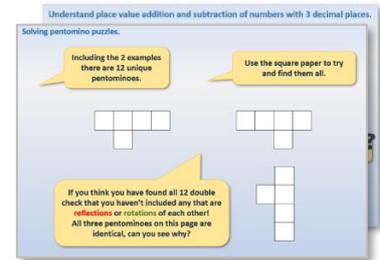


Week 15, Day 5

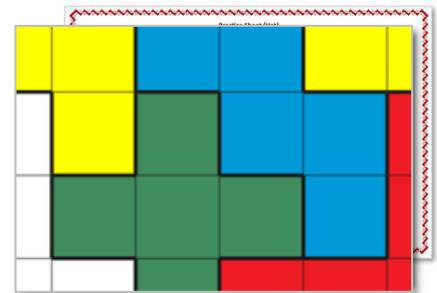
Transformations: reflection and rotation; pentomino puzzles

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

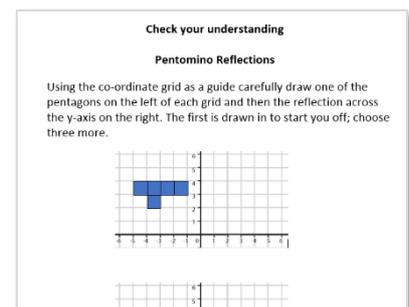
1. Start by reading through the **Learning Reminders**.



2. Think you've got it? Have a go at the **Investigative Practical Activity**.



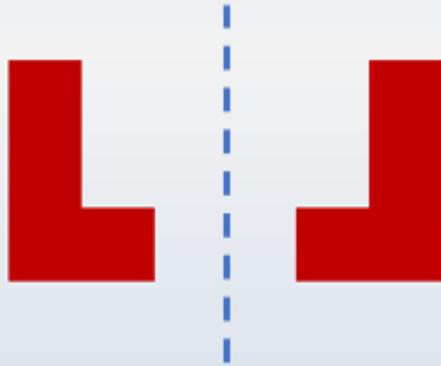
3. Have I mastered the topic? A few questions to **Check your understanding**.



Learning Reminders

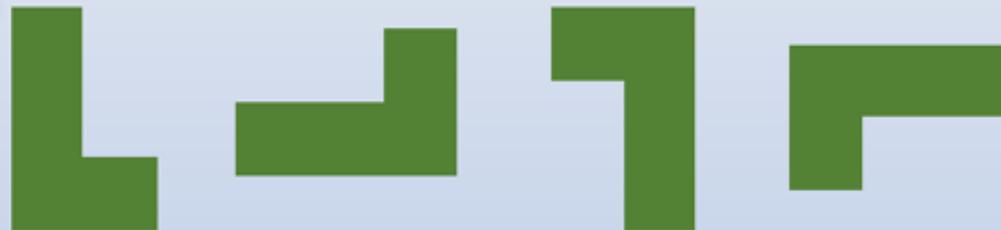
Transformations: reflection and rotation.

To solve today's puzzles we will need to **reflect** and **rotate** shapes.



Here, the **L** shape has been **reflected** across the dotted line.
The shape on the right is the **mirror image** of the shape on the left.

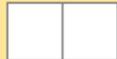
Here, the **L** shape has been **rotated** (turned around) in anticlockwise steps of $\frac{1}{4}$ turn or 90° .



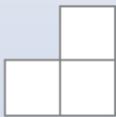
Learning Reminders

Transformations: reflection and rotation: pentomino puzzles.

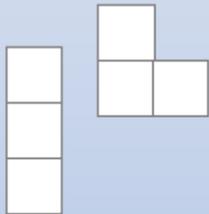
So, what is a 'pentomino'?

Well, we know that this is a domino: 

Which makes this a triomino: 
and this! 



So, is this a different triomino?



And these?

NO. Each of these arrangements of 3 squares is either a **reflection** or **rotation** of an arrangement we have already found.

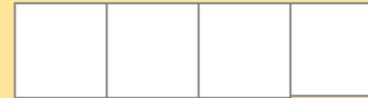
There are only two unique triominoes.

Learning Reminders

Transformations: reflection and rotation: pentomino puzzles.

So, what is a 'pentomino'?

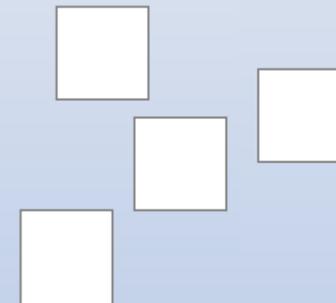
Four side-by-side squares make a tetromino:



How many other arrangements can you find?

REMEMBER – A unique tetromino will not be a **reflection** or **rotation** of an arrangement you have already found.

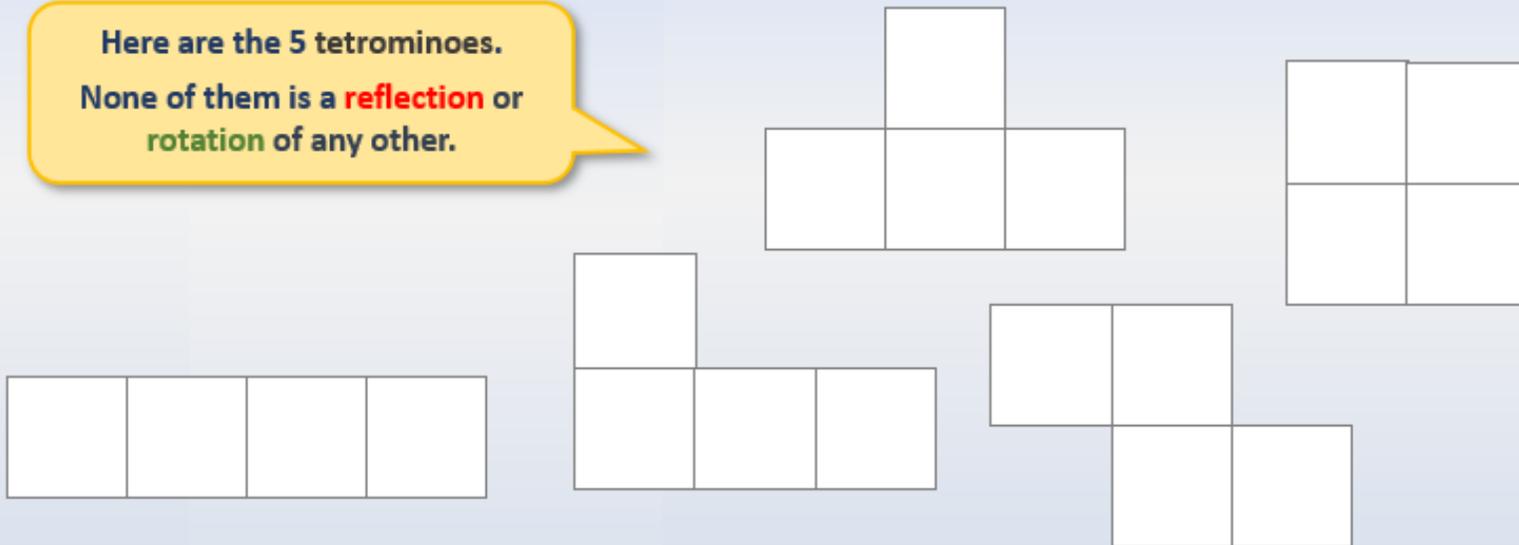
Investigate this for yourself before checking on the next slide...



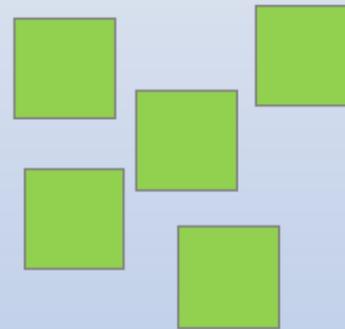
Learning Reminders

Transformations: reflection and rotation: pentomino puzzles.

Here are the 5 tetrominoes.
None of them is a **reflection** or
rotation of any other.



So, can you use 5 side-by-side squares to make every possible unique **pentomino**?!
Use the squared paper to sketch and investigate...



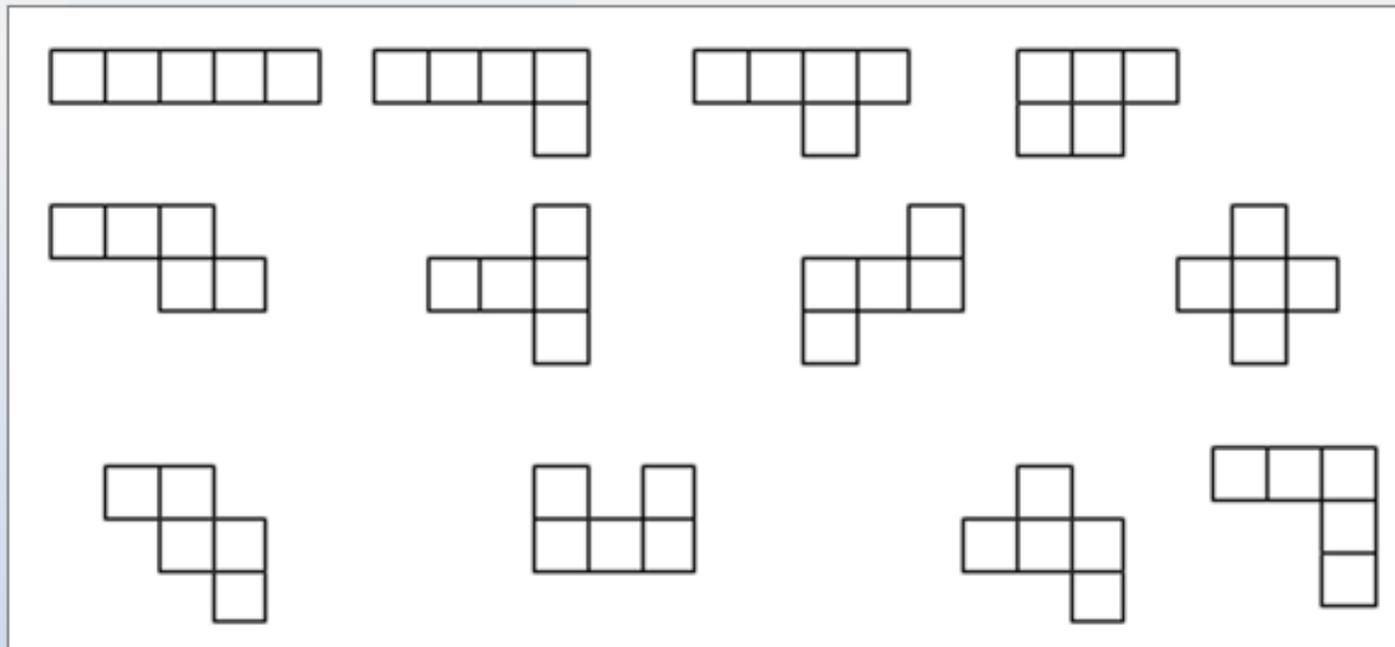
HINT

*There are more than 10,
so persevere before
checking out the whole
set on the next slide...!*

Learning Reminders

Transformations: reflection and rotation: pentomino puzzles.

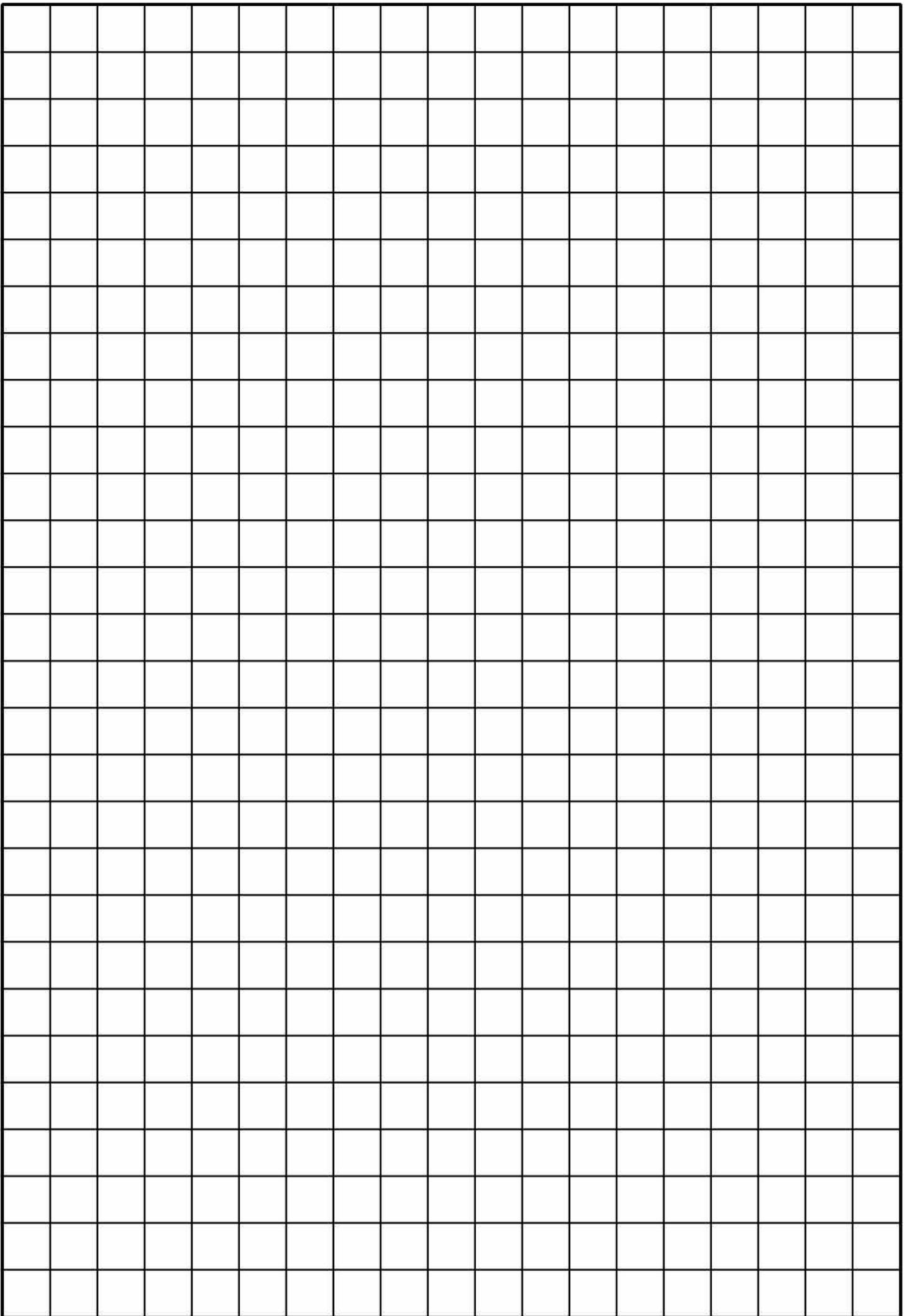
Here they are...
The 12 unique pentominoes.



Did you find them all?!

Remember, you may have a **reflection** or **rotation** of one of these, so it looks a bit different but is actually the same shape...

If in doubt, cut out your shape, then rotate or reflect it to try to sit it on top of one of these 12...

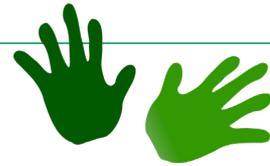


Investigative Practical Activity

Investigating Pentominoes

Things you will need:

a set of 12 pentominoes (see next page)

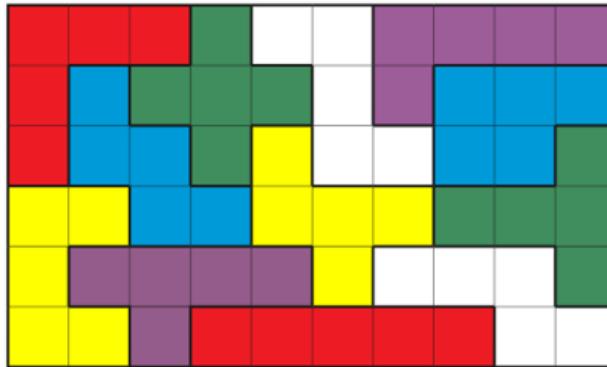


So, did you enjoy trying to find all 12 unique pentominoes?!

Carefully cut out the set of pentominoes to use for these activities.

Challenge 1

All 12 pentominoes can be arranged to make a 10 by 6 rectangle. Here is one solution:



- Look at the solution for 30 seconds. Now turn over the page and see if you can make the rectangle with all 12 of your pentominoes.
- Remember you will probably need to **reflect** or **rotate** your pentominoes. If you get stuck, have another peek at the solution...

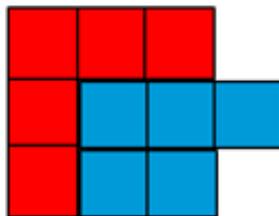
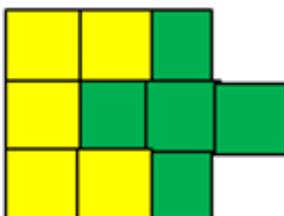
Challenge 2

Now try to make *other* rectangles with the pentominoes:

- Use three pentominoes to make a 3 by 5 rectangle.
- Use four pentominoes to make a 4 by 5 rectangle.
- Use five pentominoes to make a 5 by 5 rectangle (i.e. a square).
- Use six pentominoes to make a 6 by 5 rectangle.
- Use all 12 pentominoes to make 3 by 20, 4 by 15 and 5 by 12 rectangles!

Challenge 3

Here is the same shape, each made by joining 2 pentominoes:

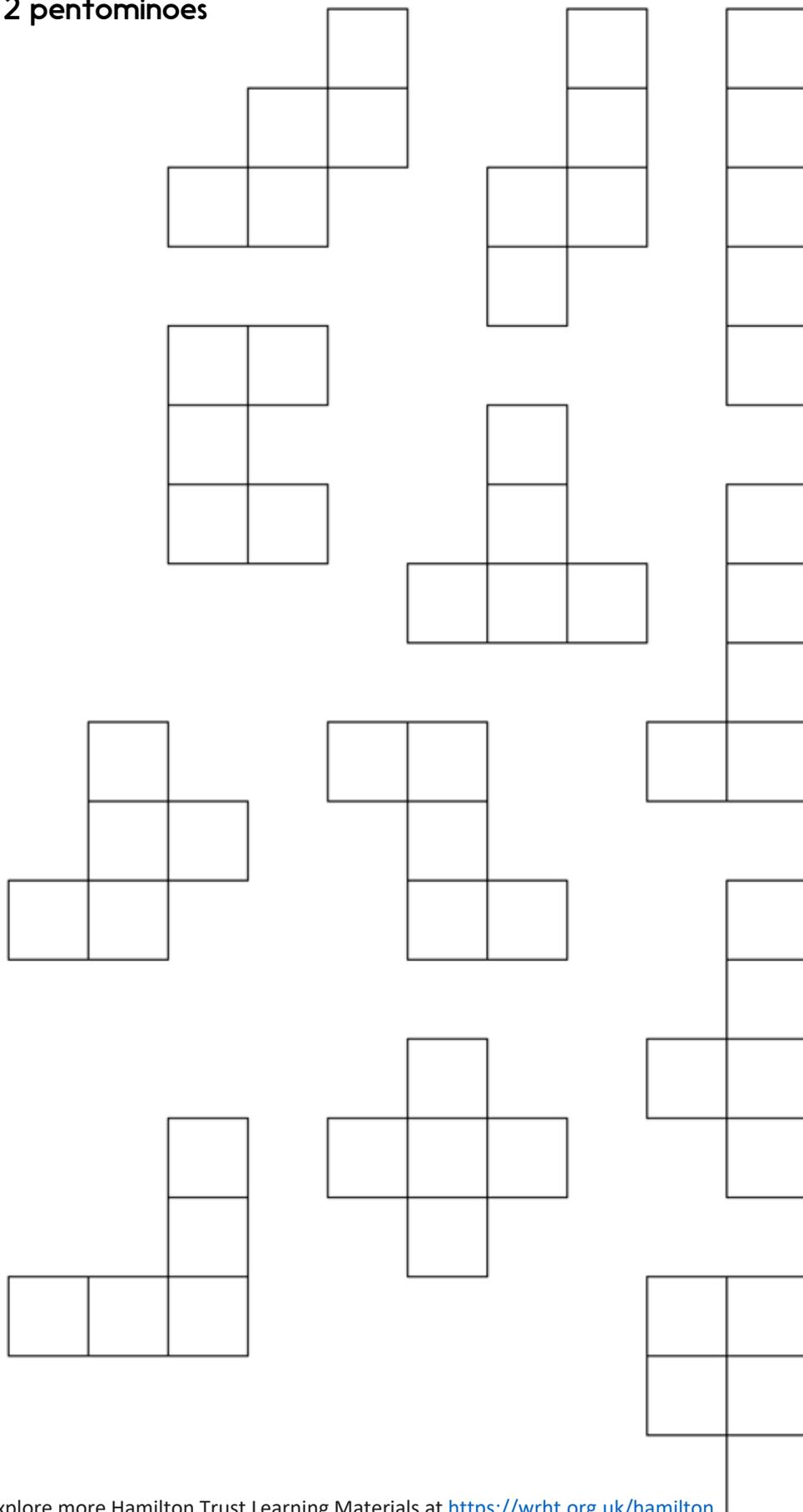


- Find 4 more pairs like this.

Investigative Practical Activity

Investigating Pentominoes

A set of all 12 pentominoes

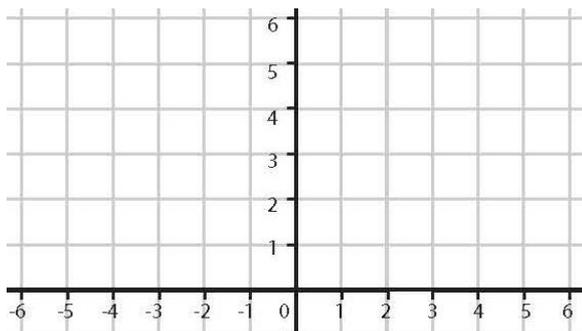
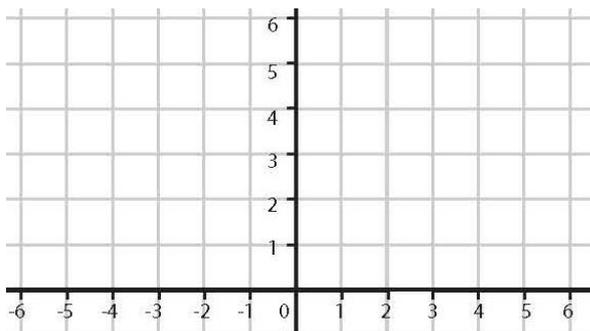
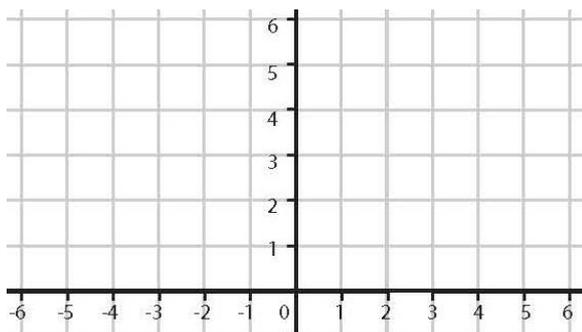
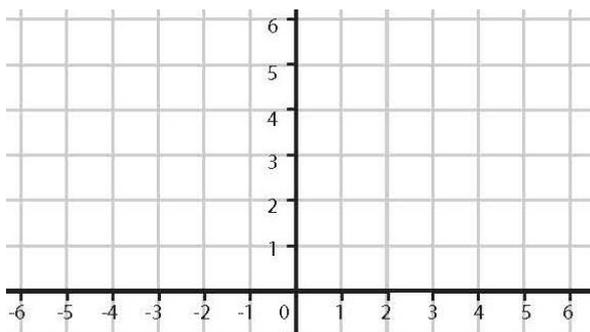
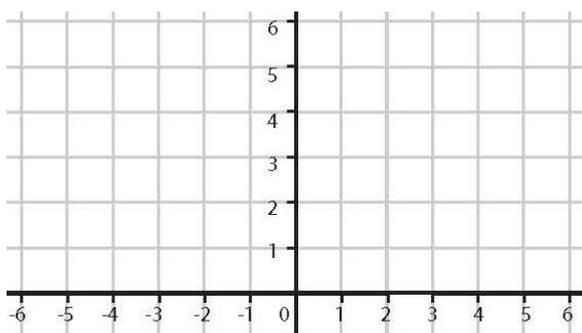
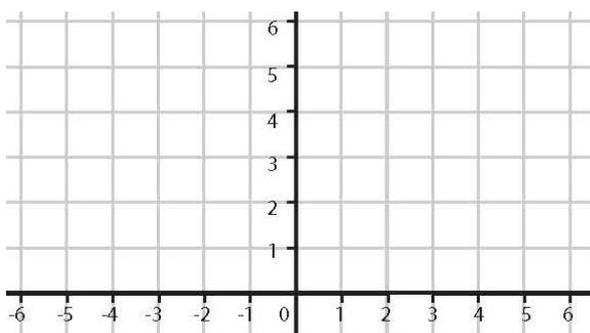
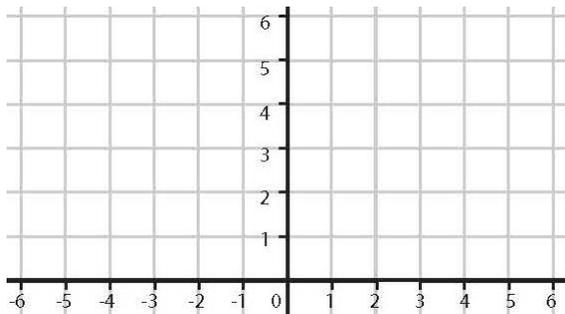
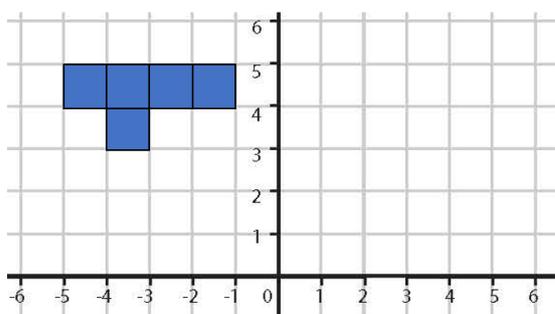


Check your understanding

Questions

Pentomino reflections

Using the co-ordinate grid as a guide, carefully draw one of your pentominoes on the left of each grid, then the reflection across the y-axis on the right. The first is drawn in to start you off; choose 7 more.



Answers on next page

Check your understanding

Answers

Pentomino reflections

Look for accurately drawn reflections across the y-axis, e.g.

