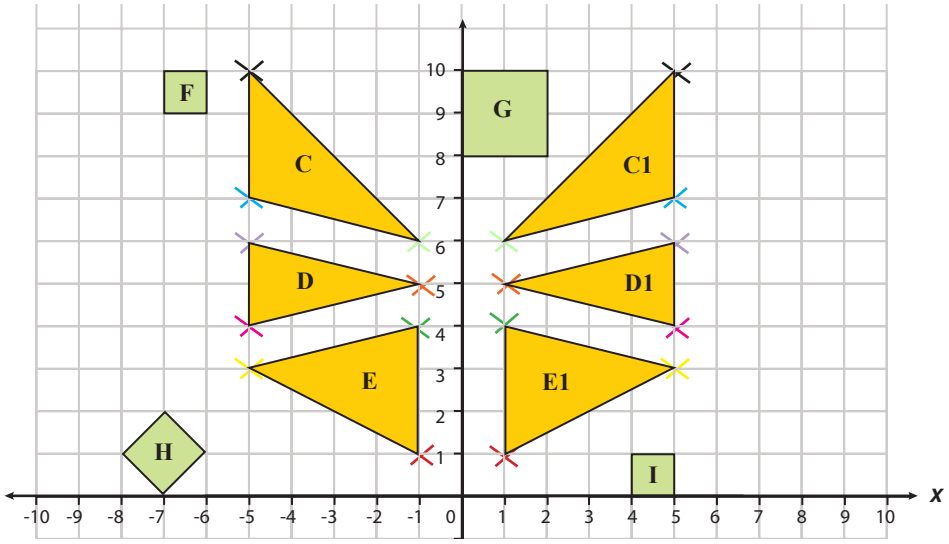
When the shape is reflected the *y* co-ordinate stays the same. The difference between the *x* co-ordinates is twice the difference between the vertex of the shape on the left and 6 - for example in the red co-ordinates 6 - 5 = 1, double 1 is 2 and the difference between 7 and 5 is 2.

Challenge

Children should be able to predict the new vertices of Triangle F using the above information:
(8, 0) will reflect to (4, 0) because 8 - 6 = 2, double 2 is 4 so 8 - 4 = 4 and the *y* co-ordinate remains the same.
(6, 3) will reflect to (6, 3) because 6 - 6 = 0 so in this case both the *x* and *y* co-ordinates remain the same.
(9, 4) will reflect to (3, 4) because 9 - 6 = 3, double 3 is 6 so 9 - 6 = 3 and the *y* co-ordinate remains the same.
Triangle F and its reflection are drawn with a red dotted line above.

Practice Sheets Answers continued

Pattern of reflections (hot)



1. There will be nine pairs of vertices.

2.

Colour of the two crosses *(note that the children will have used different colours)*	**Vertex in shape on the left**	**Vertex in shape on the right**
Red	*(-1, 1)*	*(1, 1)*
Yellow	*(-5, 3)*	*(5, 3)*
Green	*(-1, 4)*	*(1, 4)*
Pink	*(-5, 4)*	*(5, 4)*
Orange	*(-1, 5)*	*(1, 5)*
Purple	*(-5, 6)*	*(5 6)*
Light green	*(-1, 6)*	*(1, 6)*
Blue	*(-5, 7)*	*(5, 7)*
Black	*(-5, 10)*	*(5, 10)*

When the shape is reflected the *y* co-ordinate stays the same. The *x* co-ordinate on the right is the same distance away from the *y* axis but in the other direction (so it is the same number but is a positive rather than negative number) for example with the red vertices -1 becomes 1.

3. Children should be able to use the information above to predict the co-ordinates of squares F, G, H and I if they were reflected across the y-axis.

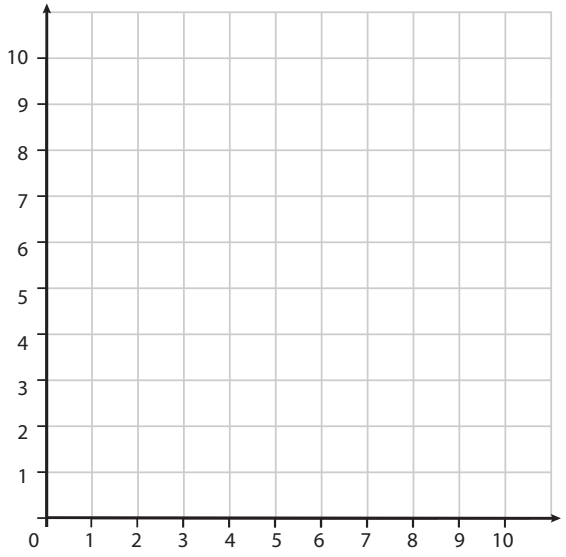
Square F original vertices (-7, 9) (-7, 10) (-6, 9) (-6, 10) new vertices (7, 9) (7, 10) (6, 9) (6, 10)
Square G original vertices (0, 8) (0, 10) (2, 10) (2, 8) new vertices (0, 8) (0, 10) (-2, 10) (-2, 8)
Square H original vertices (-7, 0) (-6, 1) (-8, 1) (-7, 2) new vertices (7, 0) (6, 1) (8, 1) (7, 2)
Square I original vertices (4, 0) (4, 1) (5, 0) (5, 1) new vertices (-4, 0) (-4, 1) (-5, 0) (-5, 1)

Challenge

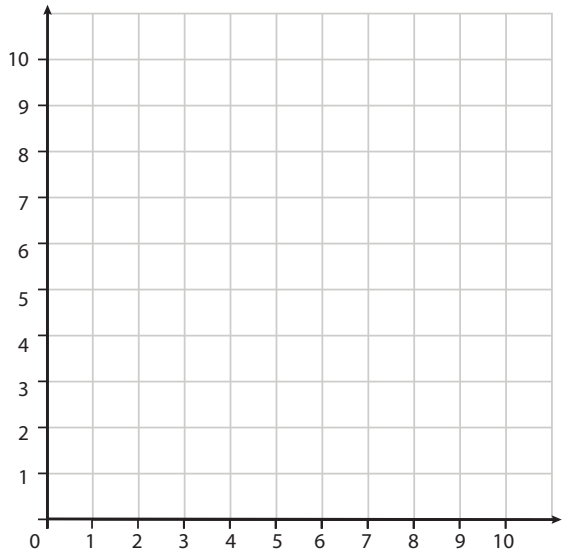
Children's drawings for this challenge will all vary.

A Bit Stuck
Plotting shapes

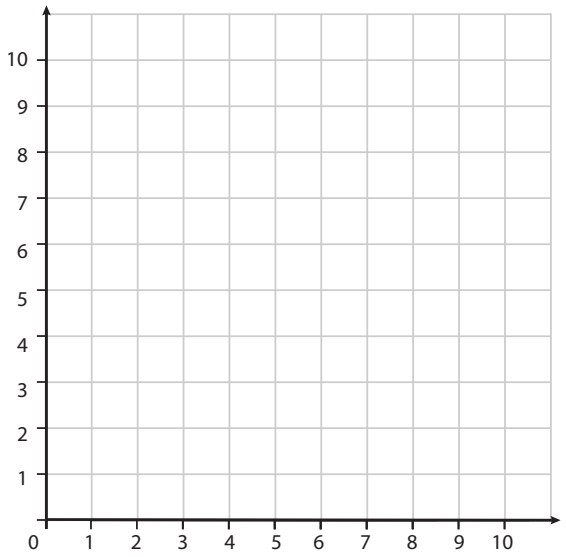
Plot the points on the grid, join them and find the missing point to make the shape.



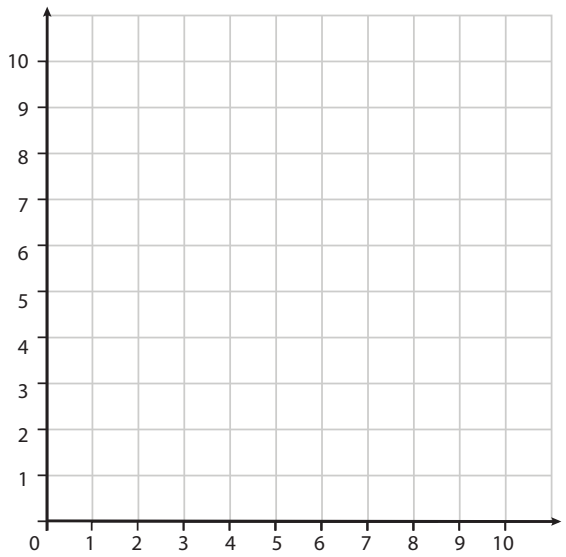
1. Square
A (3,8) B (3,2) C (6,5)



2. Rectangle
A (9,1) B (9,8) C (5,8)



3. Right-angled triangle
A (2,1) B (8,1)

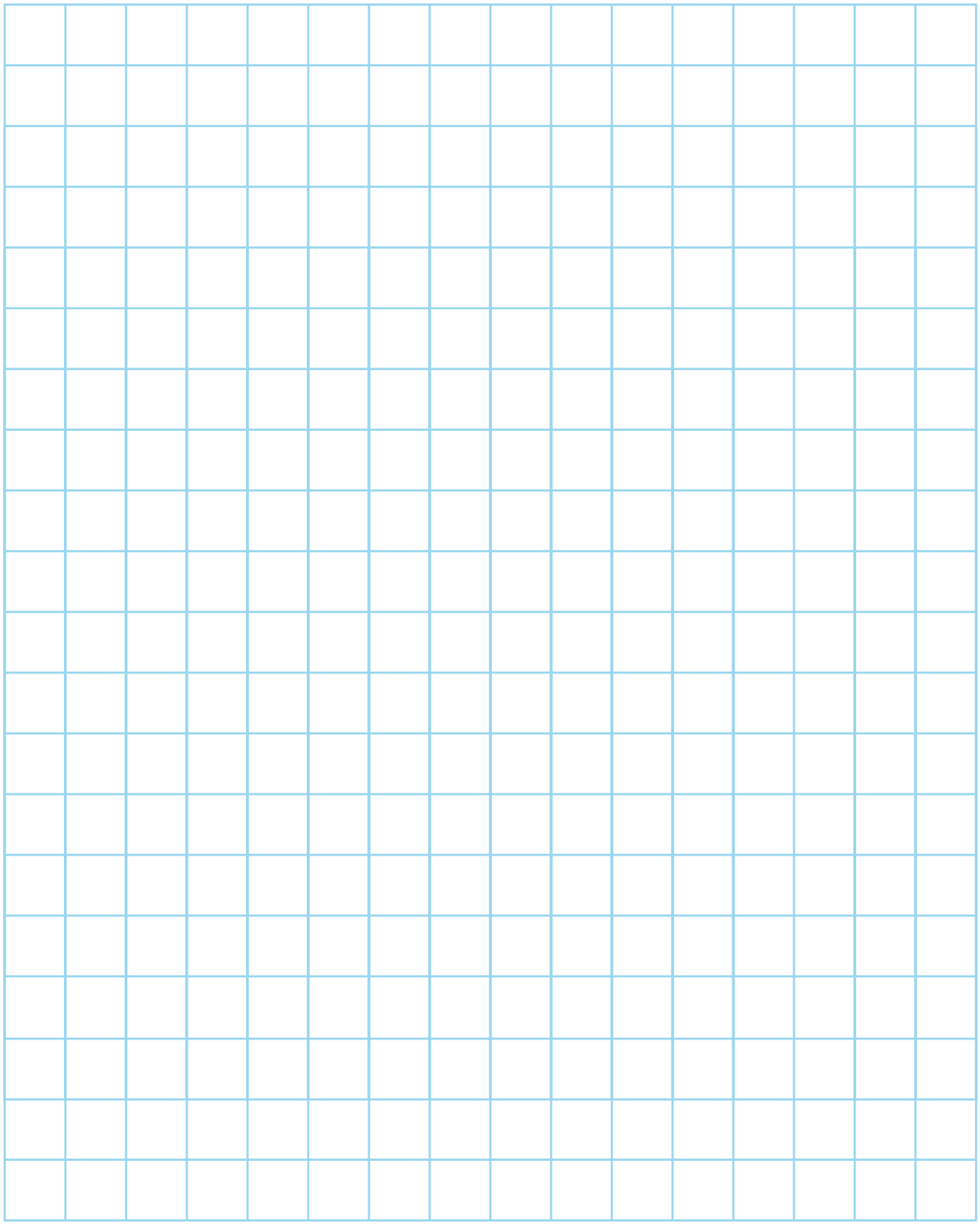


4. Isosceles triangle
A (0,2) B (0,8)

Challenge

Draw your own set of 0 to 10 axes. Plot co-ordinates (4,4) and (0,4). Find the missing pairs of co-ordinates to form the vertices of 3 different squares.

A Bit Stuck
Plotting shapes



A Bit Stuck! Answers

Plotting shapes

1. (0, 5)
2. (5, 1)
3. Lots of possible answers including co-ordinates starting with 2, e.g. (2, 2) up to (2, 10) or starting 8, e.g. (8, 2) up to (8,10).
4. Isoceles triangle missing co-ordinates could be (1, 5), (2, 5), (3, 5), etc.

Challenge

Missing pairs of co-ordinates to form a square are:
(0, 0) and (4, 0); (0, 8) and (4, 8); and (2, 2) and (2, 6)

Check your understanding

Questions

What shape will you get if you join these points **in this order** on a co-ordinate grid?
(0, 3) (2, 5) (6, 5) (6, 1) (2, 1) (2, 3)

_____

A square has vertices at (0, 2) and (0, 6). What are the co-ordinates of its two other vertices?

_____

A triangle is moved 3 spaces to the right on the co-ordinate grid. Its new co-ordinates are: (2, 5), (–1, 2) and (5, 2).
What were its original co-ordinates?

_____

Draw a rhombus and then reflect it in the *y*-axis.

_____

Check your understanding

Answers

What shape will you get if you join these points on a co-ordinate grid?
(0, 3) (2, 5) (6, 5) (6, 1) (2, 1) A pentagon.

A square has vertices at (0, 2) and (0, 6). What are the co-ordinates of its two other vertices? (4, 2) and (4, 6) or (-4, 2) and (-4, 6).
The difference between the given y co-ordinates is 4 so the difference between the x co-ordinates must also be 4.
A further solution is if the square is at a tilt with the third and fourth co-ordinates (2, 4) and (-2, 4).

A triangle is moved 3 spaces to the right on the co-ordinate grid. Its new co-ordinates are: (2, 5), (–1, 2) and (5, 2).
What were its original co-ordinates? (-1, 5) (-4, 2) and (2, 2).
As it has moved right each of the x co-ordinates must have originally been 3 less than those given. The y co-ordinates are unchanged by the move.

Draw a rhombus and then reflect it in the y-axis.
Be sure to use a sharp pencil and ruler for drawings like this. You can use a mirror to judge the accuracy of the reflection.

Check Your Understanding

Resource sheet