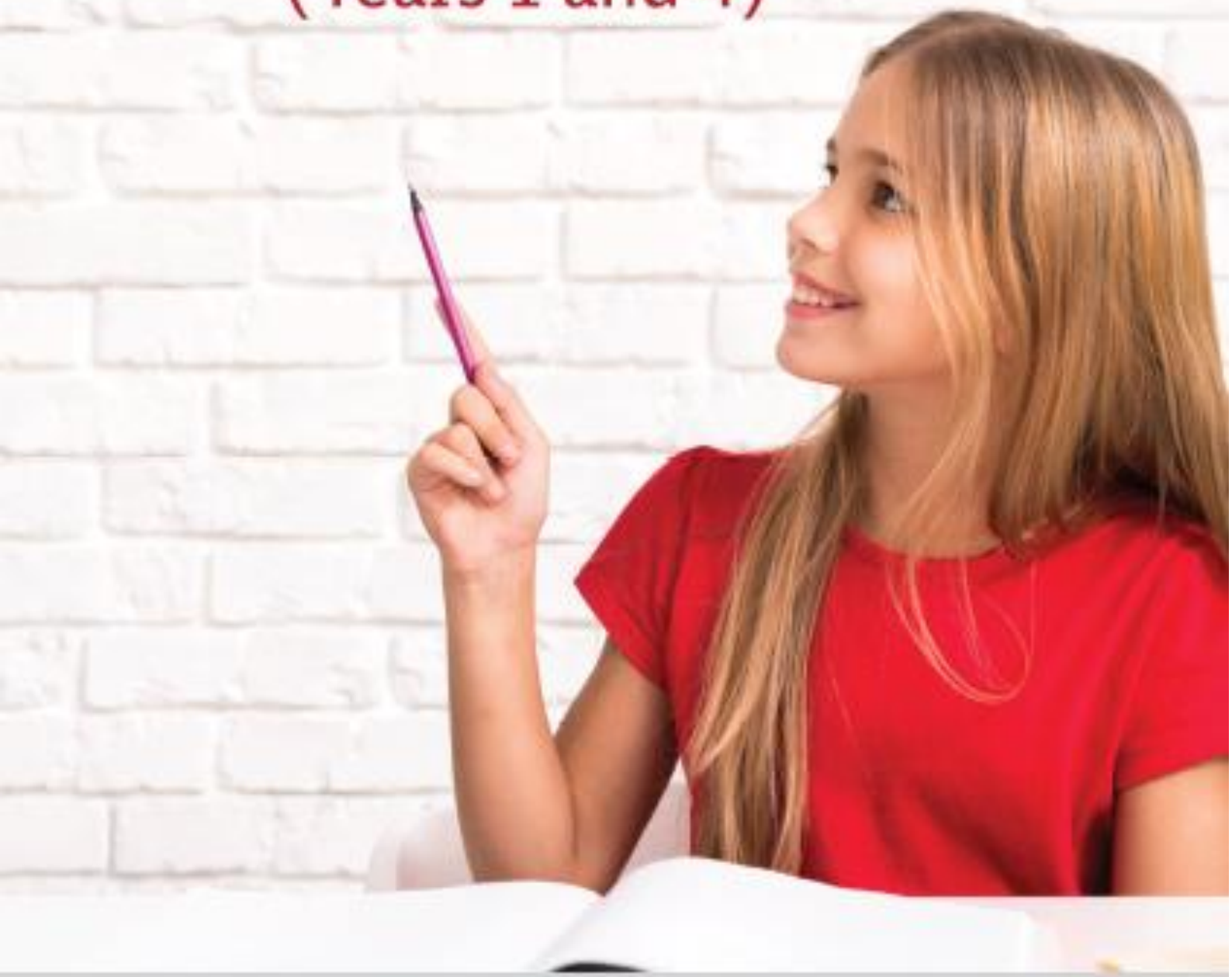
Solihull
METROPOLITAN
BOROUGH COUNCIL

Mathematics Exemplification for Greater Depth

(Years 1 and 4)



Compiled by The Solihull LA Primary Mathematics Forum 2019

Mathematics Exemplification

Background

These materials were produced by the Solihull Primary Mathematics Forum following a questionnaire sent to schools auditing Solihull primary schools' needs.

Mathematics leads requested support for staff in assessing greater depth in mathematics. The decision was taken to initial provide exemplification for Years 1 and 4 and to target 3 of the most difficult areas to assess at greater depth. Maths leads were asked to discuss with their staff which objectives were the trickiest to assess and this information was fed back to the forum. The 3 most popular objectives for each year group were selected and materials provided in these areas.

Selected objectives

Year 1

- Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems
- Recognise and name common 2-D and 3-D shapes, including: 2D shapes [for example, rectangles (including squares), circles and triangles] 3D shapes [for example, cuboids (including cubes), pyramids and spheres].

Year 4

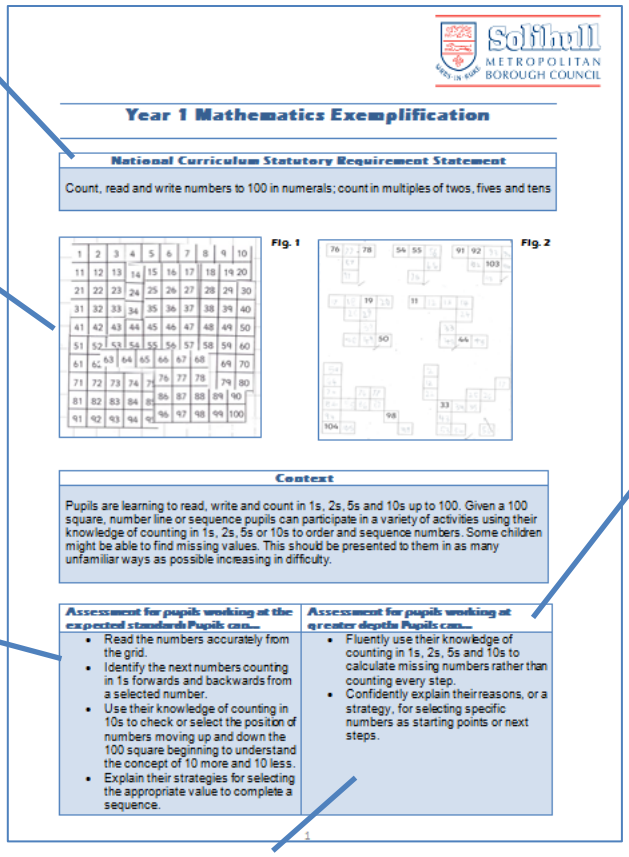
- Complete a simple symmetric figure with respect to a specific line of symmetry.
- Recognise and show, using diagrams, families of common equivalent fractions.
- Count backwards through zero to include negative numbers

How to use these materials

The national curriculum statement which is being assessed

Example of a pupil's work assessed at the expected and/ or demonstrating greater depth of understanding.

Assessment statements demonstrating what the teacher might see a pupil do, or hear a pupil say, when working at an **expected standard** for this year group.



Solihull Metropolitan Borough Council

Year 1 Mathematics Exemplification

National Curriculum Statutory Requirement Statement

Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens

Fig. 1

Fig. 2

Context

Pupils are learning to read, write and count in 1s, 2s, 5s and 10s up to 100. Given a 100 square, number line or sequence pupils can participate in a variety of activities using their knowledge of counting in 1s, 2s, 5s or 10s to order and sequence numbers. Some children might be able to find missing values. This should be presented to them in as many unfamiliar ways as possible increasing in difficulty.

Assessment for pupils working at the expected standard Pupils can...	Assessment for pupils working at greater depth Pupils can...
• Read the numbers accurately from the grid. • Identify the next numbers counting in 1s forwards and backwards from a selected number. • Use their knowledge of counting in 10s to check or select the position of numbers moving up and down the 100 square beginning to understand the concept of 10 more and 10 less. • Explain their strategies for selecting the appropriate value to complete a sequence.	• Fluently use their knowledge of counting in 1s, 2s, 5s and 10s to calculate missing numbers rather than counting every step. • Confidently explain their reasons, or a strategy, for selecting specific numbers as starting points or next steps.

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Assessment statements demonstrating what the teacher might see a pupil do, or hear a pupil say, when a pupils has a **greater depth of understanding** in this area**.**

The context of the activity and how it was presented to pupils. This might also include other information about prior knowledge.

Some activities will consist of 2 linked activities: one which will assess expected standard and another which will encourage pupils to think more deeply.

Other activities will have 1 starting point which can be extended through appropriate questioning to encourage a deeper understanding.

Examples of questions that teachers might ask to assess a pupil's understanding at the expected standard.

Key Questions for pupils working at the expected standard	Key Questions for pupils working at greater depth
• **Which piece of the 100 square/number line/sequence is good to start with?** *Starting with 1 would be a good starting point but some pupils may be able to pick any piece and work forwards and backwards from that piece. Encourage pupil to give a reasoned decision for why that piece is best or how they can use it as a starting point.* • **What is 1 more/1 less than this number?** • **What is 10 more /10 less than this number? What do these numbers have in common? Can you see a pattern?** • **How do you know this piece/number fits here?** • **Why could this piece/number not fit here?**	• **Why could it not be [number]?** • **What do you notice about the numbers as we look down the columns of a 100 square? What stays the same and what changes?** *Can pupils see that the tens digit stays the same but the unit digit goes forwards/backwards in ones? Explore this pattern using structural equipment so that pupils can see that when they add a ten the unit digit is unchanged. Pupils then use this knowledge to jump around a 100 square.* • **How we can use this knowledge to find the value of a blank space in a sequence without filling out every step in between?** • **What is 20/30 more or less than [this number]? How do you know?** *Can use any appropriate counting step to challenge pupils – 2s, 5s or combinations 10 more and 2 more so 12 more than a number.*

Examples of questions that teachers might ask to probe into a pupil's understanding at greater depth.

Year 1 Mathematics Exemplification

National Curriculum Statutory Requirement Statement
Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens

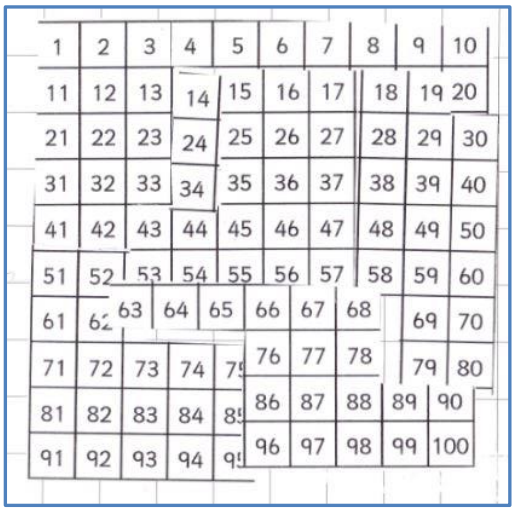


Fig. 1

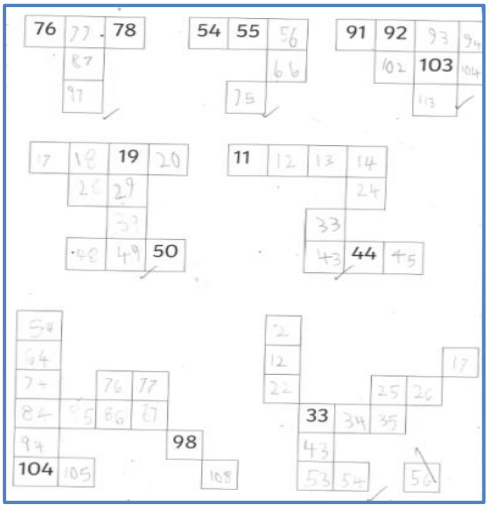


Fig. 2

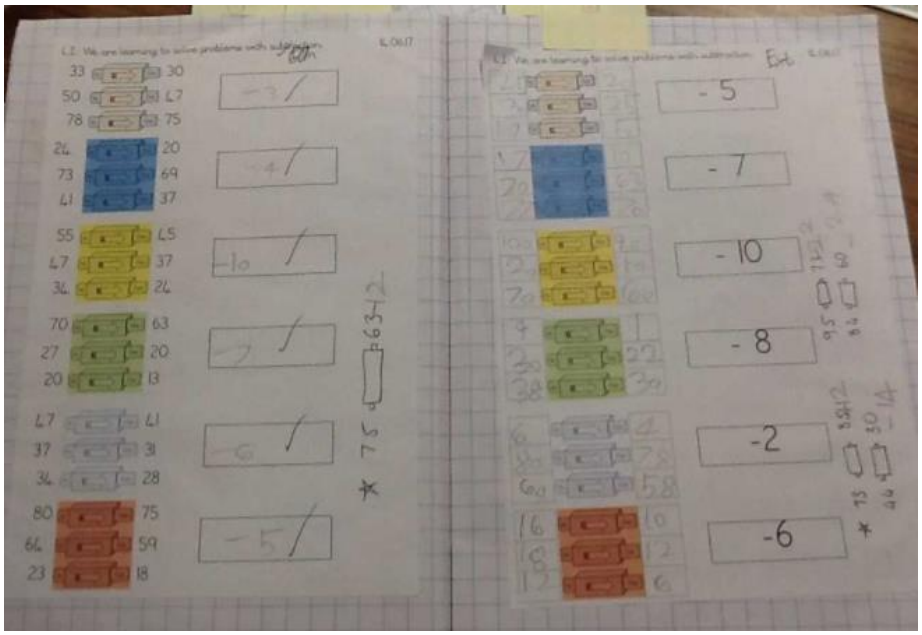
Context
Pupils are learning to read, write and count in 1s, 2s, 5s and 10s up to 100. Given a 100 square, number line or sequence pupils can participate in a variety of activities using their knowledge of counting in 1s, 2s, 5s or 10s to order and sequence numbers. Some children might be able to find missing values. This should be presented to them in as many unfamiliar ways as possible increasing in difficulty.

Assessment for pupils working at the expected standard: Pupils can…	Assessment for pupils working at greater depth: Pupils can…
• Read the numbers accurately from the grid. • Identify the next numbers counting in 1s forwards and backwards from a selected number. • Use their knowledge of counting in 10s to check or select the position of numbers moving up and down the 100 square beginning to understand the concept of 10 more and 10 less. • Explain their strategies for selecting the appropriate value to complete a sequence.	• Fluently use their knowledge of counting in 1s, 2s, 5s and 10s to calculate missing numbers rather than counting every step. • Confidently explain their reasons, or a strategy, for selecting specific numbers as starting points or next steps.

Key Questions for pupils working at the expected standard	Key Questions for pupils working at greater depth
• **Which piece of the 100 square/number line/sequence is good to start with?** *Starting with 1 would be a good starting point but some pupils may be able to pick any piece and work forwards and backwards from that piece. Encourage pupil to give a reasoned decision for why that piece is best or how they can use it as a starting point.* • **What is 1 more/1 less than this number?** • **What is 10 more /10 less than this number? What do these numbers have in common? Can you see a pattern?** • **How do you know this piece/number fits here?** • **Why could this piece/number not fit here?**	• **Why could it not be [number]?** • **What do you notice about the numbers as we look down the columns of a 100 square? What stays the same and what changes?** *Can pupils see that the tens digit stays the same but the unit digit goes forwards/backwards in ones? Explore this pattern using structural equipment so that pupils can see that when they add a ten the unit digit is unchanged. Pupils then use this knowledge to jump around a 100 square.* • **How we can use this knowledge to find the value of a blank space in a sequence without filling out every step in between?** • **What is 20/30 more or less than [this number]? How do you know?** *Can use any appropriate counting step to challenge pupils – 2s, 5s or combinations 10 more and 2 more so 12 more than a number.*

Year 1 Mathematics Exemplification

National Curriculum Statutory Requirement Statement
Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems



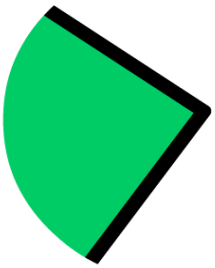
Context
Children were introduced to the idea of a function machine where a number is being increased or decreased.

Assessment for pupils working at the expected standard: Pupils can...	Assessment for pupils working at greater depth: Pupils can...
• Identify if the machine is making the number bigger or smaller, and what operation that is. • Use vocabulary such as *smaller, greater, less, more, addition, subtraction*. • Count on and back from one number to another using manipulatives to support in finding the difference between values. • Explain and show this using jottings, knowledge of place value, concrete objects and verbal responses.	• Travel backwards through the function machine using the inverse operation. • Give input and output values when given a function e.g. function is add 4. • Continue to find values for the function machine when given constraints. • Explain and show this using jottings, knowledge of place value, concrete objects and verbal responses.

Key Questions and responses for the expected standard	Key Questions and responses for working at greater depth
• **How is the machine changing the number?** *I know the machine is making the number greater because 37 is greater than 32.* • **How much greater/smaller is the number now?** • **What operation is being used***?* • **If this number is put in the machine what comes out?** • **Can you show me what's happening with concrete objects? Prove it.**	• **If this number comes out, what went in?** • **Can you show me what's happening with concrete objects? Prove it.** • **If this is the function, what could the input numbers be?** *If the function is add 5 my numbers could be 5 and 10, 15 and 20 or 40 and 45.* • **What if your numbers can't be in the 5 times table?** *I could have 1 and 6, 8 and 13 or 22 and 27.* • **What numbers greater than 20 have a difference of 4? Can you write 3 different examples?** • **Can you find two numbers with a difference of 10 that are both odd?** *My numbers are 13 and 23, they are both odd and have the same amount of 1s, but one number has 1 ten and the other has 2 tens which is 10 more.*

Year 1 Mathematics Exemplification

National Curriculum Statutory Requirement Statement
Recognise and name common 2-D and 3-D shapes, including: 2D shapes [for example, rectangles (including squares), circles and triangles] 3D shapes [for example, cuboids (including cubes), pyramids and spheres].



Context
http://www.ictgames.com/YRshape.html this image is a 'spotlight' showing part of a 2D shape. Children are challenged to use their shape knowledge to consider different possibilities as to what the rest of the shape could look like.

Assessment for pupils working at the expected standard: Pupils can...	Assessment for pupils working at greater depth: Pupils can...
• Name a variety of 2D shapes it could be • Name a variety of 2D shapes it couldn't be • Explain why they think this using their knowledge of 2D shapes	• Visualise and draw the shape they are thinking of • Consider multiple possibilities with reasons why

Key Questions and responses for pupils working at the expected standard:	Key Questions and responses for pupils working at greater depth:
Part of the shape is hidden. • What shape could this be - triangle or square? • What shapes can't this be, how do you know?	Part of this shape is hidden. • What would the rest of the shape look like? • What are all of the possible shapes this could be? • What properties could the shape have? • From what 3D shape could this be part of (opportunity to use correct terminology – face)?

Year 4 Mathematics Exemplification

National Curriculum Statutory Requirement Statement
Complete a simple symmetric figure with respect to a specific line of symmetry.

Reflect the shape in the mirror line

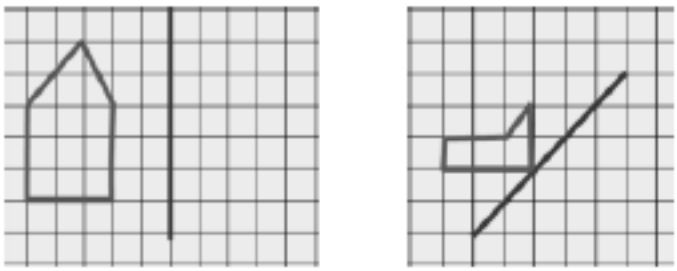


Fig.1 At the expected standard

Colour in extra squares to complete a symmetrical pattern

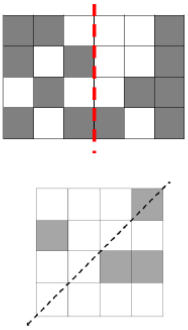


Fig.2 At greater depth

Context
Children to complete the diagrams using their mirrors and/or by counting squares from the mirror line.

Assessment for pupils working at the expected standard: Pupils can…	Assessment for pupils working at greater depth: Pupils can…
• Accurately reflect the shape in the mirror line • Ensure that the reflected shape is congruent.	• Accurately reflect more than one square to ensure a symmetrical pattern.

Key Questions and responses for pupils working at the expected standard:	Key Questions and responses for pupils working at greater depth:
• How many squares from the mirror line is point X? • How have you used your mirror to check the orientation of your reflected shape/line?	• How many squares need to be shaded to complete the diagram? • Which squares definitely wouldn't be shaded?

Year 4 Mathematics Exemplification

National Curriculum Statutory Requirement Statement
Count backwards through zero to include negative numbers

Fig 1 At Expected Standard

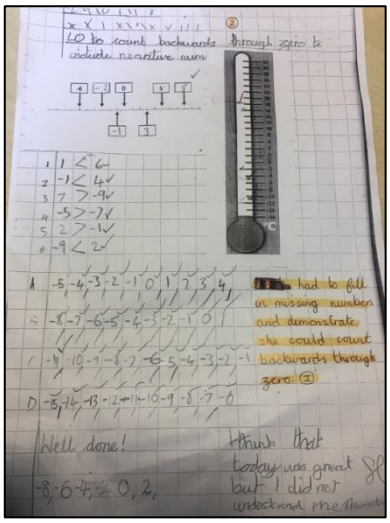
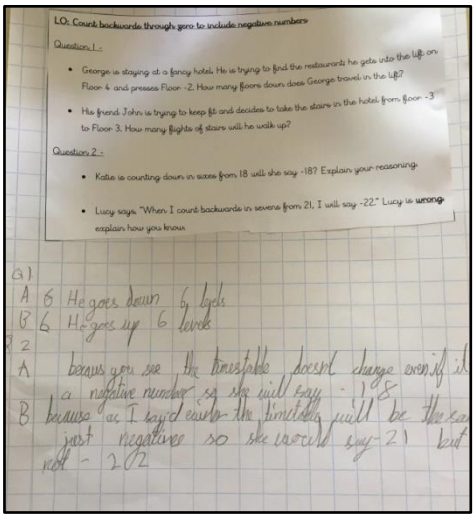


Fig 2 Greater Depth



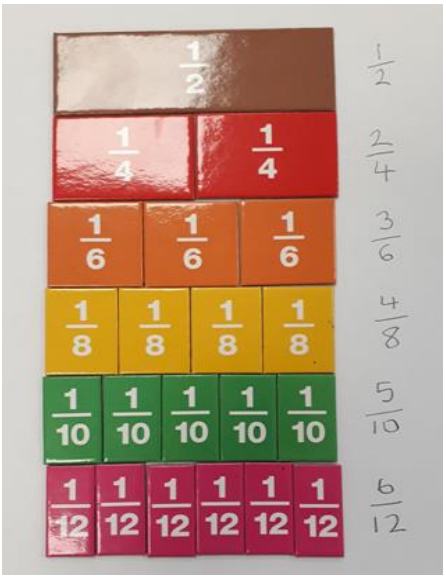
Context
Pupils are learning to count forwards and backwards within negative numbers and through zero. Given a variety of visual aids, for example number lines, sequences, grids, tables or graphs pupils should participate in activities where they must count, sequence and order numbers including values which are less than zero. Some children might be able to find missing values. This should be presented to them in as many unfamiliar ways as possible increasing in difficulty. It is essential pupils are presented negative numbers in 'real-life' contexts as well, such as thermometers.

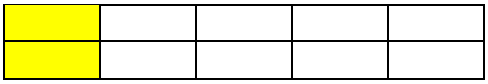
Assessment for pupils working at the expected standard: Pupils can...	Assessment for pupils working at greater depth: Pupils can...
• Count forwards and backwards through zero by a given amount. • Fill in missing values in a variety of contexts. • Prove which numbers are closest to zero when given two values or more. • Count the difference between two values when both are negative or when one is positive and one negative. • Use the terms positive and negative to discuss numbers	• When given a value count backwards or forwards by a given amount to solve problems including 'real-life' contexts. • Reflect on the patterns and symmetry of positive and negative numbers. • Reason and explain how they have counted within and across negative numbers.

Key Questions for pupils working at the expected standard:	Key Questions for pupils working at greater depth:
• **Use the [number line] to count back 6 from this number. Where do you land? What is 4 less than this number? What is 1 subtract 5?** • **Which number is closest to zero, -5 or -3?** • **Can you spot the mistake in these number sequences?** *Pupils should use their knowledge of counting in different multiples to spot errors within a negative context* • **Explain how you found the mistake and convince me you are correct.** *"The error is -5 because the rest of the numbers are decreasing by 2 each time."*	• **If I counted back in 3s from 6, what would the 4th number be?** • **If I started at 24 and counted back in 6s, how many jumps would it be until I reached -18?** • **I am counting down from 11 in fives. Do I say -11? Prove it.** *Child's response may include reference to counting to –9 and then –14 and missing –11.*

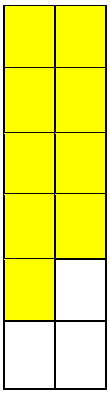
Year 4 Mathematics Exemplification

National Curriculum Statutory Requirement Statement
Recognise and show, using diagrams, families of common equivalent fractions.





$^{2}/_{10} = {}^{?}/_{5}$



$^{9}/_{12} = {}^{?}/_{?}$

Context
Use fraction cubes to find equivalent fractions e.g. to a half Use diagrams to explore a range of sequivalent fractions.

Assessment for pupils working at the expected standard: Pupils can...	Assessment for pupils working at greater depth: Pupils can...
• Manipulate the fraction cubes to accurately find a range of equivalent fractions. • Draw pictures of a range of equivalent fractions. • Find a range of equivalent fractions without manipulatives or drawing.	• Accurately identify missing equivalent fractions. • Explain their thinking clearly.

Key Questions and responses for pupils working at the expected standard:	Key Questions and responses for pupils working at greater depth:
• How many tenths are equivalent to the fraction $^{1}/_{5}$? • How can you use your multiples to help with this?	• If $^{8}/_{12}$ were shaded, how many different equivalent fractions can you make? • If you increase the denominator, how does this affect the numerator?