Summer Scheme of Learning

Year 3/4

#MathsEveryoneCan

2019-20
How to use the mixed-age SOL

In this document, you will find suggestions of how you may structure a progression in learning for a mixed-age class.

Firstly, we have created a yearly overview.

For each block of learning, we have grouped the small steps into themes that have similar content. Within these themes, we list the corresponding small steps from one or both year groups. Teachers can then use the single-age schemes to access the guidance on each small step listed within each theme.

The themes are organised into common content (above the line) and year specific content (below the line). Moving from left to right, the arrows on the line suggest the order to teach the themes.

Each term has 12 weeks of learning. We are aware that some terms are longer and shorter than others, so teachers may adapt the overview to fit their term dates.

The overview shows how the content has been matched up over the year to support teachers in teaching similar concepts to both year groups. Where this is not possible, it is clearly indicated on the overview with 2 separate blocks.

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Notes and Guidance

How to use the mixed-age SOL

Here is an example of one of the themes from the Year 1/2 mixed-age guidance.

**Points to consider**
- Use the mixed-age schemes to see where similar skills from both year groups can be taught together. Learning can then be differentiated through the questions on the single-age small steps so both year groups are focusing on their year group content.
- When there is year group specific content, consider teaching in split inputs to classes. This will depend on support in class and may need to be done through focus groups.
- On each of the block overview pages, we have described the key learning in each block and have given suggestions as to how the themes could be approached for each year group.
- We are fully aware that every class is different and the logistics of mixed-age classes can be tricky. We hope that our mixed-age SOL can help teachers to start to draw learning together.

In order to create a more coherent journey for mixed-age classes, we have re-ordered some of the single-age steps and combined some blocks of learning e.g. Money is covered within Addition and Subtraction.

The bullet points are the names of the small steps from the single-age SOL. We have referenced where the steps are from at the top of each theme e.g. Aut B2 means Autumn term, Block 2. Teachers will need to access both of the single-age SOLs from our website together with this mixed-age guidance in order to plan their learning.

### Subtraction

**Year 1 (Aut B2, Spr B1)**
- How many left? (1)
- How many left? (2)
- Counting back
- Subtraction - not crossing 10
- Subtraction - crossing 10 (1)
- Subtraction - crossing 10 (2)

**Year 2 (Aut B2, B3)**
- Subtract 1-digit from 2-digits
- Subtract with 2-digits (1)
- Subtract with 2-digits (2)
- Find change - money

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<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
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<td>Number: Multiplication and Division</td>
<td>Measurement: Length, Perimeter and Area</td>
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<td>Number: Decimals (including Money)</td>
<td>Measurement: Time</td>
<td>Statistics</td>
<td>Geometry: Properties of Shape (including Y4 Position and Direction)</td>
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In this section, content from single-age blocks are matched together to show teachers where there are clear links across the year groups. Teachers may decide to teach the lower year’s content to the whole class before moving the higher year on to their age-related expectations. The lower year group is not expected to cover the higher year group’s content as they should focus on their own age-related expectations.

In this section, content that is discrete to one year group is outlined. Teachers may need to consider a split input with lessons or working with children in focus groups to ensure they have full coverage of their year’s curriculum. Guidance is given on each page to support the planning of each block.

The themes should be taught in order from left to right.
Year 3/4 | Summer Term | Week 8 to 11 – Properties of Shape

**Properties of Shape**

**Common Content**

**Angles**
- Year 3 (Sum B3)
  - Turns and angles
  - Right angles in shapes
  - Compare angles
- Year 4 (Sum B5)
  - Identify angles
  - Compare and order angles

**2-D shapes**
- Year 3 (Sum B3)
  - Recognise and describe 2-D shapes
- Year 4 (Sum B5)
  - Triangles
  - Quadrilaterals

In this block, both year groups look at angles in shapes and compare them. They use the language, right angle, acute angle and obtuse angle.

Teachers may decide to recap Year 3 learning on lines and 3-D shapes with the whole class if needed. Both year groups look at 2-D shapes with Year 4 learning more specific language related to triangles and quadrilaterals.

Year 4 then move on to look at symmetry and co-ordinates. Teachers may use this time to recap other learning with Year 3.

**Lines**
- Year 3 (Sum B3)
  - Draw accurately
  - Horizontal and vertical
  - Parallel and perpendicular

**3-D shapes**
- Year 3 (Sum B3)
  - Recognise and describe 3-D shapes
  - Make 3-D shapes

**Symmetry**
- Year 4 (Sum B5)
  - Lines of symmetry
  - Complete a symmetric figure

**Co-ordinates**
- Year 4 (Sum B6)
  - Describe position
  - Draw on a grid
  - Move on a grid
  - Describe movement on a grid

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Children recognise angles as a measure of a turn. They practice making $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and whole turns from different starting points in both clockwise and anti-clockwise directions in practical contexts. They should listen to/follow instructions and also give instructions using the correct mathematical language in different contexts. Children understand that an angle is created when 2 straight lines meet at a point.

If we start by facing ________ and make a _______ turn, what direction will we be facing?
If we face ________ and turn to face ________, what turn have we made?
If we face north and make a quarter turn clockwise, which direction will we be facing? What if we turn anti-clockwise? What would the time be if the minute hand started at 1, then made a quarter of a turn?
Can you see any angles around the classroom?

Take children outside or into the hall where they can practice moving in turns themselves. Label 4 walls/points (for example: North, South, East, West).
Give children instructions to encourage them to make $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and whole turns from different starting points. Allow children the opportunity to give instructions too.

Look at the hands of the clock.
Turn the minute hand one quarter of a turn clockwise.
Where is the large hand pointing?
What is the new time?

What turn has the minute hand made?

Tick the images where you can see an angle.
Explain your choices.
The arrow on a spinner started in this position.

After making a turn it ended in this position.

Jack says,

The arrow has moved a quarter turn anti-clockwise.

Alex says,

The arrow has moved a three-quarter turn clockwise.

Who do you agree with?

Both children are correct.

The letter ‘X’ has four angles.

The arrow has moved a quarter turn clockwise.

Write your name in capital letters. How many angles can you see in each letter? How many angles are there in your full name?

Answers will vary depending on the children’s names.
Children recognise that a right angle is a quarter turn, 2 right angles make a half-turn, 3 right angles make three-quarters of a turn and 4 right angles make a complete turn.

Children need to see examples in different orientations so that they understand that a right angle does not have to be made up of a horizontal and vertical line.

How many right angles make a half turn/three-quarter turn/full turn?
Where can you see a right angle in the classroom/around school/outside?
Which shapes contain right angles?
Can you think of a shape which doesn’t have any right angles?
How many right angles does a ________ have?
Can you draw a shape with ____ right angles?
What headings would we place in our table?

Give children a clock each so they can practice making turns. Start with the hands showing 12 o’clock, move the minute hand one quarter of a turn.

The angle between the hands is called a _______ angle.
One quarter turn is equal to a _______ angle.

Children can create a ‘Right Angle Tester’ E.g.

They can then go on a right angle hunt around school. Find and draw at least 3 right angles you have seen around your school.

Sort the shapes based on the number of right angles they have. Record your answer in a table.
Right Angles in Shapes

Reasoning and Problem Solving

Draw a line along the dots to make a right-angle with each of these lines:

For example (see red lines):

How many right angles can you see in this image?

True or False?
This shape has two right-angles.

False.
Children could show this by using the corner of a page to show there aren't any right angles.

Can you create your own image with the same number of right angles?

There are 34 right angles.
Children identify whether an angle is greater than or less than a right angle in shapes and turns, by measuring, comparing and reasoning in practical contexts.

Children are introduced to the words ‘acute’ and ‘obtuse’ as a way of describing angles.

What is an acute? (Give 3 examples of acute angles and ask them to identify what’s the same about them. Draw out that they are all smaller than a right-angle).
What’s an obtuse angle? (Repeat activity by giving 3 examples of obtuse angles).
Can you give me a time where the hands on the clock make an acute/obtuse angle?
Can you see an acute/obtuse angle around the classroom?
Can you draw me a shape that contains acute/obtuse angles?

The angle between the hands is ________ than a right angle. This is called an ________ angle.
The angle between the hands is ________ than a right angle. This is called an ________ angle.

Explore other times where the hands make an acute/obtuse angle.

Find 3 acute angles and 3 obtuse angles in your classroom. Use your ‘Right Angle Tester’ to check.

Label any acute or obtuse angles in these images.
Label the acute angles (A) and obtuse angles (O) on the diagram below.

Teddy describes a shape.

My shape has 3 right angles and 2 obtuse angles.

What could Jack's shape look like?

Describe a shape in terms of it's angles for a friend to draw.

Possible answer:
A right angle is __ degrees.
Acute angles are ____ than a right angle.
Obtuse angles are ____ than a right angle.

Children develop their understanding of obtuse and acute angles by comparing with a right angle. They use an angle tester to check whether angles are larger or smaller than a right angle.

Children learn that an acute angle is more than 0 degrees and less than 90 degrees, a right angle is exactly 90 degrees and an obtuse angle is more than 90 degrees but less than 180 degrees.

How many degrees are there in a right angle?

Draw an acute/obtuse angle.

Estimate the size of the angle.

Sort the angles into acute, obtuse and right angles.

Label the angles. O for obtuse, A for acute and R for right angle.
Who is correct?
Explain your reasons.

All are correct. Children may reason about how Whitney has come to her answer and discuss that the angle is about half a right angle. Half of 90 degrees is 45 degrees.

Is the angle acute, obtuse or a right angle? Can you explain why?

Find the sum of the largest acute angle and the smallest obtuse angle in this list:

12° 98° 87° 179° 90° 5°

87° + 98° = 185°
Children compare and order angles in ascending and descending order.

They use an angle tester to continue to help them to decide if angles are acute or obtuse.

Children identify and order angles in different representations including in shapes and on a grid.

How can you use an angle tester to help you order the angles?

How many obtuse/acute/right angles are there in the diagrams?

Compare the angles to a right angle. Does it help you to start to order them?

Rotate the angles so one of the lines is horizontal. Does this help you to compare them more efficiently?

Circle the largest angle in each shape or diagram.

Order the angles from largest to smallest.

Can you draw a larger obtuse angle?
Can you draw a smaller acute angle?

Order the angles in the shape from smallest to largest. Complete the sentences.

Angle _____ is smaller than angle _____.
Angle _____ is larger than angle _____.

Angle b is smaller than angle c.
Angle b is larger than angle a.

How can you use an angle tester to help you order the angles?

How many obtuse/acute/right angles are there in the diagrams?

Compare the angles to a right angle. Does it help you to start to order them?

Rotate the angles so one of the lines is horizontal. Does this help you to compare them more efficiently?
Do you agree with Ron? Explain your thinking.

Angle A and Angle B are the same size. Ron has mixed up the lengths of the lines with the size of the angles.

Here are five angles. There are two pairs of identically sized angles and one odd one out. Which angle is the odd one out? Explain your reason.

Angle e is the odd one out.

Angle b and c are both right angles.

Angle a and d are both half of a right angle or 45 degrees.

Angle e is an obtuse angle.
Children measure and draw straight lines accurately in centimetres and millimetres. They also practice rounding measurements to the nearest centimetre. Make sure the children correctly position the ruler when measuring/drawing the line, by lining up the 0 with the start of the line.

Where should we position the ruler when measuring each line? Why?

How long is each line in millimetres?

Why does 9 cm and 9 mm round to 10 cm and not 9 cm? Look at the ruler/number line to explain your answer.

Do we round 10 cm and 5 mm to 10 cm or 11 cm? Why?

Measure these lines. Record your measurements in cm and mm.

_____ cm and _____ mm

_____ cm and _____ mm

_____ cm and _____ mm

Draw straight lines that measure exactly:

12 cm
8 cm and 5 mm
9 cm and 8 mm
14 cm and 2 mm

This line measures 9 cm and 9 mm

It measures ____ cm to the nearest centimetre.

Draw a line for each of the measurements.

5 cm and 2 mm
13 cm and 8 mm
0 cm and 9 mm
10 cm and 3 mm

What would each line measure to the nearest centimetre?
Alex measures the line.

She says it is 10 cm 4 mm

Is Alex correct?
Explain why.

Alex is not correct because she has started measuring the line from the end of the ruler instead of from ‘0’

Possible answer:
The length of the route will depend on the size of the maze used.

Use straight lines to show the route the car could take to get out of the maze.

Work out the length of the route to the nearest cm

Is this the shortest route?
Children identify and find horizontal and vertical lines in a range of contexts.

They identify horizontal and vertical lines of symmetry in shapes and symbols.

What can you use to help you remember what a horizontal line looks like? (The horizon)
Can you see horizontal and vertical lines around the classroom?
What do we call a line that is not horizontal or vertical?
Which shapes/symbols/letters have a horizontal/vertical line of symmetry?
Which have both?
Can you draw your own shape that has a horizontal and vertical line of symmetry?

A line that runs from left to right across the page is called a ______________ line.

A line that runs straight up and down the page is called a ______________ line.

Find 3 horizontal and 3 vertical lines in the classroom.

Label the horizontal and vertical lines in each of these images.

Sort the shapes/symbols/letters depending on whether they have a horizontal line of symmetry, a vertical line of symmetry or both.
Eva completes the table by drawing shapes.

Can you spot and correct her mistake?

<table>
<thead>
<tr>
<th>Horizontal line of symmetry</th>
<th>Vertical line of symmetry</th>
<th>Horizontal and vertical lines of symmetry</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Eva thinks the star has both lines of symmetry, but it only has a vertical line of symmetry.</td>
</tr>
</tbody>
</table>

Eva thinks the star has both lines of symmetry, but it only has a vertical line of symmetry.

There are 5 horizontal lines and 8 vertical lines.

How many horizontal and vertical lines can you spot in this image by Mondrian?

Create your own piece of art work using only horizontal and vertical lines.
Children identify and find parallel and perpendicular lines in a range of practical contexts. They use the arrow notation to represent parallel lines and the right angle notation for perpendicular lines. Ensure that children are presented with lines that are not horizontal and vertical. Children may need to use their right-angle tester to help them check that lines are perpendicular.

Where might you see sets of parallel lines in the environment?

Can you see sets of parallel and perpendicular lines around the classroom?

Which shapes have only parallel lines?
Which shapes have perpendicular lines?
Which shapes have both parallel and perpendicular lines?

Lines that never meet are called ______ lines.

Straight lines that meet at a right angle are called ______ lines.

Find 3 sets of parallel and perpendicular lines in the classroom.

Draw a line that is parallel to this one.

Draw a line that is perpendicular to this one.

Use arrows to show the parallel lines in these shapes. Use the right angle notation to show the perpendicular lines.
True or False?

Line AB is parallel to line CD.
Line AC is parallel to line BD.
Line AC is perpendicular to line CD.

Redraw the shape so that line BD is perpendicular to line CD.

These lines are NOT parallel.

Mark 3 sets of parallel lines and 3 sets of perpendicular lines in this flag.

Design your own flag containing parallel and perpendicular lines.

For example.

Children can draw and continue the lines to show that they will eventually meet so are not parallel.
Children recognise, describe and draw 2-D shapes accurately. They use properties including types of angles, lines, symmetry and lengths of sides to describe the shape. They could be given opportunities to identify/draw a hidden shape from a description given and also describe a shape for a friend to identify/draw.

**Mathematical Talk**

How many angles does a ______ have?
What types of angles does a ______ have?
How many lines of symmetry does a ______ have?
What kind of lines of symmetry does a ______ have?
(vertical/horizontal)
What types of lines can you spot in a ______?
(perpendicular/parallel)
Can you guess the shape from the description given?
Can you draw a shape from the description given?

**Varied Fluency**

Describe this quadrilateral.
- It has ____ angles.
- It has ____ right angles.
- It has ____ obtuse angle.
- It has ____ acute angle.
- It has ____ lines of symmetry.

Choose one of these 2-D shapes and describe it to a friend thinking about the angles, types of lines it is made up of and whether it has any lines of symmetry. Can your friend identify the shape from your description?

Draw the following shapes.
- A square with sides measuring 2 cm
- A square that is larger the one you have just drawn
- A rectangle with sides measuring 4 cm and 6 cm
- A triangle with two sides of equal length
Rosie describes a 2-D shape.

My shape has 2 pairs of parallel sides. The lengths of the sides are not all equal.

Draw the shape that Rosie is describing.

Could this square be Rosie's shape?

No this can't be Rosie's shape, because the lengths of the sides are equal.

Explain why.

What is the same and what is different about these shapes?

Possible answers: All have at least 1 line of symmetry. They have different number of sides/angles. Only the triangle has a pair of perpendicular sides.

Draw at least one shape in each section of the diagram.

Many possible answers.

<table>
<thead>
<tr>
<th>At least one right angle</th>
<th>No right angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 sided</td>
<td></td>
</tr>
<tr>
<td>Not 4 sided</td>
<td></td>
</tr>
</tbody>
</table>
Triangles

Notes and Guidance

Teachers might start this small step by recapping the definition of a polygon. An activity might be to sort shapes into examples and non-examples of polygons. Children will classify triangles for the first time using the names ‘isosceles’, ‘scalene’ and ‘equilateral’. Children will use rulers to measure the sides in order to classify them correctly. Children will compare the similarities and differences between triangles and use these to help them identify, sort and draw.

Mathematical Talk

What is a polygon? What isn’t a polygon?
What are the names of the different types of triangles?
What are the properties of an isosceles triangles?
What are the properties of a scalene triangle?
What are the properties of an equilateral triangle?
Which types of triangle can also be right-angled?
How are the triangles different?
Do any of the sides need to be the same length?

Varied Fluency

Label each of these triangles: isosceles, scalene or equilateral.

Are any of these triangles also right-angled?

Look at these triangles.
What is the same and what is different?

Using a ruler, draw:
•  An isosceles triangle
•  A scalene triangle
Here is a square. Inside the square is an equilateral triangle. The perimeter of the square is 60 cm. Find the perimeter of the triangle.

The perimeter of the triangle is 45 cm.

If I use 6 straws to make a triangle, I can only make an equilateral triangle.

Eva is correct. 2, 2, 2 is the only possible construction. 1, 1, 4 and 1, 2, 3 are not possible.

Investigate whether Eva is correct.

Draw two more sides to create:
- An equilateral triangle
- A scalene triangle
- An isosceles triangle

Which is the hardest to draw?

Children will draw a range of triangles. Get them to use a ruler to check their answers. Equilateral will be difficult to draw accurately because the angle between the first two sides drawn, must be 60°
Quadrilaterals

Notes and Guidance

Children name quadrilaterals including a square, rectangle, rhombus, parallelogram and trapezium. They describe their properties and highlight the similarities and differences between different quadrilaterals.

Children draw quadrilaterals accurately using knowledge of their properties.

Teachers could use a Frayer Model with the children to explore the concept of quadrilaterals further.

Mathematical Talk

What’s the same about the quadrilaterals?

What’s different about the quadrilaterals?

Why is a square a special type of rectangle?

Why is a rhombus a special type of parallelogram?

Varied Fluency

Label the quadrilaterals using the word bank.

Use the criteria to describe the shapes.

Which criteria can be used more than once?

Which shapes share the same criteria?

Draw and label:
• a rhombus.
• a parallelogram.
• 3 different trapeziums
Quadrilaterals

Reasoning and Problem Solving

Complete each of the boxes in the table with a different quadrilateral.

<table>
<thead>
<tr>
<th>4 equal sides</th>
<th>2 pairs of equal sides</th>
<th>1 pair of parallel sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 right angles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No right angles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Which box cannot be completed? Explain why.

You will need:

- Some 4 centimetre straws
- Some 6 centimetre straws

How many different quadrilaterals can you make using the straws?

Calculate the perimeter of each shape.

**Square:** Four 4 cm - perimeter is 16 cm or four 6 cm - perimeter is 24 cm

**Rectangle:** Two 4 cm and two 6 cm - perimeter is 20 cm

**Rhombus:** Four 4 cm - perimeter is 16 cm
Four 6 cm straws - perimeter is 24 cm

**Parallelogram:**
Two 4 cm and two 6 cm - perimeter is 20 cm

**Trapezium:**
Three 4 cm and one 6 cm - perimeter is 18 cm
3-D Shapes

Notes and Guidance

Children recognise and describe 3-D shapes in different orientations. They use properties including the number of faces, edges and vertices to describe the shape. Where a shape has a curved surface, children should know that this is not called a face. E.g. a cylinder has 2 circular faces and a curved surface. Teachers should explore the difference between a prism, which has the same shape all the way through, and a pyramid, which tapers to a point.

Mathematical Talk

How many faces/edges/vertices/curved surfaces does a ______ have?
What shape are the faces of a ______?
What types of lines can you see on a ______?
Can you spot objects around the classroom that are cubes/cuboids etc.?
Can you guess the shape from the description given?

Varied Fluency

Describe this 3-D shape.

This shape is a ______.
It has ____ faces.
It has ____ edges.
It has ____ vertices.

Choose one of these 3-D shapes and describe it to a friend thinking about the number and shape of faces it has and the number of edges and vertices. Can your friend identify the shape from your description?

What is the same and what is different about these two shapes?

Choose two other shapes and say what is the same and what is different about them.
**3-D Shapes**

**Reasoning and Problem Solving**

Mo has a 3-D shape, he says,

One face of my 3-D shape is a square.

What could Mo’s shape be?

Possible answers:
- Cube
- Cuboid
- Square based pyramid

Alex says,

All 3-D shapes are prisms.

Do you agree with Alex? Explain why.

I do not agree with Alex e.g. cones, pyramids, spheres are not prisms.

Sort a selection of 3-D shapes using the criteria in the table.

<table>
<thead>
<tr>
<th>At least one triangular face</th>
<th>No triangular faces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prism</td>
<td></td>
</tr>
<tr>
<td>Not a prism</td>
<td></td>
</tr>
</tbody>
</table>

Change the headings of the table and re-sort your shapes.

Various possibilities depending on the shapes used.
Construct 3-D Shapes

Notes and Guidance

Children make 3-D shapes (cubes, cuboids, prisms, cylinders, pyramids, cones, spheres) using construction materials.

They use correct mathematical language to describe the shapes they have made (edges, faces, vertices, curved surfaces).

Mathematical Talk

Can you describe your shape using edges, faces, vertices, curved surfaces?
What is the same and what is different about your shape compared to your partner’s?
What do the straws represent?
What does the Play-Doh represent?
How many straws/balls of Play-Doh do you need to create a ________?
Why can’t you create a sphere or cylinder using this technique?

Varied Fluency

Children make a 3-D shape using Play-Doh/clay/plasticine/polydron.
Ask them to make a different one to their partner.
Write down the similarities and differences between them.
Discuss what the properties of each shape are.

Use straws and Play-Doh to create a model of a cube.

What other 3-D shapes can you create?

Cut and fold these into 3-D shapes.

What shapes have you created?
**Construct 3-D Shapes**

**Reasoning and Problem Solving**

I have 9 straws and 6 balls of Play-Doh.

What 3-D shape can I create using all of the straws and Play-Doh? Have a go at making it.

**True or false?**

- You can cut out lots of equal squares and make a 3-D shape from them.
  - True – for example a cube.

- You can cut out some circles and rectangles and make a 3-D shape from them.
  - True – a cylinder.

Rosie says,

I can create a model of a square-based pyramid using 3 straws and 3 balls of Play-Doh.

Explain the mistake Rosie has made.

How many straws and balls of Play-Doh would you need to create a pyramid?

Rosie thinks that because a pyramid has some triangular faces she will only need 3 straws/balls of Play-Doh.

You would need 8 straws and 5 balls of Play-Doh to make a square-based pyramid, and 6 straws and 4 balls of Play-Doh to make a triangle based pyramid.
Lines of Symmetry

Notes and Guidance

Children find and identify lines of symmetry within 2-D shapes. Children explore symmetry in shapes of different sizes and orientations. To help find lines of symmetry children may use mirrors and tracing paper.

The key aspect of symmetry can be taught through paper folding activities. It is important for children to understand that a shape may be symmetrical, but if the pattern on the shape isn't symmetrical, then the diagram isn't symmetrical.

Mathematical Talk

Explain what you understand by the term ‘symmetrical’. Can you give any real-life examples?
How can you tell if something is symmetrical?
Are lines of symmetry always vertical?
Does the orientation of the shape affect the lines of symmetry?
What equipment could you use to help you find and identify lines of symmetry?
What would the rest of the shape look like?

Varied Fluency

Using folding, find the lines of symmetry in these shapes.

Sort the shapes into the table.

<table>
<thead>
<tr>
<th>1 line of symmetry</th>
<th>More than 1 line of symmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 4 sides</td>
<td></td>
</tr>
<tr>
<td>More than 4 sides</td>
<td></td>
</tr>
</tbody>
</table>

Draw the lines of symmetry in these shapes (you could use folding to help you).

What do you notice?
### Lines of Symmetry

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>How many symmetrical shapes can you make by colouring in a maximum of 6 squares?</th>
<th>There are a variety of options. Some examples include:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Grid" /></td>
<td><img src="image2" alt="Grid" /></td>
</tr>
</tbody>
</table>

**Jack**

Is Jack correct? Prove it.

**Jack**

A triangle has 1 line of symmetry unless you change the orientation.

**Always, Sometimes, Never.**

**A four-sided shape has four lines of symmetry.**

**Jack**

Jack is incorrect. Changing the orientation does not change the lines of symmetry. Children should prove this by drawing shapes in different orientations and identifying the same number of lines of symmetry.

**Sometimes, provided the shape is a square.**
Symmetric Figures

Notes and Guidance

Children use their knowledge of symmetry to complete 2-D shapes and patterns.

Children could use squared paper, mirrors or tracing paper to help them accurately complete figures.

Mathematical Talk

What will the rest of the shape look like?

How can you check?

How can you use the squares to help you?

Does each side need to be the same or different?

Which lines need to be extended?

Varied Fluency

- Colour the squares to make the patterns symmetrical.

- Complete the shapes according to the line of symmetry.

- Reflect the shapes in the mirror line.
Do you agree with Dora? Convince me.

Dora is sometimes correct. This depends on where the mirror line is. Encourage children to draw examples of times where Dora is correct, and to draw examples of times when Dora isn't correct.

How many different symmetrical shapes can you create using the given sides?

Children will find a variety of shapes. For example:
Block 4 – Shape
Theme 6- Co-ordinates
Create a large grid using chalk or masking tape. Give the children coordinates to stand at. Encourage the children to move along the axis in the order they read them.

Write the coordinates for the points shown.

\[ \bullet (\_, \_\_) \quad \times (\_, \_\_) \]

\[ \bullet (\_, \_\_) \quad \times (\_, \_\_) \]

Write out the coordinates that spell your name.
Describe Position

Reasoning and Problem Solving

Teddy is correct. Rosie has read the $y$-axis before the $x$-axis.

The point is plotted at $(7, 3)$

Teddy

The point is plotted at $(3, 7)$

Rosie

Who is correct? What mistake has one of the children made?

Which clue matches which coordinate?

Clue 1: My $x$ coordinate is half of my $y$ coordinate.

Clue 2: My $y$ coordinate is less than my $x$ coordinate.

Clue 3: Both my coordinates are prime numbers.
Draw the shapes at the correct points on the grid.

Plot two more points to create a square.

What shape has been created?

Children develop their understanding of coordinates by plotting given points on a 2-D grid.

Teachers should be aware that children need to accurately plot points on the grid lines (not between them).

They read, write and use pairs of coordinates.

Mathematical Talk

Do we plot our point on the line, or next to the line?

How could we use a ruler to help plot points?

In which order do we read and plot the coordinates?

Does it matter which way we plot the numbers on the axis?

What are the coordinates of _____?

Where would ( __, __) be?

Can you show _____ on the grid?
Draw on a Grid

Reasoning and Problem Solving

What shapes could be made by plotting three more points?

The children could make a range of quadrilaterals dependent on where they plot the points. If children plot some of the points in a line they could make a triangle.

The number of points is equal to the number of vertices when they are joined together.

Amir is incorrect. The $x$-axis must be plotted before the $y$-axis. Children prove this by plotting a pair of coordinates both ways and showing the difference.

When you are plotting a point on a grid it does not matter whether you go up or across first as long as you do one number on each axis.

Always, Sometimes, Never.

Amir

Do you agree with Amir? Convince me.

Sometimes. If points are plotted in a straight line they will not create a vertex.
Place a small cube on the grid at coordinate (1, 1).
Move your cube 1 up. Move your cube 1 down. What do you notice?
Now move your cube 3 to the right. Move your cube 3 to the left. What do you notice?

Translate A 6 right and 3 down. Record the coordinates before (__, __) and after (__, __)
Translate B and C 4 left and 3 up. Record the coordinates before (__, __) and after (__, __)

Translate the rectangle 2 left and 3 up. Write down the coordinates of each vertex of the rectangle before and after the translation.

Can you describe the translation?
Can you describe the translation in reverse?
Why do we go left and right first when describing translations.
What are the coordinates for point ____?
Write a translation for D for your partner to complete.
What do you notice about the new and original points?
What is the same and what is different about the new and original points?
Ron translates the point (2, 3), but realises that it has returned to the same position.

What translation did he do?

Is there more than one answer?

There could be a range of answers, for example:

- Translate 1 left and 1 right
- Translate 1 left, 1 right, 2 up and 2 down

Here is a game to play in pairs:

Each player needs:

- 1 small cube
- One barrier (e.g. a mini whiteboard)

The first player places a cube on their grid. They describe the original position and perform a translation.

The second player listens to the instructions and performs the same translation.

They check to see if they have placed their cube at the same coordinate.

Swap roles and repeat several times.

The teacher could make this more competitive (points awarded when correct).
Describe Movement

Notes and Guidance

Children describe the movement of shapes and points on a coordinate grid using specific language such as: left/right and up/down. Sentence stems might be useful. They start with the left/right translation followed by up/down.

Teachers should check that children understand the idea of ‘corresponding vertices’ when describing translation of shapes (e.g. vertex A on the object translates to vertex A on the image).

Mathematical Talk

Can you describe the translation?

Can you describe the translation in reverse?

Can you complete the following stem sentence:

Shape A is translated ___ left/right and _____up/down to shape B

Describe the translation from:

- A to B
- B to C
- C to D
- D to A

Plot two new points and describe the translations from A to your new points.

Describe the translation of shape A to shape B.

Describe the translation of shape B to shape A.

What do you notice?
Describe Movement

Reasoning and Problem Solving

Tommy has described the translation from A to B as 3 right and 4 up.

Tommy has counted one move to the right when he has not moved anywhere yet. He has done the same for one move up when he has not moved up one space yet.

Can you explain his mistake?

Possible answers include:
(0,1) (1,0)
(0,2) (2,0)
(0,3) (3,0)
(0,5) (5,0)
(1,1) (3,3)
(0,0) (4,4)

Can you plot other pairs of points where to move between them, you travel the same to left or right as you travel up or down?

What do you notice about the coordinates of these points?