Year 2

Number and Place Value

I can statements:

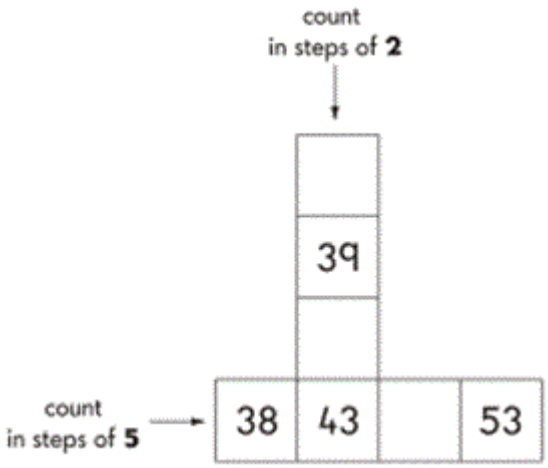
- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use <, > and = signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward

- Use their knowledge of counting on from or back to zero in steps of 2, 3, 5 and 10 to answer multiplication and division questions such as 7 × 2 and 40 ÷ 5. They understand that one way to work out 40 ÷ 5, for example, is to find out how many fives make 40. They know that this can be done by counting forwards in fives from zero or backwards in fives from 40.

  Write the missing numbers in each of these patterns.



Recognise the place value of each digit in a two-digit number (tens, ones)

Look at these numbers.

37	**12**	**45**	**60**	**72**

Which of these numbers is the largest?

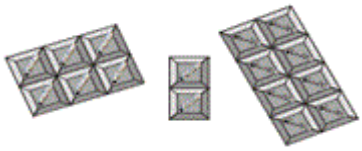
Which of these numbers is between 10 and 20?

- What is the value of … ? (point to digits in the list above)

- Identify, represent and estimate numbers using different representations, including the number line

- Children should be able to represent numbers using equipment such as bundles of ten and single art-straws, 10p and 1p coins and number lines.

  Look at the squares of chocolate

  There are 16 squares

  Tick(✔) the sum that matches the picture

  5+2+9=16

  5+6+5=16

  6+6+4=16

  6+2+8=16

  8+3+5=16

Compare and order numbers from 0 up to 100; use <, > and = signs

Here are two signs

Use these signs to make these correct

52 ☐ 17

18 ☐ 91

50 ☐ 34

- Children should be able to order a set of two-digit numbers, such as 52, 25, 5, 22, 2, 55. They explain their decisions. They understand and use the < and > symbols; for example, they write a two-digit number to make the statement 56 > ☐ true.

Read and write numbers to at least 100 in numerals and in words

- Children should be able to answer questions, such as:
    - What numbers can you make using two of these digits: 3, 6, 0?
    - Write down each number you make. Read those numbers to me. Can you write the largest of the numbers in words?

Activities

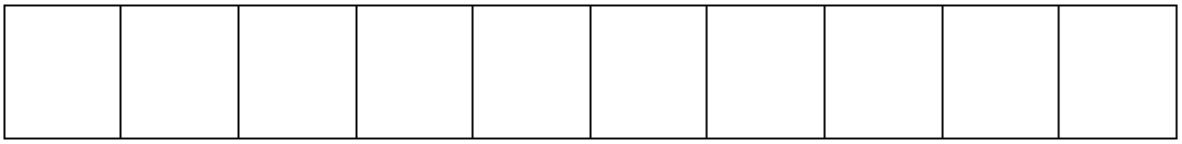
Programme of Study statements	Activities			
	A	B	C	D
count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward				
recognise the place value of each digit in a two-digit number (tens, ones)				
identify, represent and estimate numbers using different representations, including the number line				
compare and order numbers from 0 up to 100; use <, > and = signs				
read and write numbers to at least 100 in numerals and in words				
use place value and number facts to solve problems				

Activity set A

(i) You could use a counting stick to practice counting in steps of 2, 3, 5 and 10. You could also use these facts and adapt them to practice counting in steps of 20, 30, 50 and 100 and 200, 300, 500 and 1000 etc. You could ask questions as if the counting stick was a number line, for example:

- What would go on this division?
- What would go half way between these divisions?

(ii) You could give each child a paper clip and a strip of paper that has been divided into ten sections as below:



Tell them that at one end is zero and at the other is 30. Ask them to tell you what they need to count in to get from zero to 30. Next ask them to show you where different multiples of three would go, for example 27, 18, 9. The children put their paper clip on the line that shows where the number you call out will go.

(iii) You could draw a Venn diagram on the board with two interlocking circles. Start writing multiples of 3 in one circle and five in the other until the children can tell you what the numbers in each circle have in common. They could then suggest numbers that go in each circle, in the middle and outside the circles.

(iv) You could set number problems, for example, give a series of clues that involve counting in steps of different sizes. The children try to identify your 'mystery' number from the clues you give, for example:

- If you count in 5s you will reach my number
- It is an odd number
- It is larger than 20 but smaller than 30

You could ask the children to make up some of their own for a partner to solve.

Activity set B

The children need to develop their concept of place value. Many teachers think that if children can partition numbers into tens and ones then they understand this concept. This is not necessarily the case. There are four aspects of number value that children need to understand. These are:

Tens	Ones
10	1
2	7

- Positional: The digit 2 is in the tens position and the digit 7 is in the ones
- Multiplicative: The digit 2 is two tens (10 x 2) which is 20, the digit 7 is seven ones (1 x 7) which is 7
- Additional: combine the two numbers to make the whole by addition 20 + 7 = 27
- Base10: the value of the digits increase or decrease by the power of 10 as they get bigger or smaller

You could make simple grids like this for the children to use in class and work through the 'big ideas' of place value (in simple terms) as they make numbers to explore using digit cards. It would be a good idea to include a 100s column in your grids. Encourage the children to write the

additional number sentence in figures and then the total in words. You could ask them to think of reasons why writing the number in words can help their understanding of place value.

The children should explore partitioning numbers in different ways, for example, 58 as 50+ 8, 40 + 18, 30 + 28, 20 + 28, 10 + 38.

Activity set C

It is really important that the children are given plenty of opportunities to identify and represent numbers using different representations. You could ask the children to show you, for example, 46 using:

- Bead strings (4 groups of 10 and 6 singles)
- Base 10 apparatus (4 tens sticks and 6 cubes)
- Straws (4 bundles of 10 and singles)
- Money (four 10 pence and seven 1 pence coins)
- Two different coloured counters, one representing 10s and the other ones

Once they have done this practically ask them to show how to make the number on a number line: jump of 40 and then 6.

You could ask the children to make a selection of numbers using the representations above. Once they have ask them to order them onto a number line and compare pairs using < and >. You could also ask them to choose pairs of their numbers and make number sentences using = where they need to work out a missing number to make the number sentence correct, for example: 46 = 13 + ?

Activity set D

You could give the children problems such as these to solve:

- Harry had 6 bundles of10 straws and 7 single straws. How many straws did he have altogether?
- Hamish had five 10p coins and 3 pennies. How much money did he have altogether?
- Sandy had 37 pennies. He wanted to change them into other coins. What are the fewest coins that he could use?
- Suzie made some cakes. She put them on plates in groups of 10. She had 8 full plates and 7 cakes left over. How many cakes did she have altogether?

Addition and Subtraction

I can statements:

- solve problems with addition and subtraction:
    - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
    - applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
    - a two-digit number and ones
    - a two-digit number and tens
    - two two-digit numbers
    - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Solve problems with addition and subtraction:

- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods

Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers

- Use partitioning, counting strategies and knowledge of number bonds to add or subtract a one-digit number or a multiple of 10 to any two-digit number. To work out 86 – 50, for example, they might partition and calculate:

86 – 50 = 80 + 6 – 50 = 80 – 50 + 6 = 30 + 6 = 36

- Similarly, to find the total number of people on a bus with 14 people on the top deck and 8 below, they might use:

  14 + 8 = 14 + 6 + 2 = 20 + 2 = 22

- Children add or subtract two-digit numbers using practical and informal methods and their knowledge of the relationships between operations. For example, they count back along a number line to find 64 – 25 or count up from 67 to find the answer to 94 – 67. They represent such calculations as number sentences. They calculate the value of an unknown in a number sentence such as ☐ ÷ 2 = 6 or 85 – ☐ = 29. They recognise, for example, that to answer 85 – ☐ = 29 they could use the related addition 29 + ☐ = 85

Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

- Extend their knowledge and use of number facts, and use partitioning and number bonds to add and subtract numbers mentally to answer questions such as 60 – ☐ = 52 or 35 = 20 + ☐. They make jottings where appropriate to support their thinking.
- Answer problems such as:
  - Look at this number sentence: ☐ + ☐ = 20. What could the two missing numbers be? What else?
  - Can you tell me all the pairs of numbers that make 20?

Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot

- Understand that addition can be done in any order and use this to solve an addition by rearranging the numbers to simplify the operation. They need to understand that two numbers can be taken away from each other but that the answers will not be the same.

Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems

- Check their addition and subtraction with a calculation that uses the inverse operation.
- Answer questions, such as:
  - Look at this number sentence: 74 – 13 = 61

    Write three more number sentences using these numbers. How do you know, without calculating, that they are correct?

  - What addition facts can you use to help you calculate these?

    12 – 5, 19 – 8

    Explain how the addition facts helped you.

  - I think of a number, I subtract 19 and the answer is 30. What is my number? How do you know?

Activities

Programme of study statements	Activities			
	A	B	C	D
solve problems with addition and subtraction: • using concrete objects and pictorial representations, including those involving numbers, quantities and measures • applying their increasing knowledge of mental and written methods				
recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				
add and subtract numbers using concrete objects, pictorial representations, and mentally, including: • a two-digit number and ones • a two-digit number and tens • two two-digit numbers • adding three one-digit numbers				
show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				
recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.				

Activity set A

Use of concrete models and apparatus and helpful visual images are vital aspects of children's mathematical activity – for all ages and all attainer groups. Knowing and using mental calculation strategies remain important in the National Curriculum. Use of manipulatives and mental strategies are practised and developed through a variety of short activities, for example:

- bridging through ten
- adding near multiples of 10 and adjusting

Give each child a 100 square. Ask them to put a finger on the number 3 and then give a series of instructions that involve the strategies above, for example: add 9 (add 10, subtract 1), add 13 (add 8 to get to 20 and then 5), take away 11 (subtract 10 and then another one). Activities similar to this, carried out regularly, will ensure that most children will remember and use them when appropriate.

You could also write four or five addition or subtraction calculations on the board for the children to represent in concrete, pictorial an abstract ways, for example:

Addition

- 35 + 36 (e.g. near doubles: double 35 and add 1)
- 36 + 49 (e.g. adding near multiples of 10: 36 + 50 – 1)
- 75 + 8 (e.g. bridging through 10: 75 + 5 + 3)
- 38 + 27 (e.g. partitioning: 30 + 20 = 50, 8 + 7 = 15, 50 + 15 = 65 or sequencing 38 + 20 + 7)

Subtraction

- 54 – 5 (e.g. bridging through 10: 54 – 4 – 1)
- 46 – 19 (e.g. subtracting near multiples of 10: 46 – 20 + 1)
- 50 – 25 (e.g. doubles: know two 25s make 50)
- 53 – 22 (e.g. sequencing: 53 – 20 – 2)

** Strategies given are examples, others can be used as efficiently.

You could give the children problems that they can answer using the strategy they think is best, which might include using practical apparatus, a number line, the bar model or a mental calculation strategy.

For example:

- Nathan had a collection of 46 coins. His friend gave him another 29. How many coins does he have now?
- Fran baked 97 cakes for the school cake sale. She sold 73. How many were left unsold?
- Ben had 25 football stickers. Bobby has 36. How many do they have in total? How many more stickers does Bobby have?

Activity set B

The children need to be able to recall and use addition and subtraction facts for all numbers to 20. They need to have plenty of practice in order to become fluent. Here are some examples of activities that can help:

- Write the number you wish the children to find facts for on the board, for example 18. Give the children a minute to write down as many facts as they can for addition and then another minute for subtraction facts. Encourage them to be systematic in their recording.
- Use a pendulum (three interlocking cubes on a piece of string), as it swings one way you call out a number to, say, 15 and as it swings the other way they call out the number pair that goes with it to make 15.
- Use a set of number cards to 20. Hold up one at a time. For each card you hold up the children write down the number that goes with it to make 20.

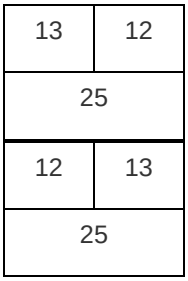
You can adapt these for any facts you wish to practice, including multiples of 5 and 10 to 100.

For practising number facts for 10, encourage the children to use their fingers. For example, ask them to show you the number of fingers needed to add to 8 to make 10, ask them to show you the number of fingers you need to take away from 10 to give four.

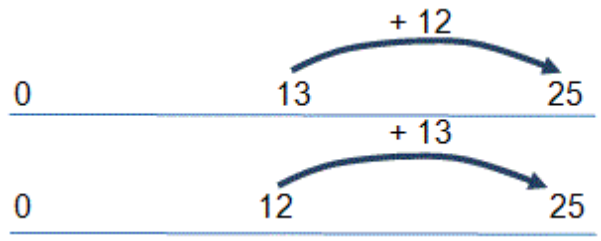
Activity set C

The children need to develop the understanding that addition is commutative (whichever way you add numbers the answers will always be the same). Provide plenty of practical experiences to show this:

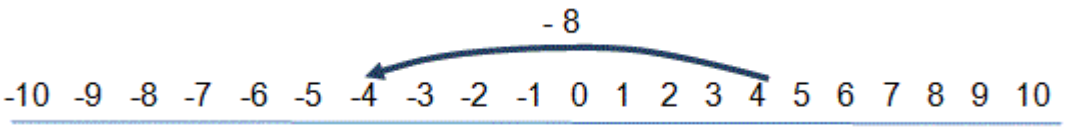
- Give the children two different colours of counters and a simple addition to explore. Ask them to count out the correct number of coloured counters for one of those in the calculation and then the correct number of a different colour for the other number. Ask them to add one of the coloured counters to the other and then vice versa. What do they notice? The total is the same!
- You could then repeat the above with bead strings and base 10 apparatus.
- You could demonstrate this idea with the bar model:



The children could then explore this using a number line, for example:



The children need to develop the understanding that subtraction is not commutative. However, it is important that children don't develop the misconception that they cannot take a larger number from a smaller one. This is only the case when dealing with concrete apparatus. Provide opportunities for the children to explore taking small numbers away on a number line. Give or show them a number line that begins with -10 and ends with 10. Ask them to put their finger on, for example, 4 and take away 8.



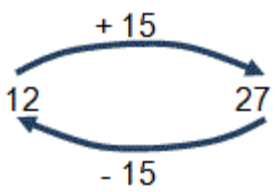
Some children develop the misconception that our number system begins with zero because this is how our number system is presented on many number lines. Most young children are aware of negative numbers in real life, for example winter temperatures. We need to capitalise on this from an early age to demonstrate that our numbers are replicated on the other side of zero with equivalent negative numbers.

Activity set D

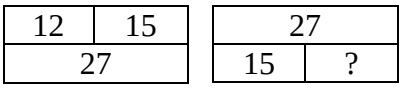
In order to develop the understanding of the inverse relationship between addition and subtraction, the children initially need practical experiences. You could provide counters or similar apparatus. Ask the children to add two small quantities, for example 12 and 15. Once they have 27, ask them what they think they will have left if they take 15 away from the 27. Then ask them to check by taking 15 counters away leaving the other quantity.

Inversion loops and the bar model are useful visual representations of inverse:

Inversion loops



The bar model



You could give the children problems such as these to solve and then check using the inverse operation:

- Nafisat had 23 marbles. Her friend gave her 18 more. How many does she have now? The children add 23 and 18 to give 41. They then check by taking away 18 from 41 to give the original number.
- Adnaan had 36 sweets. He gave 21 to his friend. How many did he have left?

The children take 21 from 36 to give 15 and then check by adding 15 to 21 to give the original number.

Multiplication and Division

I can statements:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

The children should be able to:

Recognise a multiple of 2, 5 or 10 and use their knowledge of multiplication facts to find corresponding division facts. They can say which numbers are odd and which are even.

e.g. 2 x 5 = 10, show me three more number facts using these numbers.

Is 34 an odd number? How do you know?

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals signs

Children should be able to:

Find missing numbers or symbols in a calculation:

4 x __ = 20, __ ÷ 10 = 3

Anna has 3 boxes of cakes. Each box contains 5 cakes. How many cakes does she have altogether? Show how you worked this out.

Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

Children should be able to:

Use their knowledge of triangles of numbers to show related number facts.

e.g. If 6 x 2 = 12 then 2 x 6 = 12 and 12 ÷ 6 = 2.

Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

Children should be able to:

Use various methods and apparatus to help them solve word problems such as:

There are 10 lollies in a bag. Charlie needs 30 lollies for his party. How many bags does he need to buy? Show how you worked this out

Activities

Programme of Study statements	Activity			
	A	B	C	D
Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.				
Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals(=) signs				
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.				
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.				

Highlighted details are for NRICH or other stated websites

Activity Set A

- **Multiplication tables** - pelmanism style matching cards. Find the pairs of cards showing the product and multiplication fact in a timed activity.
- Counting stick: using a metre stick with ten divisions use sticky notes to mark multiples of 2, 5 or 10. Practise counting on and back from different numbers. As the children become more fluent, remove more sticky notes and see how they can recall multiples starting at different points counting on and back.
- BBC KS1 Bitesize: **Camel Times Tables** and **Division Mine**. These two games are a super resource for the children to practise their recall of multiplication and division facts independently

Activity Set B

- BBC KS1 **Starship Number Jumbler game**, a simple animation where children choose the missing operation sign in the calculation.
- Write the calculation: give the children different pictures of groups of items or arrays. They then have to write the multiplication sentence to match the picture. 2p, 5p and 10p coins could be used for this activity. The children can write down how many of each coin they have and the total amount. Using coins, the children could also write division calculations to match the images.

Activity Set C

- **Triangle of numbers**: a good activity to use as a starter or plenary, demonstrating the commutativity of multiplication. It can be used to demonstrate one number fact and the children can suggest the others.
- **Function box**: reinforcing the relationship of division being the inverse of multiplication. To build up to this online activity, a function box could be made and used as a visual resource in class. For example, model how a number goes in and doubles, but put the number back through the machine it will halve. There are lots of different ways to use the function box in class to deepen the understanding of the relationship between multiplication and division.
- Class number sentence: using digit cards and x and ÷ and = cards. Get the children to show how we can take one known fact and find others using those numbers. As the children move the digits around, they will demonstrate their understanding of using and applying their tables knowledge. What numbers can we move around in a division sentence? Can they spot the relationship between multiplication and division? Ensure they really understand the concept behind this activity, by encouraging them to show you with practical apparatus.

Activity Set D

- TES **word problems with differentiated questions**: resources submitted by a Year 2 teacher, focusing on problem solving using multiplication.
- BBC Class Clips: **problem solving - how many chairs?** Use multiplication facts to help the Chuckle Brothers organise their tables ready for their guests' arrival.
- Give the children a multiplication or division fact. Can they write a word problem to match it? Now swap calculations with a partner and talk about how you would solve the problem.

Fractions

I can statements:

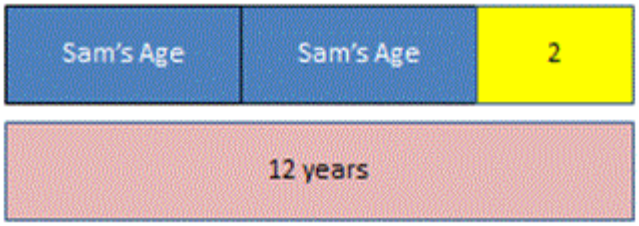
- recognise, find, name and write fractions ⅓, ¼, ²⁄₄ and ¾ of a length, shape, set of objects or quantity
- write simple fractions e.g. ½ of 6 = 3 and recognise the equivalence of two quarters and one half.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Recognise, find, name and write fractions ¹⁄₃,¹⁄₄ ,²⁄₄ and ³⁄₄ of a length, shape, set of objects or quantity

Using bar models to represent and unpick a fraction word problem



Harrison and sam were talking and Harrison said that if he doubled Sam's age and added 2 he would get 12

Write simple fractions for example,½ of 6 = 3 and recognise the equivalence of ¾ and ½

Would a chocolate lover rather have ½ or ⅗ of this bar of chocolate? Explain your answer.

Activities

Knowledge and understanding covered in Year 2 Fractions Programme of Study	**Activities**			
	A	**B**	**C**	**D**
Recognise fractions of shapes				
Write fractions				
Recognise fractions of a quantity				
Recognise equivalence of ¾ and ½				
Find fractions of objects				

Activity A(i) NRICH

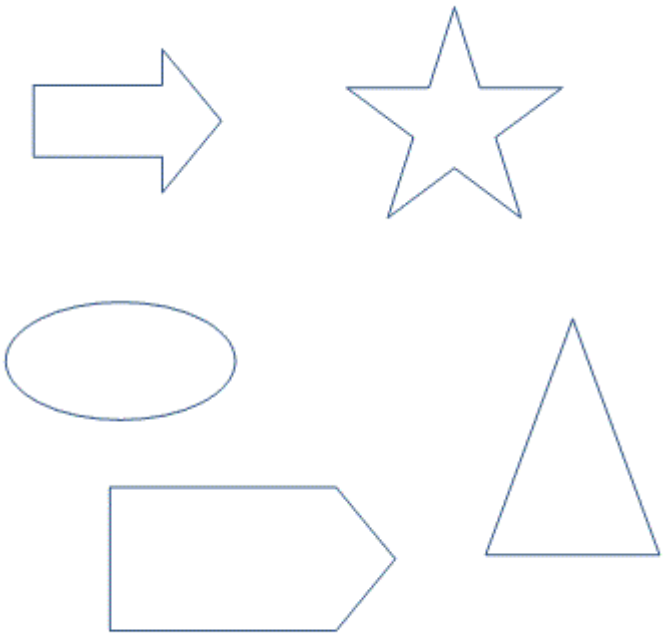
This problem is a wonderful way to consolidate children's understanding of halving and halves. It also gives learners experience of mathematical proof.

Activity A(ii) – Early Fraction Development NRICH

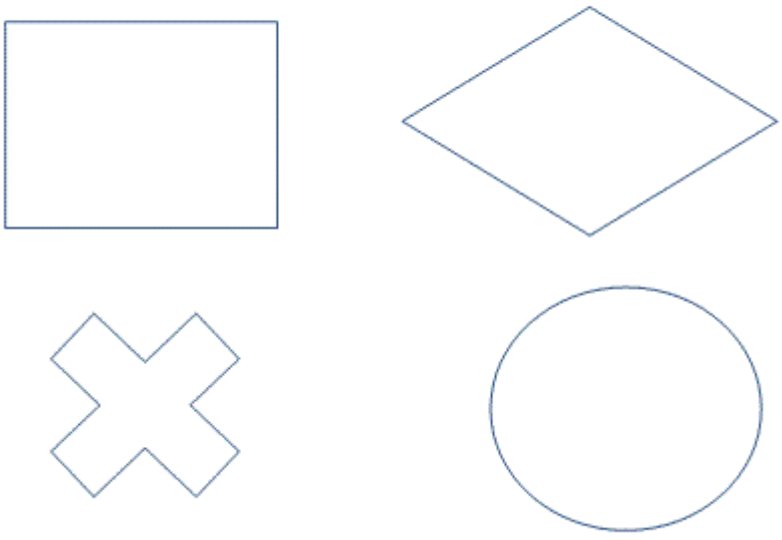
In this article, Bernard Bagnall outlines suggestions for tasks which will help young children develop the concept of fractions

Activities B – Colouring halves and quarters of shapes

Colour a half of these shapes

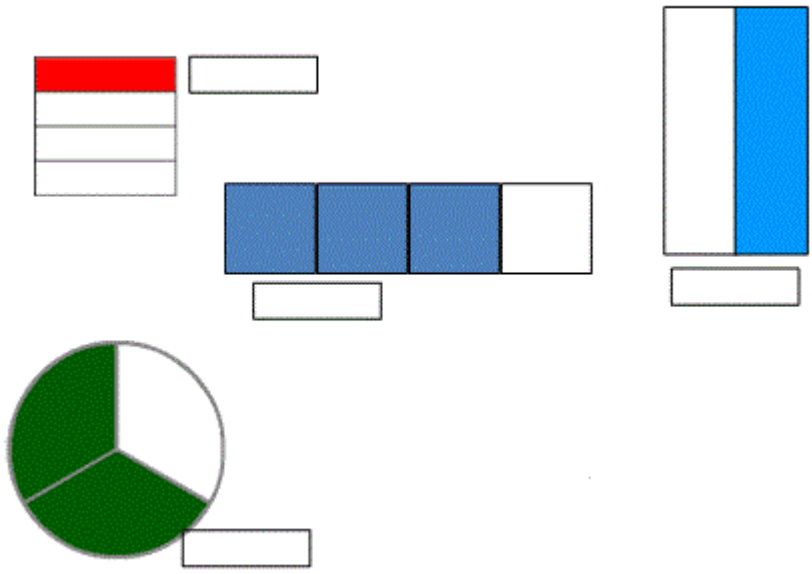


Colour a quarter of each shape

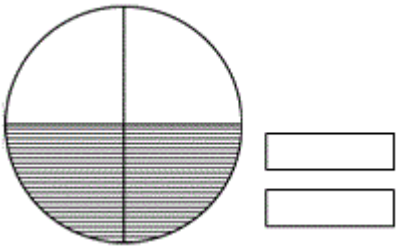


Activities C – What fractions is shaded?

What fraction of each of these shapes is shaded?



What are two ways we could write this fraction?



Activities D

Find the number.....

What is half of 12?

A half of 12 is _____

What is a third of 15?

A third of 15 is _____

What is a Quarter of 8?

A quarter of 8 is _____

What is two thirds of 9?

Two thirds of 9 is _____

What is three quarters of 24?

Three quarters of 24 is _____

Making longer, making shorter

From nrich, brings in doubling, halves and quarters in a very practical way using rods made from interlocking cubes. It gives children a practical context in which to explore simple multiplying and

dividing, even if these particular terms are not used explicitly. It can provide a very useful context for introducing and using the vocabulary of halves and quarters.

Useful Resources – each can be found on NCETM

Powerpoint slides – Key Stage 1 Fractions

A series of powerpoint slides which can be used as starting points to a discussion. Slides are adapable

Powerpoint slides – Key Stage 1 Fractions – Misconceptions

A series of powerpoint slides which can be used to unpick misconceptions.

Powerpoint slides – Key Stage 1 Resources

Useful set of slides to cut and laminate to support the teaching of fractions.

Measurement

I can statements:

- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- compare and order lengths, mass, volume/capacity and record the results using >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money
- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- know the number of minutes in an hour and the number of hours in a day.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels

- Suggest sensible units you might use to measure: the height of your table; how much water is in a cup; the weight of my reading book; how long it takes me to wash my hands.
- Choose a piece of equipment to help you measure: the weight of your shoe; how long the classroom is; how long this lesson lasts; how much water a cup holds.
- How long is this line? Now draw a line 2 cm longer than this one.

  How much water is in this measuring jug?

- Find an object in the classroom that you think is about 10 cm long.

  About how heavy do you think your pencil case is?

- If I programme my floor turtle to go forward three metres is there enough room in the classroom? How could you measure to find out?

Compare and order lengths, mass, volume/capacity and record the results using >, < and =

- Megan and Jack are growing beans. Megan's plant is 25 cm tall. Jack's is 38 cm tall. Whose plant is the taller? By how much? Can you compare them using > or < ?

Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value and find different combinations of coins that equal the same amounts of money

- Holly has these coins.

  Harry has the same amount of money but has six coins. What are they? Is there only one possible answer?

Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change

- Jess has saved 62p. She spends 15p. How much money does she have left? She pays with a 50p piece. How much change does she get?

Compare and sequence intervals of time.
Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.

- What time does this clock show?
- Draw a clock showing the time five minutes later.
- Show your school day on clock faces: when do you leave home, have breaks, go back home, etc.?

Activities

Programme of study statements	Activities			
	A	B	C	D
choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels				
compare and order lengths, mass, volume/capacity and record the results using >, < and =				
recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value				

find different combinations of coins that equal the same amounts of money				
solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change				
compare and sequence intervals of time				
tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times				
know the number of minutes in an hour and the number of hours in a day				

Activity Set A

- Sally and Josh measured the hall using their feet but they couldn't agree how many feet long the hall was. Why do you think that happened? What else could they use to measure the hall? Will that be better? Why?

  Other questions to use as starting points;

  - What could you use to find out how much water this container holds?
  - Would it be better to use multilink cubes or peas to balance the weight of this shoe? Why?
  - Would you measure the length of a book in centimetres or metres? Why?
  - What units would you use to measure the width of the classroom?
  - How about the weight of your teacher?
  - Look at a mug. Which of these amounts would you choose to say how much water the mug holds? 1 metre, 1 litre, 1 centimetre, ¼ kilogram, ¼ litre

  Possible contexts include:

  - Estimating measures, e.g. give children a 1kg weight to hold. Then give them a range of everyday items and ask them to say whether they weigh more, less or about the same as 1kg.
  - Estimate and then check how far you can jump from this line.
  - Units used to measure everyday objects, e.g. look at food labels and find a big packet of food that weighs less than a small packet of food.

    - Comparing objects using appropriate measurements, e.g. working with two or more objects to find the shortest, longest, heaviest, smallest capacity, etc. and explain how this was done and what units of measurement were used.

- **Ruler**

  (NB The following three resources were produced for the Primary National Strategy, which was formally discontinued in 2011. However, the resources have the potential to complement teaching in line with the new 2014 mathematics curriculum)

  This Interactive Teaching Programme displays an on-screen ruler you can use to measure lines and the sides of shapes. There is a choice of rulers and five screens to use to demonstrate measuring length. You can draw your own lines and shapes or select those that are available on the ITP. The ITP can be used to demonstrate how to use measure using different rulers. The ITP can be used to compare lengths and the perimeters of shapes and to support children's understanding of scale. You can develop their ability to estimate length against a given scale and use the ruler to check the accuracy and demonstrate what to the nearest half and whole unit means.

- **Measuring scales**

  This ITP allows you to add different masses to or from a scale pan. You can add masses of 1, 2, 5, 10, 50, 100 and 500 units. The pointer or hand shows the total mass. This can be hidden to promote children's prediction skills. The maximum value of the circular scale can be changed together with the size of the interval. A digital readout can also be hidden or displayed. A red marker can be used to keep a track of previous values and to set target quantitiesp

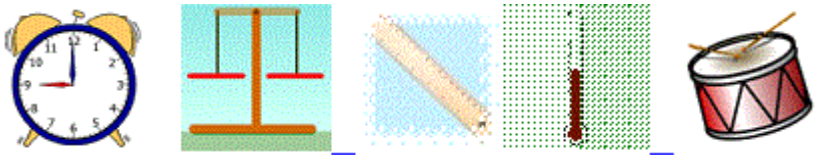
- **Measuring cylinder**

  This ITP allows you to control two taps that pour a liquid in and out of a measuring cylinder. You can set the scale on the cylinder to a maximum of 50, 100, 200, 500 or 1000 units and the scale interval to 1, 2, 5 or 10 units. You can simply turn the taps on and off and ask questions that involve prediction, addition and subtraction.

Activity Set B

- **Order Order!** NRICH
- **In Order** NRICH

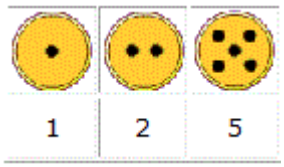
Both of these activities require the children to order various quantities from smallest to largest. A good activity to assess estimation skills and knowledge of units of measurement.



Activity Set C

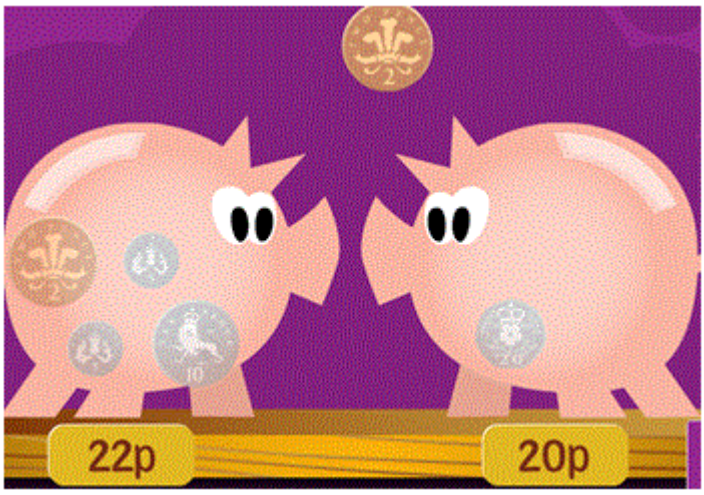
- **Fair Exchange** NRICH

In your bank, you have three types of coins. The number of spots shows how much they are worth. Match your coin values to those shown.



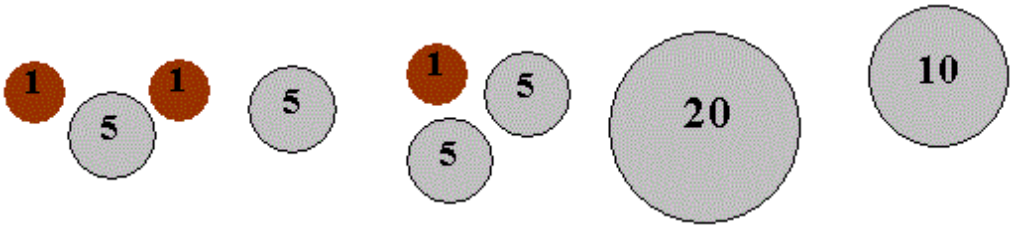
- **Coin matching computer activity.** NRICH

  This activity from Nationwide Bank Education has three levels of difficulty, requiring children to share coins equally.



- **Christmas Shopping** NRICH

  Vera is shopping at a market with these coins in her purse. Which things could she give exactly the right amount for?



Change White Elephant NRICH is an activity about giving change.

Activity Set D

- **Tell The Time ITP**

  (NB This resource was produced for the Primary National Strategy, which was formally discontinued in 2011. However, the resource has the potential to complement teaching in line with the new 2014 mathematics curriculum)

  This ITP can be used to show analogue time, digital time or synchronised analogue and digital clocks. The program allows you to add or subtract a selected time interval.

- Counting stick

  Use a counting stick to practise counting in 5-minute, quarter-hour or half-hour intervals.

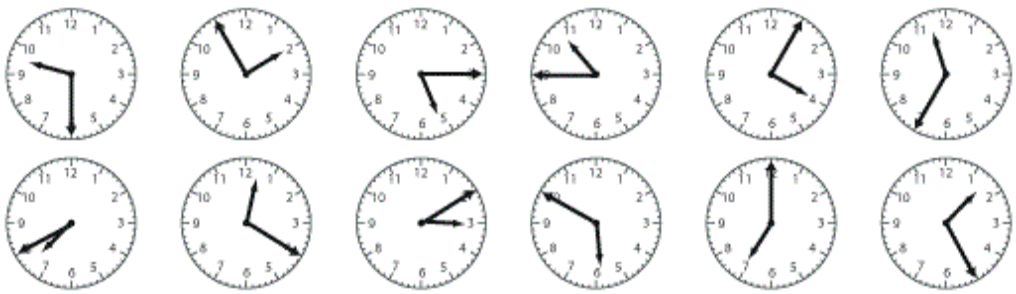
  1 pm 2 pm 3 pm

  1/2 past

  Since counting sticks usually have 10 intervals, you may wish to make a stick with 12 divisions.

- **What Is the Time?** NRICH



  - Routine activities
    - Provide plenty of opportunities to tell the time during the routine of the day. Put children in charge of letting everyone know when it is 10

minutes before assembly/lunch/break.Check that children can tell you how many minutes are in an hour and how many hours in a day. Have a detailed timetable for children to refer to, with times displayed as analogue clock faces as well as written times.

- Matching times to everyday events, e.g. match some pictures of daily events to some given clock faces showing their typical times.
- Comparing times, e.g. sort some given times into a sequence from earliest to latest and draw hands onto corresponding clock faces.
- Problems involving the duration of time, e.g. School starts at 9 o'clock; show this time on your clock. Now show what time it would be if you were half an hour late.
- I went out for a walk at half past 3 and walked for quarter of an hour. Show me on these two clock faces what time I started and what time I would then have finished.

Geometry: Properties of Shapes

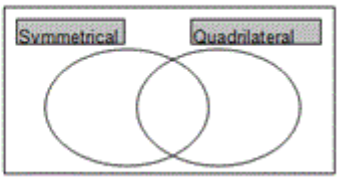
I can statements:

- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Identify and describe the properties of 2-D shapes, including the number of sides and symmetry in a vertical line

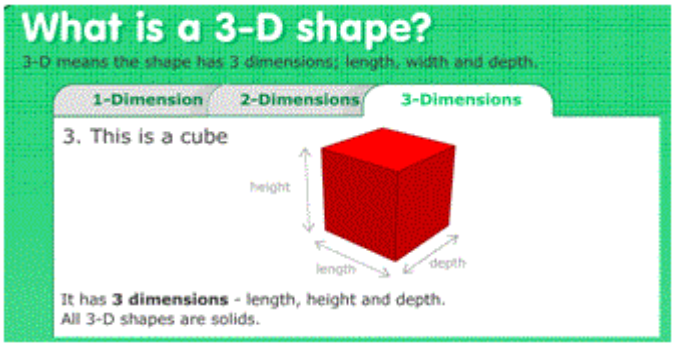
I can sort shapes describing how I have classified them *I can identify whether shapes are symmetrical*	Place the shapes below in the correct place in the Venn diagram.  Make one shape of your own to add to each section of the diagram.	

Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces

Write the missing numbers in the 2 empty boxes.

	number of square faces	number of triangular faces	number of circular faces
cylinder	0	0	
cube		0	0
pyramid	1	4	0

Identify 2-D shapes on the surface of 3-D shapes, for example a circle on a cylinder and a triangle on a pyramid



Compare and sort common 2-D and 3-D shapes and everyday objects.

Children can sort two sets of 2D and 3D shapes in 2 or more different ways using different criteria each time. For example, they might choose ‘dimensions’ or ‘right angled’

Activities

Programme of Study statements	Activities				
	A	B	C	D	E
Identify and describe the properties of 2-D shapes, including the number of sides and symmetry in a vertical line					
Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces					

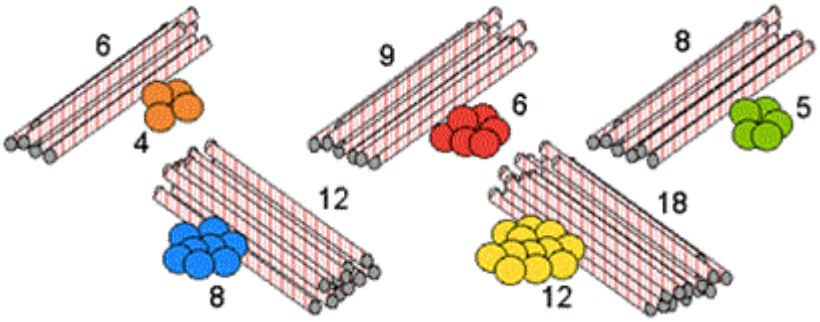
Identify 2D shapes on the surface of 3-D shapes, for example a circle on a cylinder and a triangle on a pyramid					
Compare and sort common 2-D and 3-D shapes and everyday objects					

Activity A: Skeleton Shapes NRICH

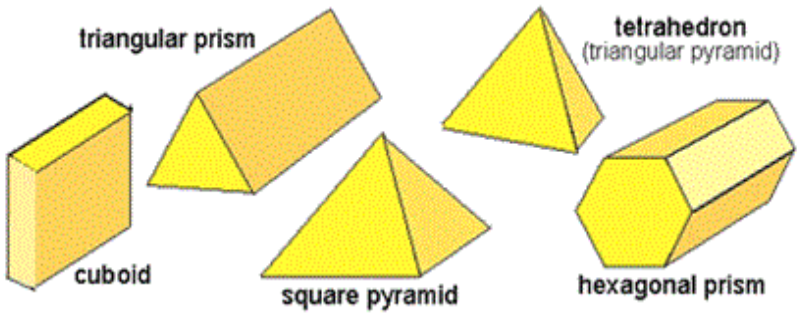
Children think about how much modelling clay and straws they would need to create outlines of 3D shapes.

How many balls of modelling clay and how many straws does it take to make the cube?

Here are some piles of modelling clay balls and straws:



Look at the shapes below and decide which piles are needed to make a skeleton of each shape.



Activity B: Shadow Play NRICH

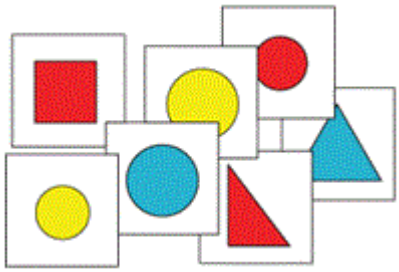
Stage: 1

Why do this problem?

This problem requires learners to visualise 3D shapes, and therefore consolidates knowledge of their properties. Pupils are also reminded that there is not necessarily one right answer in mathematics!

Activity C: Data Shapes NRICH

This problem uses simple shapes on cards in three colours for sorting data in different ways. Some excellent extension ideas for moving the children on in their understanding of shape.



If you would like to make your own cards like these they can be downloaded from NRICH using the link above.

Activity D: Dismantling Boxes

– Haylock and Cockburn, Page 200

Haylock, D. (2008). Understanding Mathematics for Young Children Available: 978-1-4129-4726-8

Objective: To help children identify the plane shape forming the constituent parts of a solid shape

Materials: Ask the children to bring in 2 each of any interestingly shaped boxes from home, ideally from the family shop. If necessary supplement these with your own examples: cylinder, pyramids, tetrahedral, cubes, cuboids, prisms.

Activity: The children should go round the edges of one of one of the boxes with a thick, preferably black, marker. Then they dismantle the box, cut out, and identify the shapes that have been marked out. Discard any flaps. The complete box in the pair, and the cut out shapes from the other are then put in a display to show the various flat surfaces used to make the solid shape.

Activity E: Stolen Shape

Haylock and Cockburn, Page 197

Haylock, D. (2008). Understanding Mathematics for Young Children Available: 978-1-4129-4726-8

Objective: To develop young children's ability to sort shapes according to attributes

Materials: to differentiate consider breadth of knowledge and use a variety of

- Plastic shapes – 2 D (colour, size, shape) Expand selection to include more names and variations on family group (Polygons, Triangles)
- Plastic shapes – 3D (colour, size, shape) Expand selection to include more names and variations on family groups (Tetrahedra, Prisms)
- Real life objects – 3D

Activity: First, two or three children discuss the shapes and work together to sort them into different categories. Perhaps the children can annotate their categories with signs, symbols. Given the opportunity to present their findings children may design their own display, labelling, table of results? Supporting their discussion by providing the language prompts, ensuring the children understand the language needed to discuss properties. Do the children know how to think, share their thoughts with others, and listen to the ideas of others? How can you support their findings and ideas, though annotation, scaffolding where necessary (EAL/ SEN)?

Then the children take turn to close their eyes while the shapes are jumbled back up. The teacher, adult or child in the group then 'steals' a shape. The children open their eyes and have to work out, through discussion, which shape has been stolen. Once decided they must describe it to the teacher, adult or child "the large red circle". Once mastered the number of shapes 'stolen' could be increased.

What ways do the children record their solutions, annotate their findings?

How does the correct use of language support their conversation, and their generalising (talk) about shape?

Geometry: Position and Direction

I can statements:

- order and arrange combinations of mathematical objects in patterns and sequences
- use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).

Exemplification

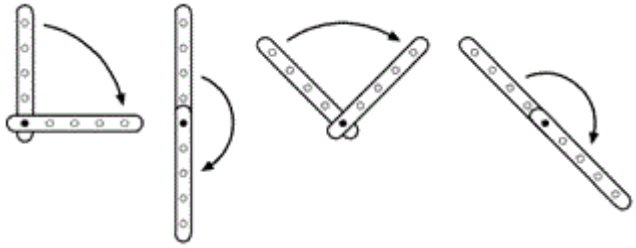
Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

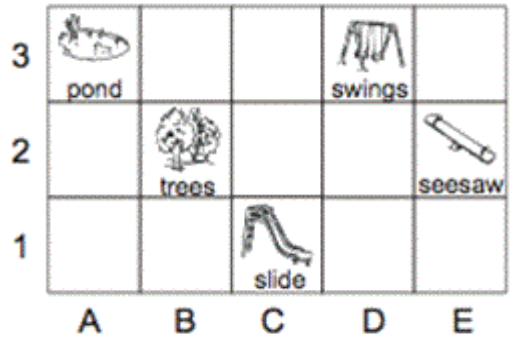
Order and arrange combinations of mathematical objects in patterns

- Describe the patterns in sequences and predict what comes next in the sequence and continue the pattern.

Use mathematical vocabulary to describe position, direction and movement including distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise), and movement in a straight line

- Recognise whole, half and quarter turns. They describe turns and give and follow instructions to turn. For example, they give instructions to a friend to follow a route around the playground. They make and draw half and quarter turns from the same starting point using, for example, two geostrips.





Use the grid to help you complete this table.

trees	B2
slide	
seesaw	

	A3

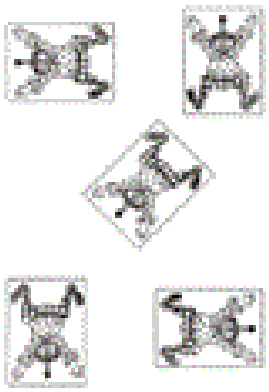
Watch me as I rotate (turn) this picture of a clown.

(Rotate the clown smoothly and continuously through a full turn, keeping it facing the children a t all times.)

Which of the pictures shows what the clown will look like if I rotate (turn) my picture a half turn?

Tick the picture

(Do not rotate your picture this time)

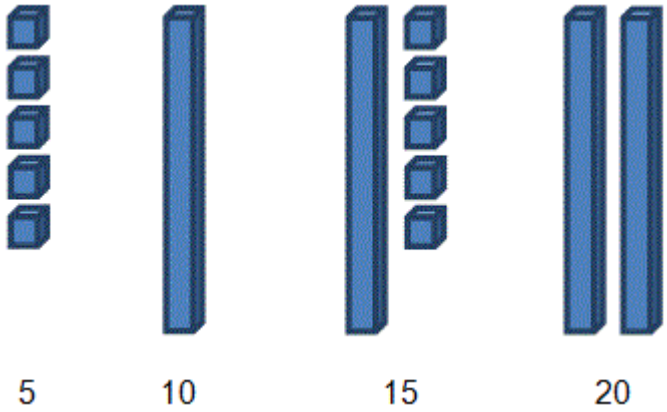


Activities

Programme of study statements	Activities	
	A	B
order and arrange combinations of mathematical objects in patterns	●	
use mathematical vocabulary to describe position, direction and movement including distinguishing between rotation as a turn and in terms of right angles for quarter, half and three- quarter turns (clockwise and anti-clockwise), and movement in a straight line		●

Activity set A

Give the children opportunities to arrange objects, such as shapes, base 10 equipment and counters in a variety of patterns. They could work with a partner. One child makes a pattern and the other child needs to predict what the next five objects in that pattern will be and give a reason for their thinking. Doing this with shapes enables the children to rehearse shape names and also their properties. If they do this with the cubes and 10 sticks from a set of base 10 equipment, they could make number patterns. For example:



You could give pairs of children different coloured counters. One child makes a random pattern using around five counters. Encourage them to make patterns that don't simply go in a straight line. Their partner then repeats this pattern. They continue until they run out of the colours needed to continue. They could then record their pattern on paper.

You could give the children squared paper, ask them to fold it in half and then to create a pattern by colouring in different squares on one side of the paper. They then give it to a partner who recreates the pattern as a reflection of the first. This makes a great link to symmetry.

You might like to explore **Polly Plug Pattern** from Nrich with the children. It gives them the opportunity to make and describe patterns. The challenge of extending a pattern allows the children to be creative and you may observe use of symmetry, rotations, enlargements and/or translations, even if the children themselves are not yet familiar with these mathematical terms.

Activity set B

You could explore direction and movement by asking the children to suggest things that move and how they do this. Ideas could include cars, airplanes, balloons, writing with a pencil.

You could ask them to draw a Formula 1 type track with several twists and turns in it. They could then take a toy car and move it around their track, describing to a friend the different directions they take. Encourage them to talk in terms of quarter, half, three quarter turns in clockwise and anti-clockwise directions and movements in a straight line.

You could ask then to work with a partner and give each other a task to do in slow motion, for example, sharpen a pencil, rub out a pencil mark, open a book. They take it in turns to observe each other and record the movements and directions of turn they make. They may well be surprised at the results!

You might like to explore **Turning Man** from Nrich This is intended to help children who are confident about turning themselves a quarter or half turn, but find it difficult to relate this to quarter or half turns in a picture or diagram. The activity is a 'halfway house' between the two.

Coloured Squares from Nrich gives children the chance to become more familiar with everyday words which describe position. It also requires them to work in a systematic way.

Statistics

I can statements:

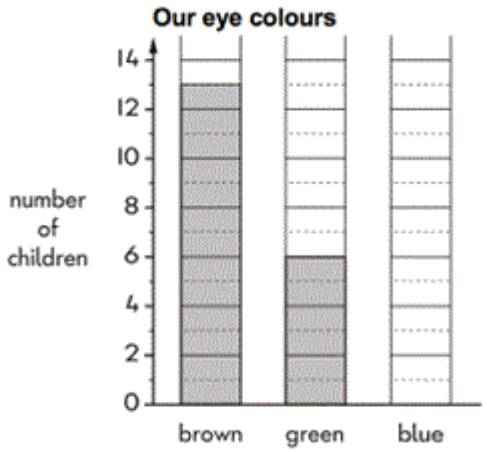
- interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask and answer questions about totalling and comparing categorical data.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Interpret and construct simple pictograms, tally charts, block diagrams and simple tables

- Class 2 make a graph

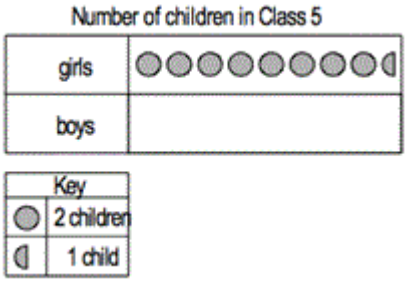


5 children have blue eyes. Show this on a graph. More children have brown eyes than green eyes.

How many more?

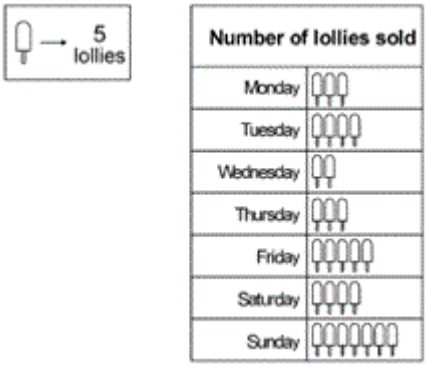
Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity

- Look at this pictogram



There are 12 boys in class 5.
Show this on a pictogram.

- A shop sold 10 ice lollies on Wednesday.

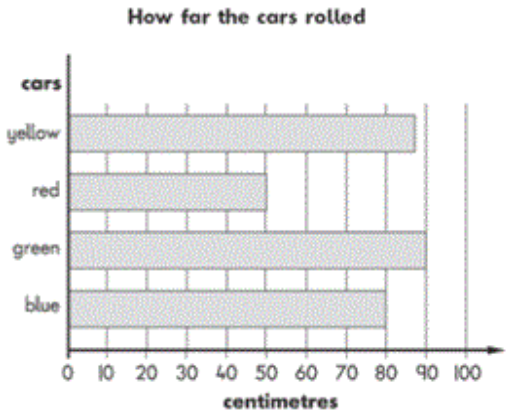


How many lollies were sold on Monday?

How many more lollies were sold on Tuesday than on Wednesday?

Ask and answer questions about totalling and comparing categorical data

- Some children rolled toy cars down a slope



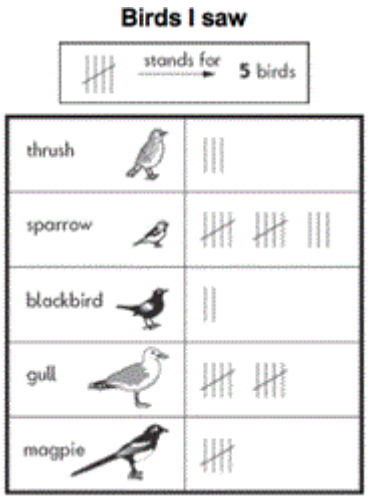
How far did the blue car roll?

How much further did the green car roll than the red car?

additional questions:

  - Which car rolled the furthest?
  - Make up a question about the red car and the yellow car.

- Jane made a tally chart



How many more gulls than blackbirds did she see?

Additional questions:

- Make up a question comparing the numbers of sparrows and blackbirds that Jane saw?
- How many fewer thrushes than magpies did she see:-
  - 12
  - 2
  - 10
  - 3

- Some children were asked to choose their favourite animal in the zoo. This table shows the results.

	Girls	Boys
zebra	9	3
lion	4	9
giraffe	7	4
monkey	8	7
elephant	6	5

How many more girls than boys chose the giraffes?

How many more boys chose lions than elephants?

Which animal was chosen by the greatest number of children?

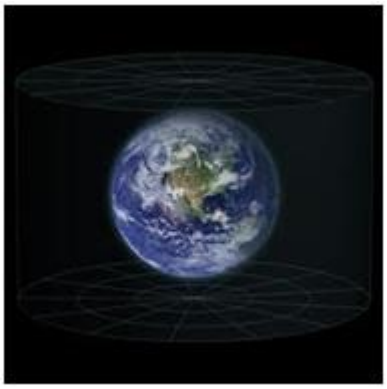
Activities

Programme of Study statements	Activities				
	A	B	C	D	E
interpret and construct simple pictograms, tally charts, block diagrams and simple tables					
ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity					
Ask and answer questions about totalling and comparing categorical data.					

Activity A - Ladybird count NRICH

In this activity the children think about how to represent the data collected.

Activity B - If the world was a village NRICH



This activity is based on the book 'If the World Were a Village' by David J Smith and Shelagh Armstrong. It looks at different ways to represent data but could also use the idea to make tables, pictograms and block graph. The concept of the world being reduced down to 100 people might be a little challenging, but a similar activity could be planned using the data from one class, year group, or the school.

Activity C - Using an atlas.

Use an atlas and find a table, pictogram or block graph. Discuss what it can tell you and ask the children to come up with questions for each other to answer. Ask them if they think a graph of showing today's data would look the same? Why?

Activity D - Sound investigation

Link with the Yr2 Science unit. How can we find the quietest place in the school? Use sound level meters to record sound levels in different places at the same time of day. How can we turn these into bar graphs? What do they tell us?

Activity E – Aerial Photographs

Link with KS1 Geography Look at aerial photographs of a local village and town. How can we compare the two? Discuss use of tally charts to record the key features such as fields, houses, shops, etc. Turn into a pictogram or block graph. What does it mean?

Teaching tips from Overcoming Barriers – helping children move from level 1 to 2.

- Provide children with plenty of opportunities to see and make simple lists, such as days of the week, numbers that total 10, multiples of 5, children with birthdays in the summer, etc.
- Draw a table on the playground and get children to physically stand in the correct place. You can then demonstrate how such information can be recorded on paper. Make it explicit to EAL pupils when a subject-specific word, such as ‘table’, carries a different meaning in mathematics to that in everyday language.
- Create block graphs practically by using multilink towers to represent the data. You can then show how this can be represented in a more abstract way on paper.
- Create pictograms quickly in groups or as a class. Initially, create pictograms using real data, for example ask children to take off one shoe and organise them into rows of shoes with laces, buckles, hook and loop tape, etc. Children can then draw their shoe on sticky notes and take it in turns to place it in the correct place on a large paper pictogram. This will quickly generate a set of class data and provide opportunities for questions to be asked.
- Ensure that children experience examples of block graphs and pictograms where the information is represented horizontally, as well as examples where they are represented vertically.
- Data can be generated and discussed on a daily basis by creating an interactive whiteboard file containing the children’s names or photographs. Children can drag and drop their name/photo into the correct place on a table, pictogram or block graph during registration to create data that shows how many children are having sandwiches, school dinner, etc.
- Use tables and charts in role-play areas, for example to show prices in a café, hairdresser’s, toy shop, etc.
- Ensure that children have opportunities to respond to questions that involve the language of comparison, such as: How many more…?, How many fewer…?, What is the difference between…?
- Model how data can be used to answer a given question. You can then provide opportunities for children to begin to consider other questions that particular data could answer. Support them to do this by providing them with question openers, such as those in the bullet point above.
- Model annotating tables, pictograms and block graphs to support reading and interpreting the information they present. Ensure that annotations are a valued part of the classroom environment and displays.
- To support the development of children’s reasoning skills ask questions such as: Would this chart be different if we asked the teachers about their favourite drinks? How?
- Try to maintain a balance across the five aspects of the data-handling cycle. To achieve this balance, you may need to support children to collect and represent the data efficiently in

Useful Resources

Unifix is useful for making 3D block graphs

Post it notes can make quick whole class pictograms or block graphs.