Week 4 - Package 1 - Year 3 and 4 Mathematics - Factor squares

Things you need

Have these things available so your child can complete this task.

Ideal

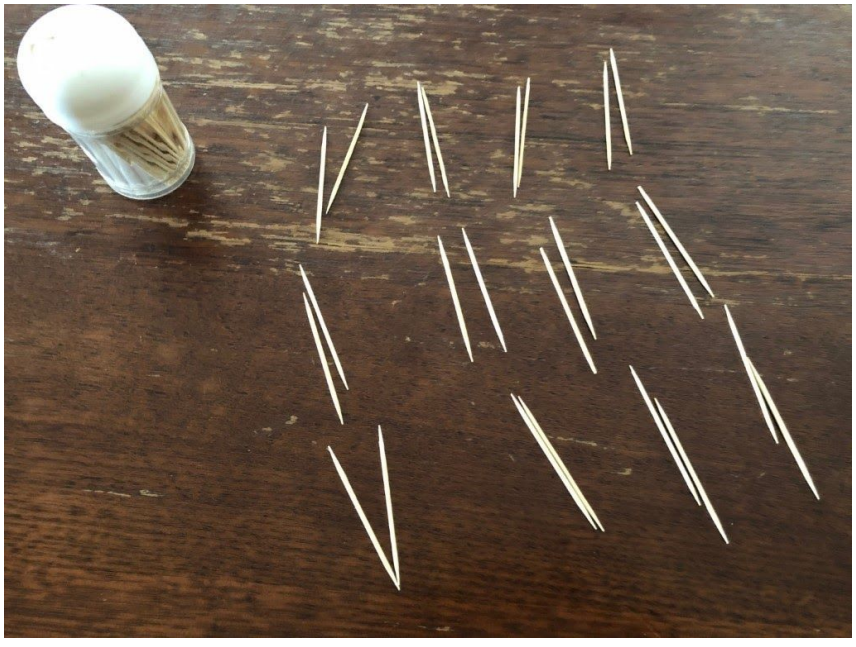
- 24 toothpicks

Back up

- 24 pencils or sticks

Before you start

You will need a large table or floor space to spread the toothpicks out.



What your child needs to know and do

Students will need to know how to count to 24 and the properties of a square.

What to do next

1. Make 1 large square.

2. Make 2 squares.
3. Make 3 squares.
4. Make 4 squares. Hint: A square can share a side of another square.
5. Can you make 5 squares? Hint: Squares don’t all have to be the same size.
6. Can you make 6 squares?
7. Can you make 7 squares?
8. Now make 8 squares?
9. Can you make 9 squares? Why or why not?
10. Can you make 10 squares? Why or why not?
11. Why can we make some squares and not others?

Options for your child

Activity too hard?

Use 12 toothpicks instead of 24 and make 1 square, 2 squares, 3 squares and 4 squares.

Activity too easy?

Follow the same instructions as above but use 48 toothpicks.

Can you make more squares?

Extension/additional activity

Try this activity with a triangle and pick a number which is divisible by 3.

E.g 27 toothpicks.

Does this work as successfully as an even number? Why?

What happens when you halve the number?

Week 4 - Package 2 - Year 3 and 4 Mathematics - Inside Seven Squares

Adapted from NRICH maths.

Things you need

Have these things available so your child can complete this task.

Ideal

- Pencil
- Dotty grid paper (square dots)
- Ruler
- A square or A4 piece of paper

Back up

- Pen or texta
- Grid paper such as that in your child's mathematics book.

Before you start

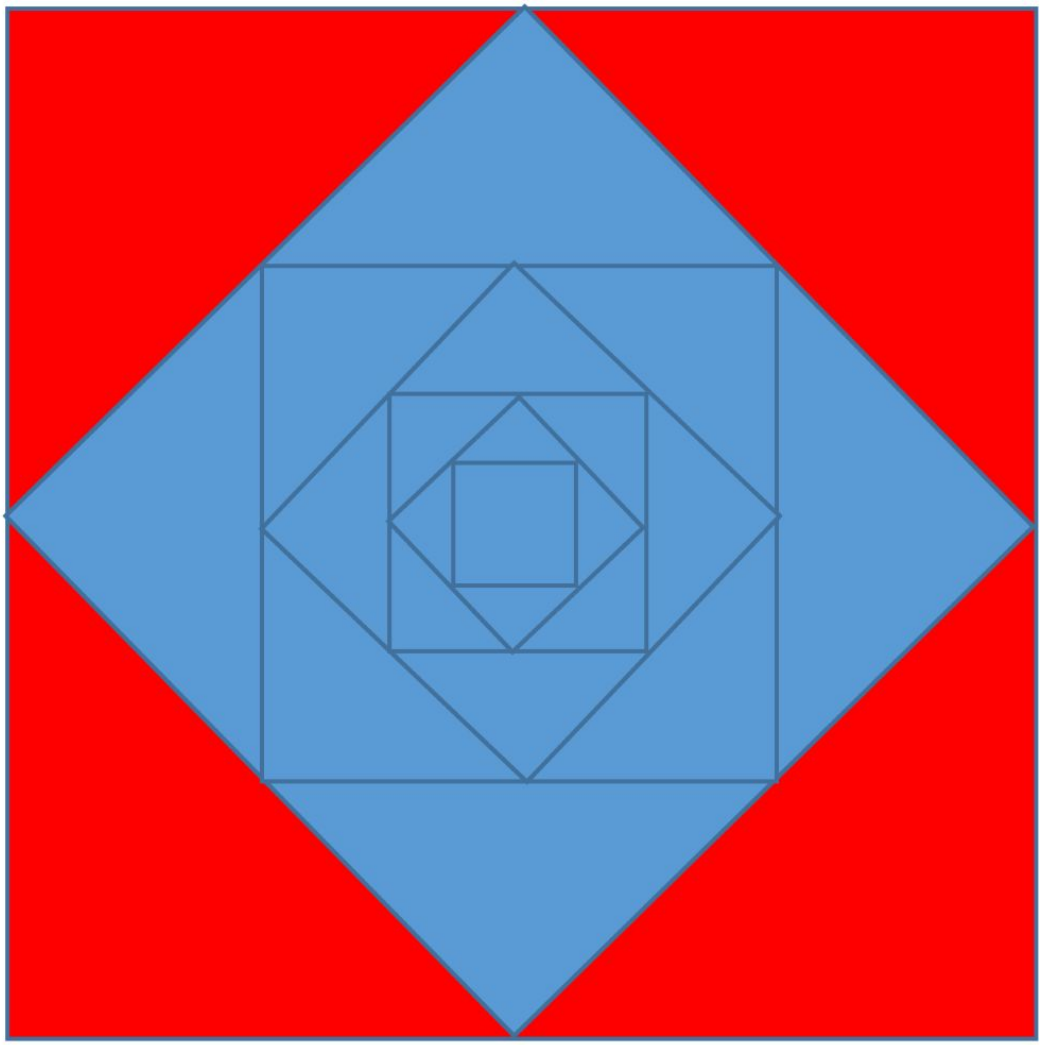
This is a reasoning activity adapted from nrich.maths and is expected to take some time. Try to encourage your child to solve the problem without stepping in to help at the first hurdle.

Your child will need to be able to draw lines accurately with a ruler using the dotty grid paper or ordinary grid paper as a guide. Drawing lines accurately is an important mathematics skill but is not necessary for the reasoning part of the activity. Your child will also need to know the basic properties of squares and right-angled triangles so you may want to do some research before you get started. In addition, your child will need to understand that area is the amount of space inside the boundary of a two-dimensional shape and can be measured in square units.

What your child needs to know and do

The problem

Seven squares are set inside each other. The centre point of each side of the outer square are joined to make a smaller square inside. This is repeated each time a square is drawn until there are 7 squares.



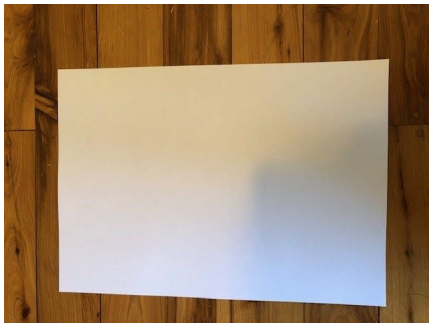
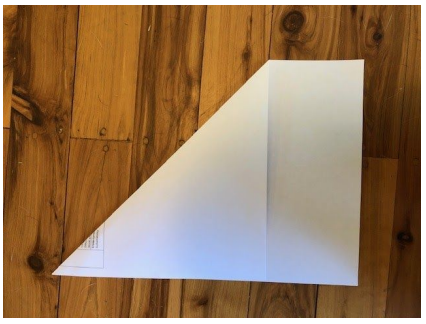
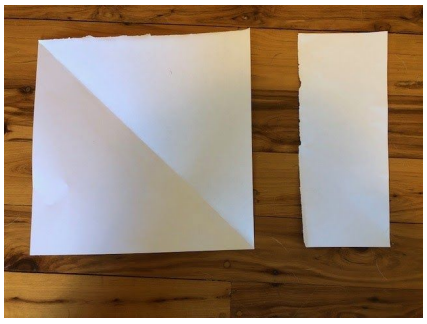
The centre square has an area of 1 square unit.

What is the total area of the four outside right-angled triangles (the ones in red)?

What to do next

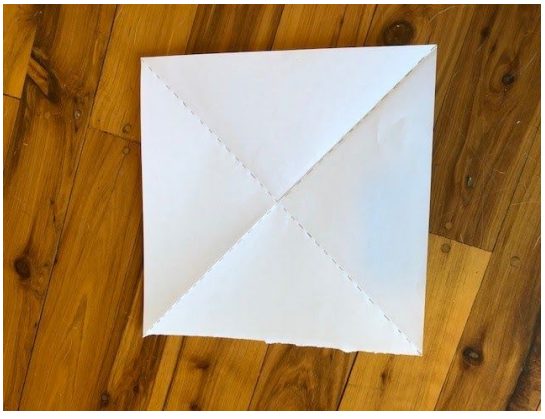
A useful way to get your child thinking about this problem is to make the beginning of the design by folding a square piece of paper. Using concrete materials is an important mathematical skill at all levels of learning. Remind your child that this is a tool for learning.

An A4 piece of paper can be made to represent a square as follows:

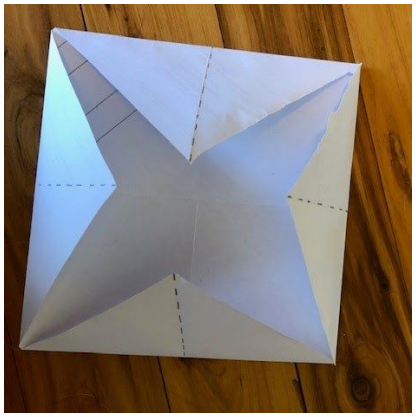




The following folding activity will help your child consider where the problem came from. It is really helpful to **ask what they notice** at each step of the process.

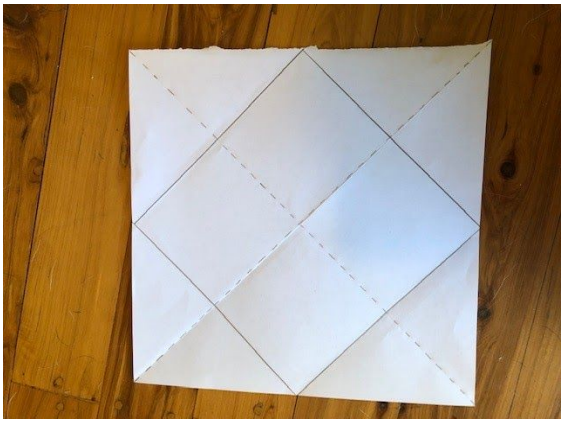
1. Once you have your square piece of paper fold it along both diagonals to find the centre.



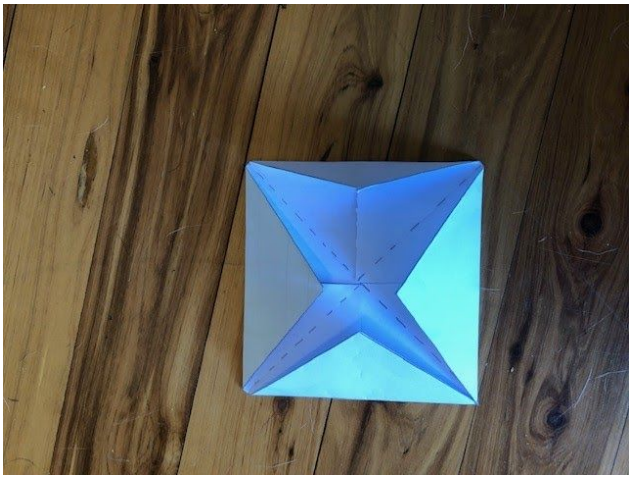
2. Fold each right angle carefully into the centre.



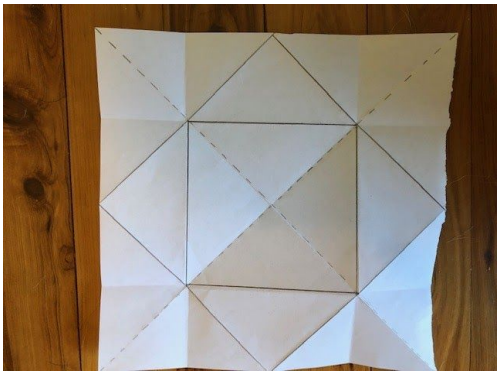
3. Open out and use the folds to draw the next square.



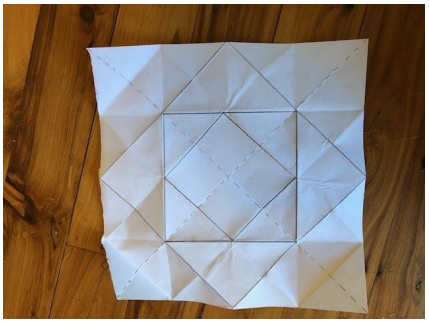
4. Fold in again and then fold the next four right angles into the centre of the new square. At this point the paper is going to start looking like a Chatterbox. Making a Chatterbox would be a lovely fun activity to do after the maths! It is a great way to practise accurate folding.



5. Open out again and draw the next square.



6. Your child can continue this activity until it becomes too hard to fold the paper. I wonder whether 7 times really is the limit for folding a piece of paper? The folds will become less and less accurate as the paper gets thicker. (You might even like to view an old episode of Myth Busters about this!)



Next you will need the dotty paper or squared paper from your child's maths book, a pencil and ruler.

It would be wonderful if you could do the activity alongside your child or if they could work with a sibling to share ideas. Make sure you give your child a chance to think about and discuss where on the paper they will start, what size square to start with, and whether to start with the largest or the smallest square. There may be a few trial runs.

Once all of the squares have been drawn it is important to remember that the problem asks you to find the combined area of the four outer triangles (the red ones in the diagram). There will be a number of ways to explain this. All strategies are good strategies and it is worth brainstorming as many ways as possible.

Options for your child

Activity too hard?

If the drawing activity is too difficult there is still a lot of learning in the folding activity. Ask your child how much bigger the area of the original square is than the square created by the folds. Ask them how they know.

Activity too easy?

Ask your child to determine how many times bigger the area of the outside square than each of the successive squares.

Ask if they can predict the area of the square outside the largest one they have drawn. Can they create a table that shows the areas of each square so they can predict the areas of both smaller and larger squares?

Can they add perimeter to their table or length of each side to discover the relationship between the perimeters of the squares and their areas?

Extension/additional activity

A lovely extension activity that everyone can try also involves manipulating squares. It is called Fitted. From NRICH maths.

The problem

Nine squares with side lengths 1,4,7,8,9,10,14,15 and 18 cm can be fitted together with no gaps and no overlaps, to form a rectangle.

What are the dimensions of the rectangle?

Week 4 - Package 3 - Year 3 and 4 Mathematics - Totality

Things you need

Have these things available so your child can complete this task.

Ideal

- Watch the video from NRICH maths.
- Print out of the game board.
- 1 counter.

Back up

- Follow typed instructions below.
- Draw your own game board.
- 1 coin.

Before you start

This is a strategic game of addition. It is played with 2 players. It offers the opportunity to think strategically by considering several moves in advance, and practise working with addition at the same time!

What your child needs to know and do

Your child needs to have strategies for solving problems with addition.

What to do next

Play the game!

Students slide the shared counter across several adjacent numbers, adding them up as you go to make a 'running' (or cumulative) total. The goal is to be the first player to make the final slide so that the chosen target is reached exactly. Making the total go above the target loses you the game.

How to play

1. Player 1 chooses a target to reach. This is the total both players try to make.
2. Player 2 places their counter on the game board over one of the numbers and says that number.
3. Player 1 moves the same counter in any direction along a line segment to a neighbouring number and announces the total of the two numbers.
4. Player 2 moves the same counter to cover a neighbouring number, adds on that number, and announces the 'running' total of the three numbers.
5. Players take it in turns to slide the counter to cover a neighbouring number and to add that number to the 'running' total.
6. Players must move when it is their turn.
7. No 'jumping' is allowed.

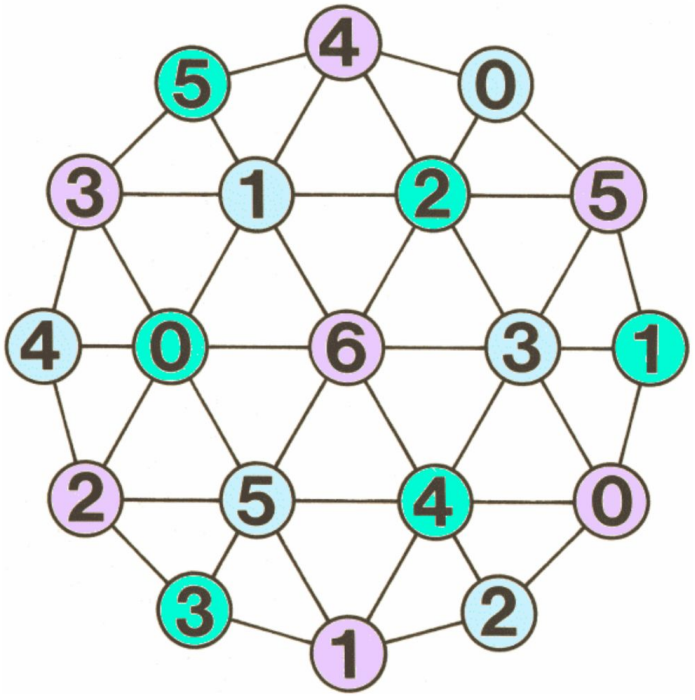


Image from NRICH.

Options for your child

Activity too hard?

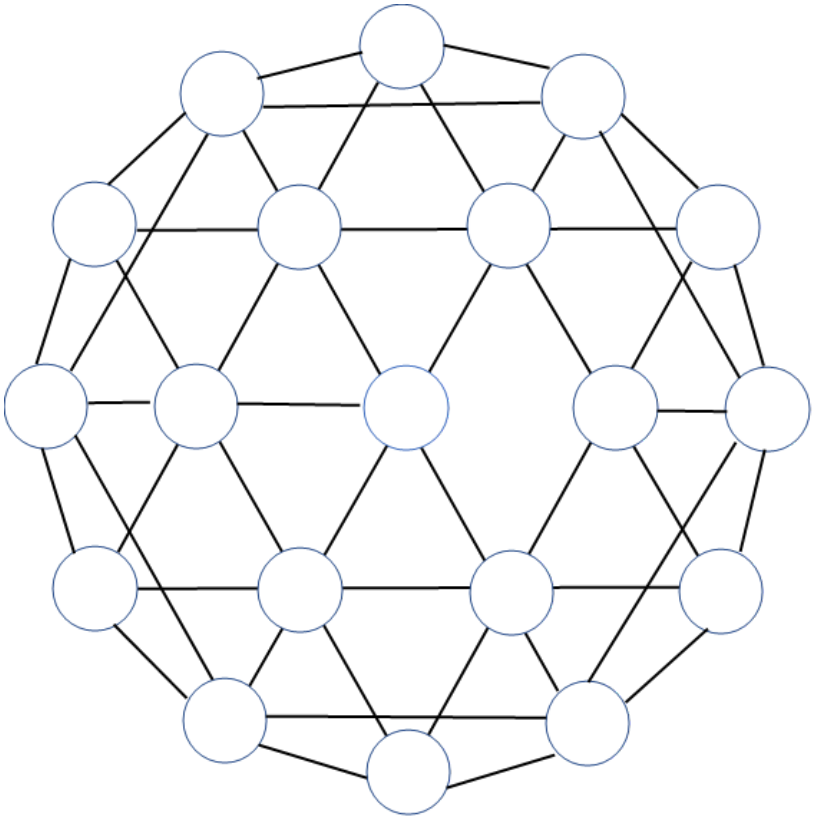
Play the game to a small target number. Eg 20.

Activity too easy?

Play the game with a larger target number. Use multiplication and addition to reach a large target number.

Extension/additional activity

Play the game using this game board. Add your own numbers.



Week 4 - Package 4 - Year 3 and 4 Mathematics - Sponge art transformations

From Youcubed.

Things you need

Have these things available so your child can complete this task.

Ideal

- Plain paper
- Kitchen sponge (old or new)
- Paint in different colours
- Containers for the paint
- Plastic gloves and clothes covering (you may get paint on you)
- Plastic table covering
- Scissors

Back up

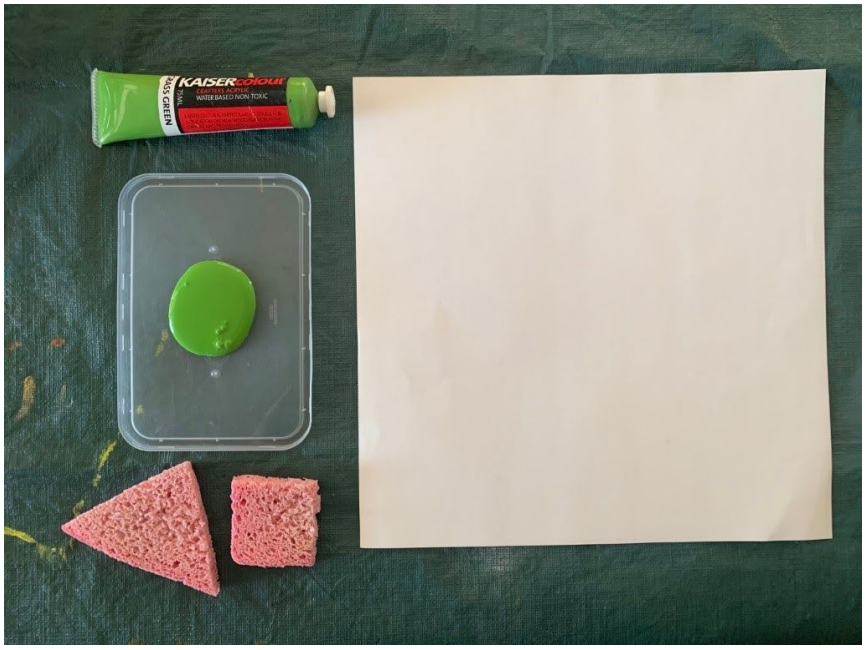
- Card from old packages or boxes
- Paper or card from old packages or boxes, lids, cut potato stamps.
- Food colouring
- Paper plates
- An old shirt you don’t mind getting paint on
- Cut up plastic bag laid flat on a table
- Paper

Before you start

This task comes from YouCubed at Stanford University. Watch the video.

Cut out the sponge into different shapes like different geometric shapes such as quadrilaterals, triangles, pentagons, and so on.

Set up your equipment.



What your child needs to know and do

Students will be exploring ideas around the movement of shapes. We use words like ‘translate’, ‘rotate’ and ‘reflect’ to describe these movements.

Translate is when a shape moves position without turning (sliding). Reflect is when a shape is flipped (flip). Rotate is when a shape is turned, like it has a pin through its centre (turn).

Rotational symmetry is when a shape has a centre point (like a pin through its middle) so that when it is rotated, it moves onto itself perfectly. E.g an equilateral triangle has a rotation of 120 degrees where it turns onto itself.

What to do next

1. Talk to your child about the different shapes you could make and allow them to make a range of different shapes. Then, get creating!
2. Try making prints of the shape by **‘translating’ (sliding)** a two-dimensional shape.

3. You can also try r**eflecting (flipping)**.

4. And **rotating (turning).**

5. Have fun making some art using your maths skills!

You can upload a picture of your painting to Geogebra to explore different transformations!

Options for your child

Activity too hard?

- Draw around a two-dimensional shape and use that to make your stamps.
- Practise tracing shapes by sliding the shape across a blank piece of paper.
- Use a mirror to show the reflection of a two-dimensional shape by holding it up against the shape on a table.

Activity too easy?

- Using a sponge shape, test whether the shape can be tessellated by stamping the shape several times with one side lining up with the other.
- Does the shape fit perfectly next to each other?
- Can you think of other shapes which can tessellate?
- Can you find things in your house which are tessellations? (bathroom tiles)

Extension/additional activity

Rotational symmetry

Using a sponge shape, test whether the shape has rotational symmetry by stamping the shape in a clockwise direction without overlapping the paint.

Does the shape complete a full circle (360 degrees) without overlapping?

How can you change the shape of the sponge so it does have rotational symmetry?

Can you find the ‘centre’ of rotation?

Week 4 - Package 5 - Year 3 and 4 Mathematics - A square of numbers

Things you need

Have these things available so your child can complete this task.

Ideal

- Interactive activity
- Blank paper for working out

Back up

- Draw the square grid with question marks below.

Before you start

This activity will support your child's understanding of the properties of numbers and the operations of addition, subtraction, multiplication and division.

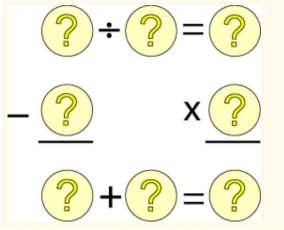
What your child needs to know and do

Your child will need opportunities to think as they do this task.

What to do next

The challenge:

Put the numbers 1 to 8 into the circles so that the four calculations are correct.



You might like to use the interactive activity to support your thinking.

How many correct solutions can you make?

- Where could the two largest even numbers go? Why?
- Where could the number 1 go? Why?
- How will you keep track of what you have tried?

Options for your child

Activity too hard?

Use the interactive tool to help your thinking.

Activity too easy?

Make a similar problem which uses different numbers or operations.

Extension/additional activity

Consecutive numbers are numbers which follow one after the other. For example, 6, 7, 8, 9.

- Choose 4 consecutive numbers and write them in a row.
- Add an addition or subtraction symbol between the numbers. E.g. 6 + 7 - 8 + 9 =?
- Solve the equation.
- Discuss different ways of solving the problem.
- Which strategy is quicker and easier? Why?
- Try using a multiplication or division symbol.
- Practise using different sets of consecutive numbers.