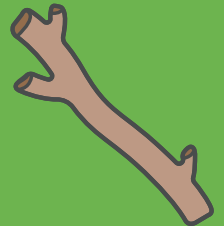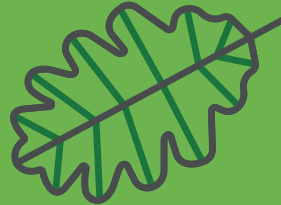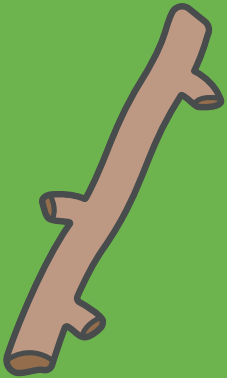**Maths-Whizz®**
by **whizz** EDUCATION

Making Maths Stick
End of year five

Maths-Whizz account details:

Username _____

Password _____

🌐 www.whizz.com

[f] @MathsWhizzTutor

[twitter] @MathsWhizzTutor

Contents

Making Maths Stick

Did you know?

At Whizz Education, we've been examining our live learning data which shows that **children can lose 2.6 months worth of learning over a typical 6 week summer holiday!**

This is known as Summer Learning Loss and this year, we've decided to do something about it.

Overall summer learning loss
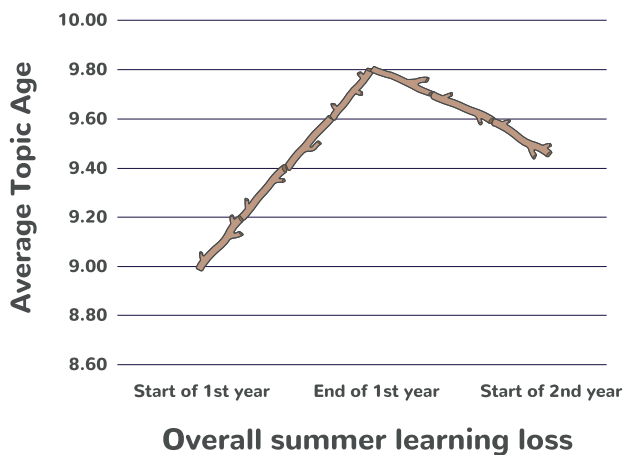
Reducing summer learning loss

We recommend children continue to use Maths-Whizz throughout the year, achieving at least 3 Progressions each week (that's likely to take between 45 and 60 minutes per week). So, over a 6-week summer holiday, not only will children be able to maintain their maths knowledge, they will also make additional progress as well. For such a small amount of time each week the gains are huge!

Making Maths Stick this summer

We've created a handy chart for you to stick up at home as a way of tracking the Progressions your child has made on Maths-Whizz over the holidays.

We've also created a fun activity pack, full of ideas, activities and games to bring the maths your children have been learning at school to life, and all inspired by the outdoors! The activities and games can be done at home, on holiday, while you're visiting friends, in the local park, the wood, at the beach or in the garden. Our activities involve a range of engaging, hands-on activities and games to suit all learning styles. Every activity aims to encourage enquiry, creativity and teamwork in making maths fun.

Getting started

Everything you need can be found outdoors or in cupboards at home, so you can be creative! For rainy days or if you want to stay indoors, you can use paper straws, spaghetti, pencils, beans or building blocks. If you're outside, remind children to be kind to the environment - be careful not to disturb or damage trees or plants, use what you find on the ground instead. And always wash your hands before handling food and drinks.

What's in the pack?

There are 12 activities, for each year group - have a look through and you can choose the pack that matches the year group your child has just finished or the year group they will join in September. Try to complete two a week throughout the holidays.

Connect with us!

Share what you have been up to with us through Twitter or Facebook - just search **@MathsWhizzTutor**. We will share the best of your posts with our followers each week! Most of all, have fun Making Maths Stick over the summer.

Name:

Weekly Progression chart

Maths-Whizz Progressions

Draw a tick over the stone for every Progression you make.
How many did you make in total this week? Write it in the box!

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Activities

Put a tick in the box when you have completed the exercise in your 'Making Maths Stick' activity pack!

1	2	3
4	5	6
7	8	9
10	11	12

Activity one - Take ten sticks

Key skills

- To problem solve.

Have ready

- 10 sticks or alternatives.

Activity

- Take ten sticks and put them into three piles any way you like.

- One possible distribution of the sticks is 4 - 1 - 5, but there are lots of other arrangements possible.

- Move the sticks in a way that means each pile now has a different number of sticks.

- Here, we have moved one stick from the left pile to the middle and one from the right pile to the middle. Our example now becomes 3 - 3 - 4.

- Keep rearranging the sticks so that each time there is a different number of sticks in each pile. What do you notice?

Activity two - Spot the shapes

Key skills

- To draw and make 2D shapes using materials.

Have ready

- Yourself.

- Possibly a camera.

Activity

- Have a look around you and see if you can find (and take a photo of) a shape with:

  - Five or more sides.

  - 2 right angles.

  - 2 acute angles.

  - One pair of parallel sides.

  - 2 perpendicular sides.

  - 4 lines of symmetry.

  - More than 4 diagonal lines.

- You could make the shapes you see with sticks!

Activity three - Crossing sticks

Key skills

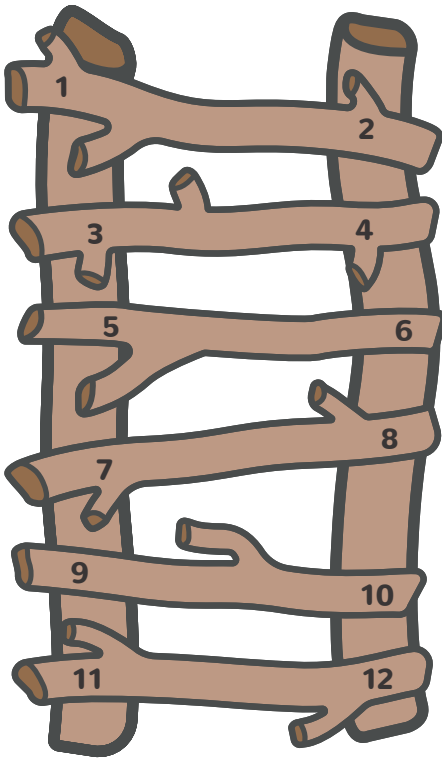- To problem solve.

Have ready

- Sticks or alternatives.

Activity

- Take 8 sticks. You can only place them horizontally or vertically to each other.

- Unless all sticks are parallel to each other then sticks placed horizontally will always cross sticks placed vertically.

- For example, with 8 sticks placed like this there are 12 places where the sticks cross.

- Have a go with six sticks.

- Explore different variations.
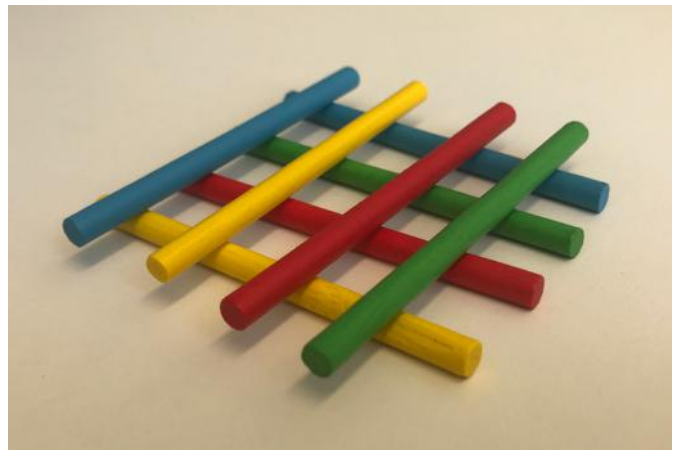
- How many different numbers of crossings are there?

- If all lines are parallel, how many crossing points will there be?

- What is the next largest number of crossings after zero? Can you explain your answer?

- What is the largest number of crossings? Can you explain your answer?

- Explore for different numbers of sticks.

- If I changed the direction of some of the sticks would the number of crossings change?
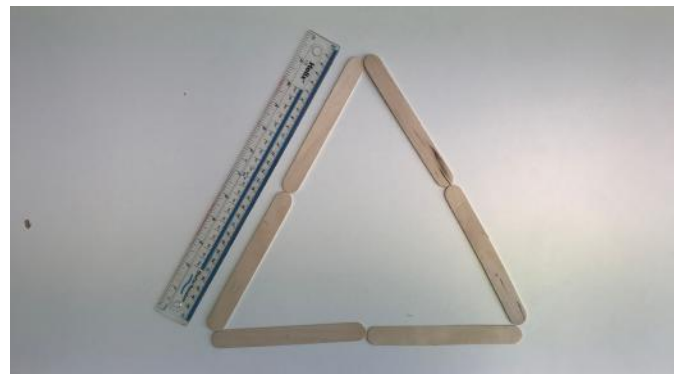
5

Activity four - Perimeter and area

Key skills

- To calculate the perimeter and area of shapes.

Have ready

- Tape measure.

Activity

- I'm thinking of a rectangle with an area of 48cm. What could its perimeter be? Is there more than one possibility?

- Prove it – show pictures or make the rectangle .

Stuck?

Try thinking of all the ways you can make 48 using just four numbers!

6

# Activity five - What maths can you see?

Key skills

- To make connections with mathematics and the real world.

Have ready

- Tape measure.
- Camera.
- Pencil and paper.

Activity

- Look at nature or architecture to identify geometric shapes and properties.

- Look around you. What can you see that has a mathematical connection? Write or draw any mathematical words or shapes in and around the space you are in.

- Write your ideas down in words or draw a mathematical calculation. Take a photo.
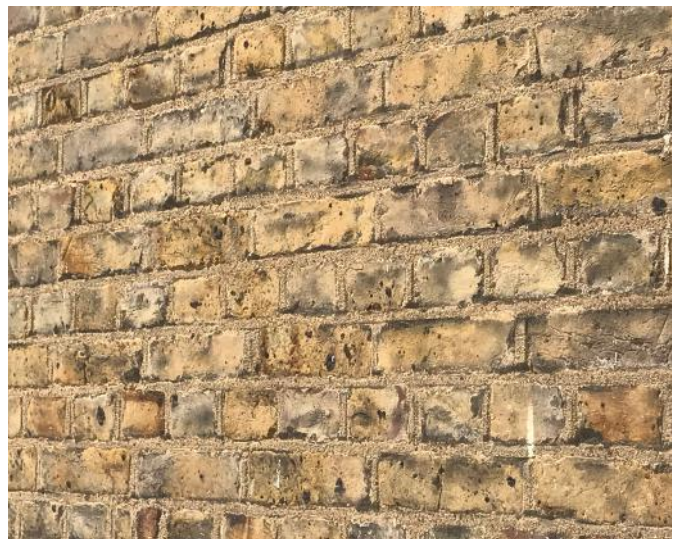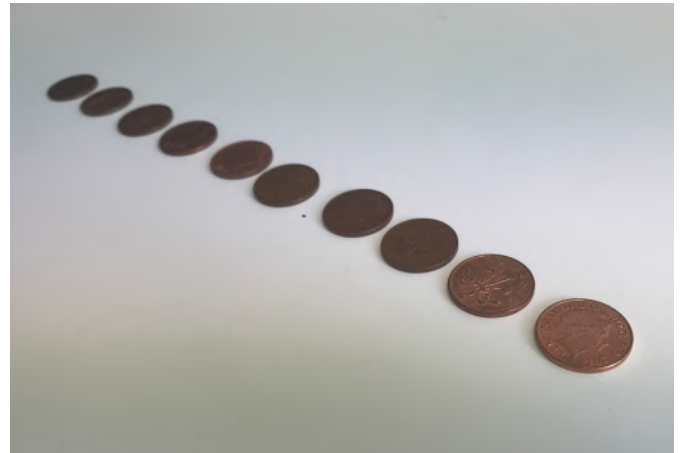
Activity six - Make pairs (Nrich)

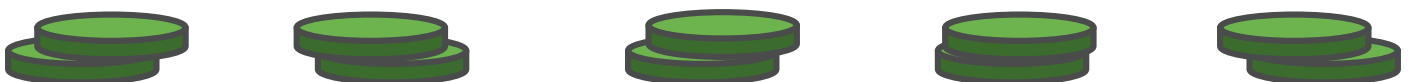| Key skills |
|---|

- To problem solve.

Have ready

- 10 counters (you could use stones or alternatives).

Activity

- Put 10 counters in a row.

- Find a way to arrange the counters into five pairs, one on top of another, evenly spaced in a row so that they look like this:

- A counter can only be moved by picking it up, jumping over two counters and landing on another counter.

- Count the number of moves it takes. Can you do it in just five moves?

8

Activity Seven - Make a sun clock

Key skills

- To explain how a sundial works with sunlight and to compare the accuracy and precision of this method with an analogue or digital clock.

Have ready

- A stick.
- Stones.
- A watch.

Activity

- Use a stick to tell the time for a day and see how the earth moves in relation to the sun. You will need a watch or clock handy.

- Find an open area of ground that gets the sun all day. It needs to be somewhere where it won't get disturbed.

- As early as possible in the morning, push the 1m stick in the ground. Make sure the stick is vertical.

- Every hour on the dot mark the tip of the stick's shadow with a short stick or pebble, writing the hour beside it.

- The following day you can tell the time by looking at your sundial.

- Work out the timings between the sticks. How accurate is your sundial?

Activity eight - Fractions

Key skills

- To recall and use equivalent fractions.

Have ready

- Sticks or alternatives.

Activity

- Collect lots of sticks of different lengths and compare the length of the sticks. Have a go at building a fraction wall.

- What fraction sentences can you come up with?

- For example:

$$\frac{3}{10} > \frac{1}{4}$$

$$\frac{5}{10} = \frac{1}{2}$$

$$\frac{7}{10} < \frac{3}{4}$$
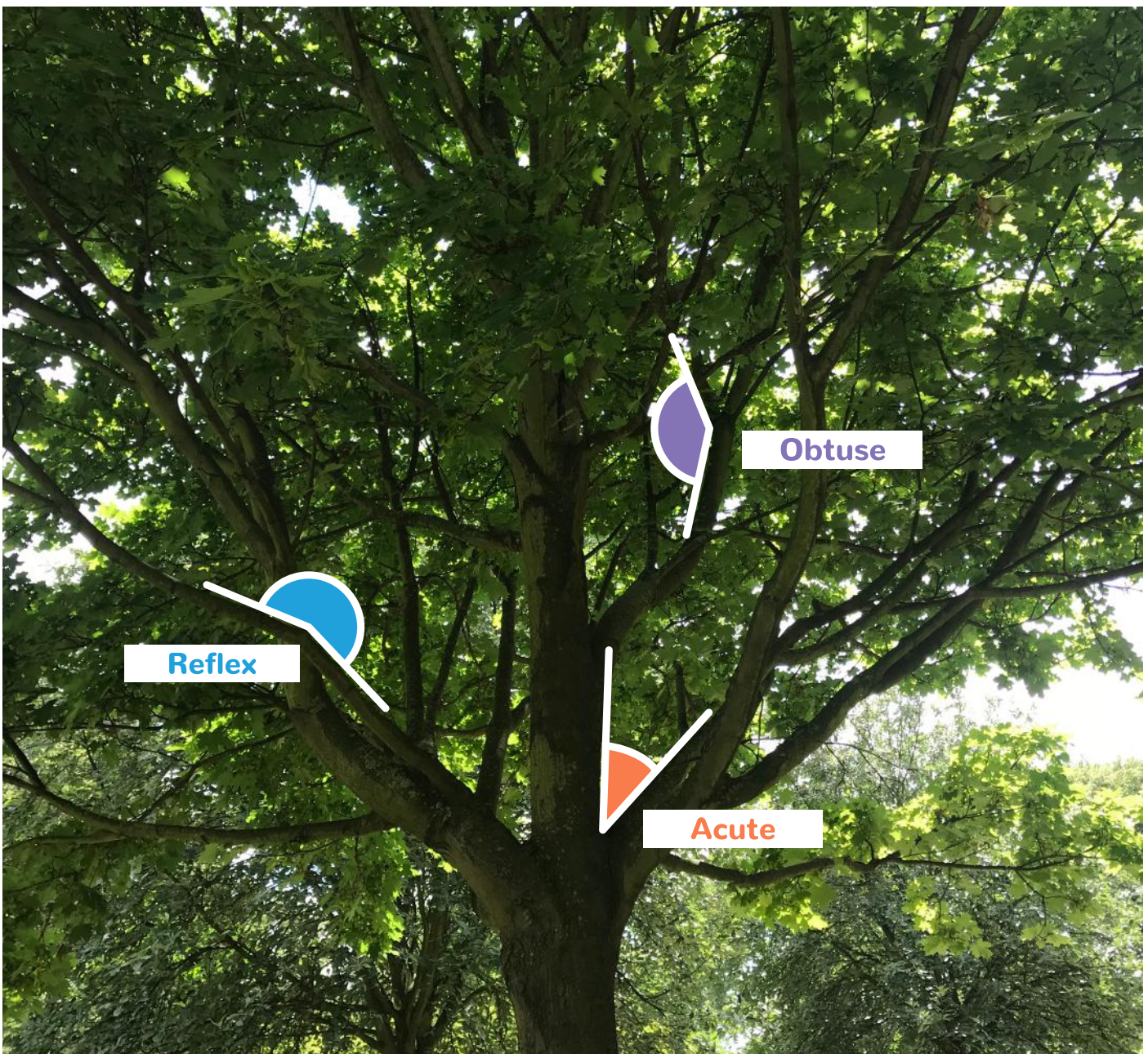
Activity nine - Looking at angles in trees

Key skills

- To identify acute, obtuse and reflex angles.

Have ready

- A camera.

Activity

- Have a look around you – can you see lots of different angles?

- Take a photo and then label the different angles.

Obtuse

Reflex

Acute

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by **whizz** EDUCATION

Activity ten - Achi

- To problem solve.

Have ready

- Two players.

- 4 counters each (you could use stones or alternatives).

- Achi game board (see resources).

Activity

- Be the first to connect **3** of your counters in a row, vertically, horizontally, or diagonally.

- Players take turns placing one counter at a time on the empty spaces of the board.
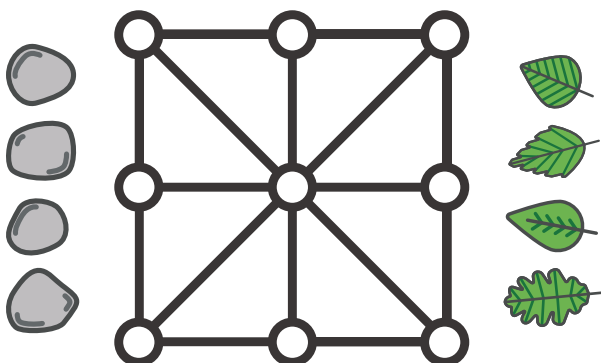
- If a player connects **3** counters in a row during this phase, he/she wins the game. Connections can be vertical, horizontal, or diagonal.
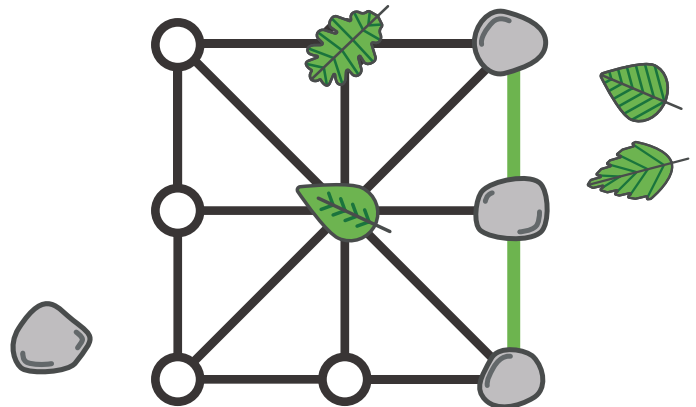
- Once all 8 counters have been placed on the board, one space will be left empty. Players take turns moving one of their counters to an empty space next to it.

WIN!
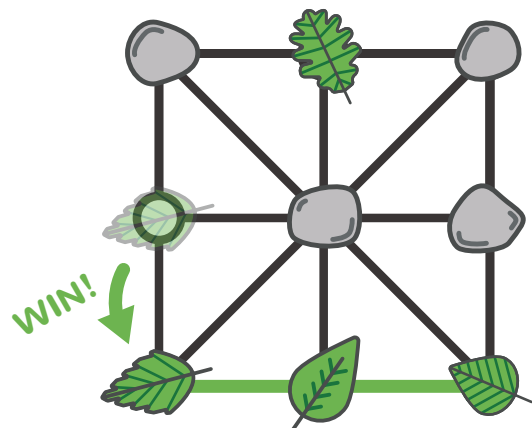
- Move when possible. If a player can move, he/she must move. If a player cannot move, his/her turn is skipped.

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Activity eleven - Mayan numbers

Key skills

- To understand place value in a different number system.

Have ready

- An assortment of materials to represent the counting system below.

- Mayan place value frame (see resources).

- Mayan addition frame (see resources).

Activity

- The Mayans had a number system to help them keep track of the date. They counted in twenties.

- Their numbers look like beans, sticks and shells.

- Let's have a look...

0	1	2	3	4
5	6	7	8	9
10	11	12	13	14
15	16	17	18	19

- Mayans arranged their sticks and beans in layers.

- Our numbers are written horizontally but the Mayans worked vertically.

Activity eleven - Mayan numbers (cont.)

- The Mayan number system is base 20 and the numbers are written in a vertical place value format using powers of 20: 1, 20, 400... as opposed to our Arabic horizontal base 10 number system of 1, 10, 100...

- So 58 would be:

| 20 | •• | 2 x 20 |
| 1 | ≡ | 18 |

- So 2458 would be:

400	•	6 x 400
20	••	2 x 20
1	≡	18
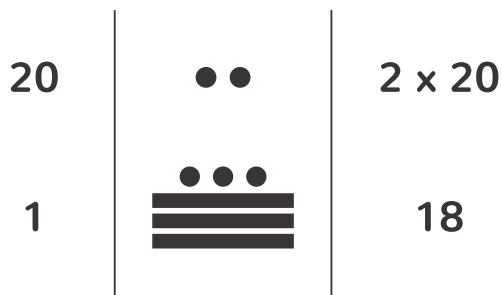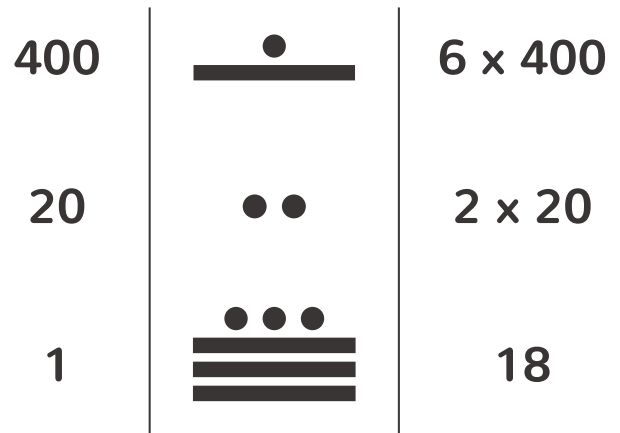
- Have a go at using the materials to write different numbers using the Mayan place value grid. What would be the layer above 400s?

Extra task

- Try adding two numbers using the Mayan number system.

- For example:

400	•			—			•
20	—	+		•••	=		•••
1	≡••			••••			≡•
512				**2064**			**2576**
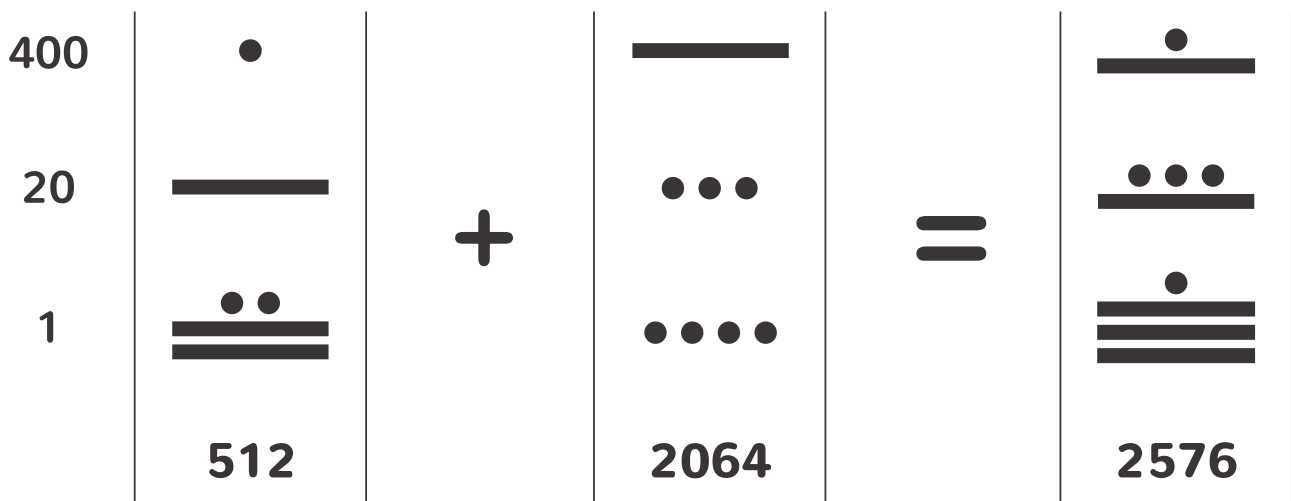
Activity twelve - Shaping it (Nrich)

Key skills

- To problem solve.

Have ready

- Sticks or alternatives.
- Paper and pencil.

Activity

- Make a picture by simply starting with a square, then find the half-way point on each side and join the points up.

- This creates a smaller shape (which also happens to be a square) inside the original.

- The half-way points of this new shape are then joined up to make a third shape. This way of making new shapes is continued until it gets too small to do properly.

- Try this with other shapes. You could use sticks or string.

- Does it work with regular and irregular polygons?
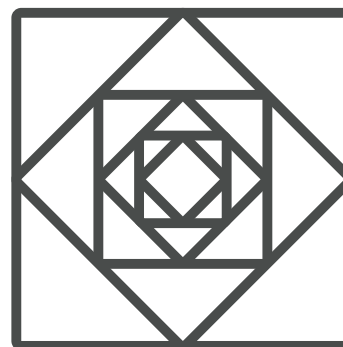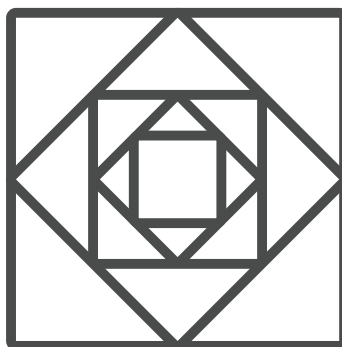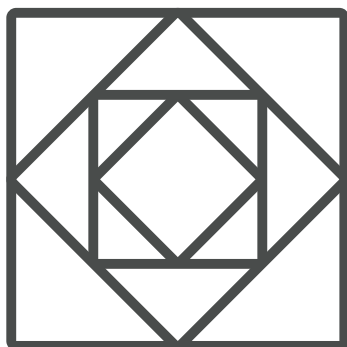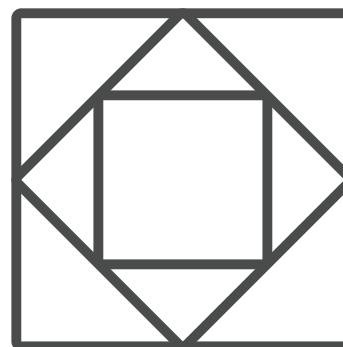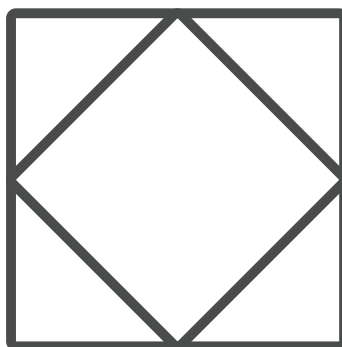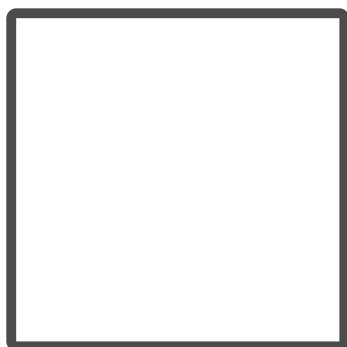
Resources
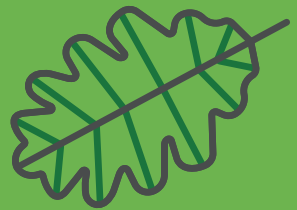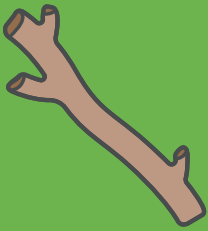
Achi game board
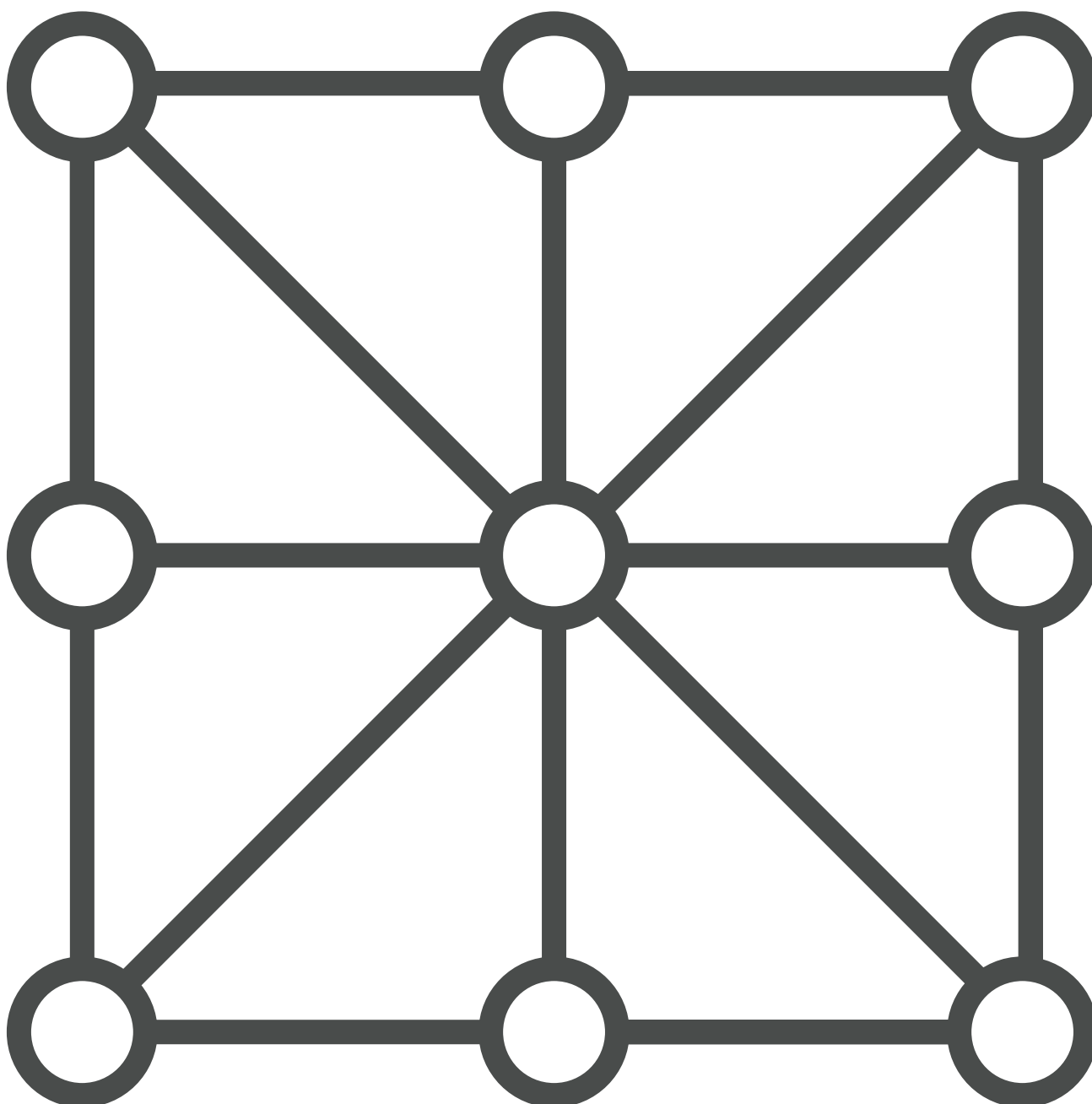
Mayan place value frame

400		
20		
1		

Mayan addition frame

400	
20	
1	

+

=
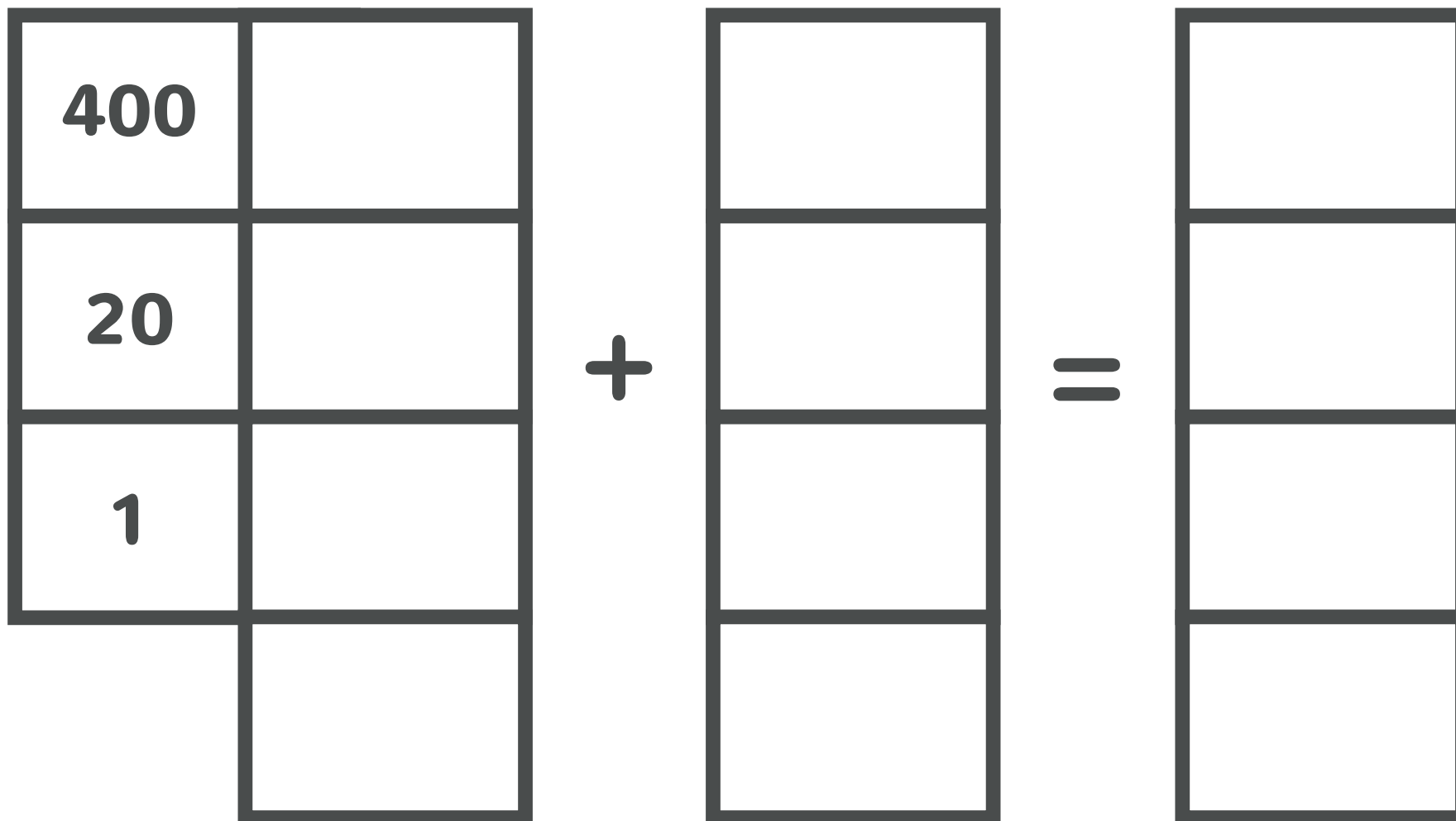
Glossary
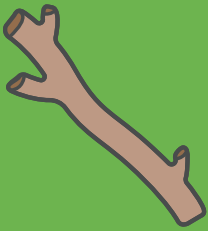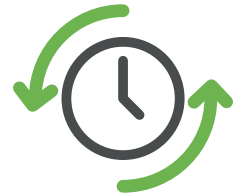
Glossary
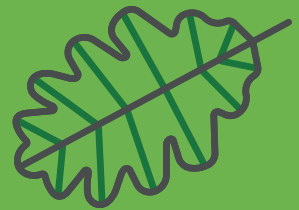
Acute angle

An angle smaller than a right angle. It is an angle between 0° and 90°.

Angle

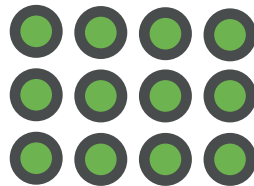An amount of turn. Angles are measured in degrees.

Anti-clockwise

Turning the opposite way to the clock.

Area

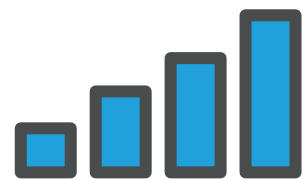The area of a shape is a measure of how much surface it has.
Area = length x width

Array

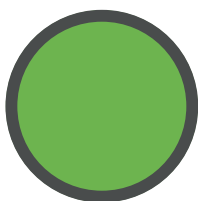A regular arrangement of numbers or objects. It has rows and columns usually in the form of a rectangle.

Ascending

Going up or increasing in order from smallest to largest.

Circle

A shape with every point at its edge at exactly the same distance from the centre.

Clockwise

Turning the same way as a clock.

Corner

A corner is a point where two or more lines meet.

Glossary

Cuboid

Solid shape with six rectangular faces.
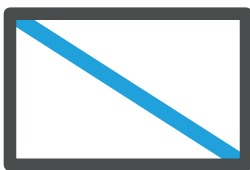
Denominator

$$\frac{1}{2}$$

The number below the line in a fraction.

Descending

Going down or reducing in size.

Diagonal

A straight line that joins any two corners which are not adjacent.

Diameter

A line that passes from one side of a circle through the centre to the other side.

Half

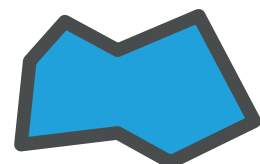One of two equal parts. When something is divided into two equal parts, each part is one half.

Hexagon

Any polygon with six straight sides.

Horizontal

Same direction as the horizon.

Irregular polygon

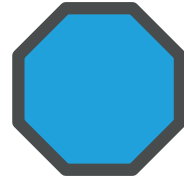Shapes that do not have all their sides the same length. They have different sized angles.

Glossary

Numerator

$$\frac{1}{2}$$

The number above the line in a fraction.

Obtuse angle

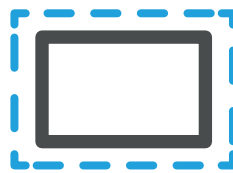An angle that measures between 90° - 180°.

Octagon

Any polygon with eight straight sides.
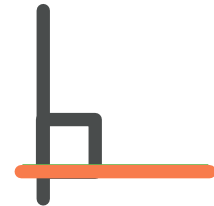
Parallel lines

Lines that stay at the same distance apart.
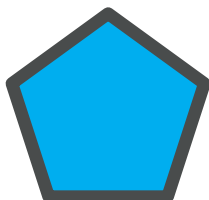
Perimeter

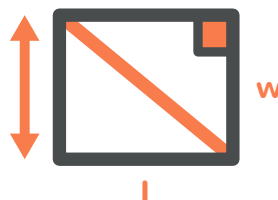The distance around the outside of the shape.

Perpendicular lines

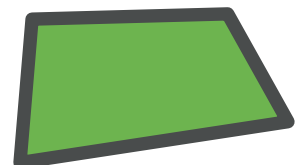One line is at right angles to another line.

Polygon

Any 2D shape with straight sides. Polygons can be regular or irregular

Property

w

l

A property of a shape is a particular fact or feature of it that makes it part of a group with the same properties.

Quadrilateral

Any polygon that has four sides. The four angles add up to 360°.
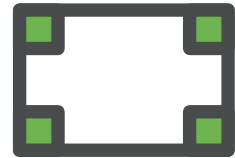
Glossary

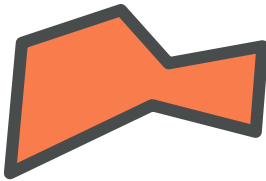## Quarter

Is one of four equal parts.

Radius

Is the length of a straight line from the centre of a circle to its circumference.
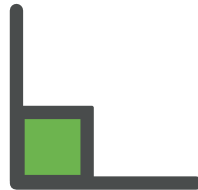
Rectangle

A four-sided flat shape. It has two pairs of opposite, equal parallel sides and each angle is a right angle.

Rectilinear

A rectilinear shape is a shape whose edges are all straight lines. All polygons are rectilinear shapes.

Right angle

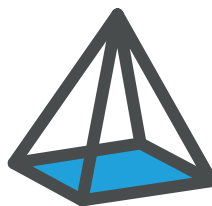An angle of 90°. It is a quarter turn.

Side

A side of a shape is the line that forms part of the edge or perimeter.

Square

A flat shape with four straight and equal sides. The angles in its corners are all right angles.

Square-based pyramid

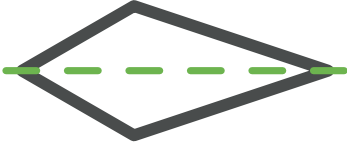Has a face that is square and the other four faces are triangles.

Straight lines

A straight line is half a turn. It is two right angles.
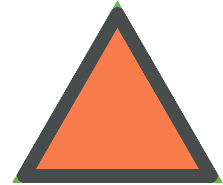
Glossary

Symmetry

The 'Line of Symmetry' is the imaginary line where you could fold the image and have both halves match exactly.
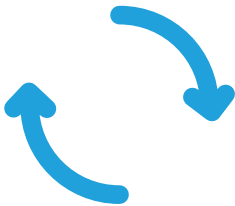
Three-dimensional shape

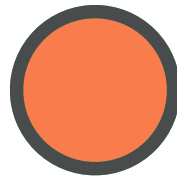Three-dimensional shapes are solid shapes.

Triangle

Any polygon with three sides. The angles of a triangle add up to 180°.

Turn

When something turns it spins, rotates, revolves, or whirls.

Two-dimensional shape

Two dimensionsal shapes are flat shapes.

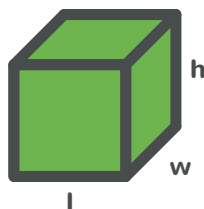## Unit fraction

$$\frac{1}{x}$$

Has a numerator of 1 and any number as a denominator.

Vertical

At right angles to a horizontal line.

Volume

Volume of an object is the amount of space it fills. To find the volume you multiply the length by the width by the height.

Volume = l x w x h