

Year 6

Mastery Overview
Autumn

SOL Overview

As well as providing term by term overviews for the new National Curriculum as a Maths Hub we are aiming to support primary schools by providing more detailed Schemes of Learning, which help teachers plan lessons on a day to day basis.

The following schemes provide exemplification for each of the objectives in our new term by term overviews, which are linked to the new National Curriculum. The schemes are broken down into fluency, reasoning and problem solving, which are the key aims of the curriculum. Each objective has with it examples of key questions, activities and resources that you can use in your classroom. These can be used in tandem with the mastery assessment materials that the NCETM have recently produced.

We hope you find them useful. If you have any comments about this document or have any ideas please do get in touch.

The White Rose Maths Hub Team

Assessment

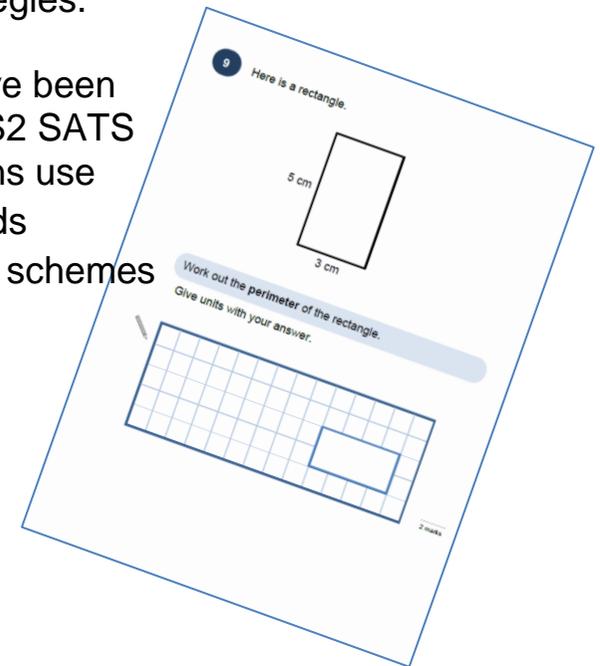
Alongside these curriculum overviews, we also provide a free assessment for each term's plan. Each assessment will be made up of two parts:

Part 1: Fluency based arithmetic practice

Part 2: Reasoning based questions

You can use these assessments to determine gaps in your students' knowledge and use them to plan support and intervention strategies.

The assessments have been designed with new KS2 SATS in mind. The questions use strategies and methods promoted through the schemes of learning.



Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews;

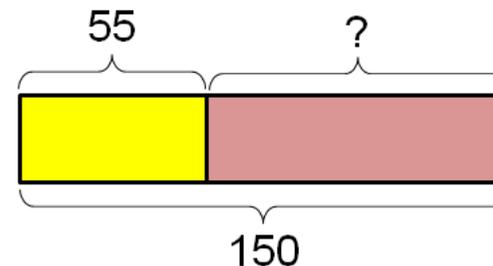
- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole group
- provide plenty of time to build reasoning and problem solving elements into the curriculum.

Concrete – Pictorial – Abstract

As a hub we believe that all students, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking this approach.

Concrete – students should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – students should then build on this concrete approach by using pictorial representations. These representations can then be used to reason and solve problems.



An example of a bar modelling diagram used to solve problems.

Abstract – with the foundations firmly laid, students should be able to move to an abstract approach using numbers and key concepts with confidence.

Frequently Asked Questions

We have bought one of the new Singapore textbooks. Can we use these curriculum plans?

Many schools are starting to make use of a mastery textbook used in Singapore and China, the schemes have been designed to work alongside these textbooks. There are some variations in sequencing, but this should not cause a large number of issues

If we spend so much time on number work, how can we cover the rest of the curriculum?

Students who have an excellent grasp of number make better mathematicians. Spending longer on mastering key topics will build a student's confidence and help secure understanding. This should mean that less time will need to be spent on other topics.

In addition schools that have been using these schemes already have used other subjects and topic time to teach and consolidate other areas of the mathematics curriculum.

My students have completed the assessment but they have not done well.

This is your call as a school, however our recommendation is that you would spend some time with the whole group focussing on the areas of the curriculum that they don't appear to have grasped. If a couple of students have done well then these could be given rich tasks and deeper problems to build an even deeper understanding.

Can we really move straight to this curriculum plan if our students already have so many gaps in knowledge?

The simple answer is yes. You might have to pick the correct starting point for your groups. This might not be in the relevant year group and you may have to do some consolidation work before.

These schemes work incredibly well if they are introduced from Year 1 and continued into Year 2, then into Year 3 and so on.

NCETM Mastery Booklets

In addition to the schemes attached the NCETM have developed a fantastic series of problems, tasks and activities that can be used to support 'Teaching for Mastery'. They have been written by experts in mathematics.

It will also give you a detailed idea of what it means to take a mastery approach across your school. Information can be found on the link below.

<https://www.ncetm.org.uk/resources/46689>



Everyone Can Succeed

As a Maths Hub we believe that all students can succeed in mathematics. We don't believe that there are individuals who can do maths and those that can't. A positive teacher mindset and strong subject knowledge are key to student success in mathematics.

More Information

If you would like more information on 'Teaching for Mastery' you can contact the White Rose Maths Hub at mathshub@trinityacademyhalifax.org

We are offering courses on:

- Bar modelling
- Teaching for Mastery
- Subject specialism intensive courses – become a maths expert.

Our monthly newsletter also contains the latest initiatives we are involved with. We are looking to improve maths across our area and on a wider scale by working with the other Maths Hubs across the country.

Year 6 Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number- Place Value		Number- Addition, Subtraction, Multiplication and Division				Fractions					
Spring	Number- Decimals		Number- Percentages	Measurement			Number- Algebra		Number- Ratio		Geometry and Statistics	
Summer	Geometry- Properties of Shapes		Geometry- Position and Direction	Post SATs Project Work								

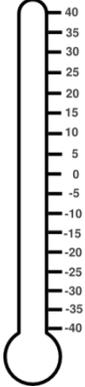
Year Group	Y6	Term	Autumn
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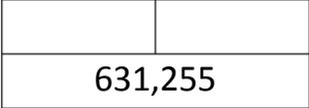
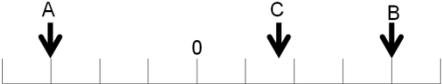
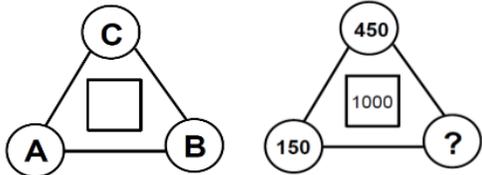
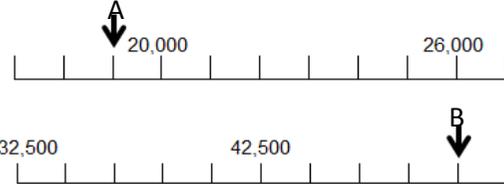
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<p><u>Number: place value</u> Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.</p> <p>Round any whole number to a required degree of accuracy.</p> <p>Use negative numbers in context, and calculate intervals across zero.</p> <p>Solve number and practical problems that involve all of the above</p>	<p><u>Number- addition subtraction, multiplication and division</u> Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.</p> <p>Multiply multi-digit number up to 4 digits by a 2 digit number using the formal written method of long multiplication.</p> <p>Divide numbers up to 4 digits by a 2 digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context.</p> <p>Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division, interpreting remainders according to context.</p> <p>Perform mental calculations, including with mixed operations and large numbers.</p> <p>Identify common factors, common multiples and prime numbers.</p> <p>Use their knowledge of the order of operations to carry out calculations involving the four operations.</p> <p>Solve problems involving addition, subtraction, multiplication and division.</p>	<p><u>Fractions</u> Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.</p> <p>Compare and order fractions, including fractions > 1</p> <p>Generate and describe linear number sequences (with fractions)</p> <p>Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.</p> <p>Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]</p> <p>Divide proper fractions by whole numbers [for example $\frac{1}{3} \div 2 = \frac{1}{6}$]</p> <p>Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example $\frac{3}{8}$]</p> <p>Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.</p>									

	National Curriculum Statement	All students																																									
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Place Value	<p>Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.</p>	<ul style="list-style-type: none"> Which is greater? Seventy six thousand, eight hundred and twenty six or 78,626 Order these numbers from smallest to largest 3,620,566, 366,216, 3,267,958, 3,410,058, 3,267,589, 3,654,233 Here are 7 digit cards. Make as many 7 digit numbers as you can and order them from largest to smallest. 	<ul style="list-style-type: none"> Put a number in the missing space below to make the sentence correct. $4_236460 > 46236460$ Is there another option? Explain how you it is correct. Show the value of the digit 6 in these numbers? 6,787,555 9,546,754 Explain how you know. Put one number in each box so that the list of numbers is ordered smallest to largest. 	<ul style="list-style-type: none"> Do, then explain Find out the populations in five countries. Order the populations starting with the largest. Explain how you ordered the countries and their populations. Miss Jones, the teacher has four cards. On each card is a number: <table border="1" style="margin-left: 20px;"> <tr> <td>42,350</td> <td>43,685</td> </tr> <tr> <td>56,995</td> <td>56,943</td> </tr> </table> <p>She gives one card to each pupil. They each look at them and say a clue. Alfie says, "My number is 57,000 when rounded to the nearest 10" Ben says "My number has exactly 3 hundreds in it." Caleb says "My number is 44,000 when rounded to the nearest thousand." Patrick says "My number is exactly 100 less than 57,043" Solve who had which card and explain how you know.</p> Claire is given the calculation below to estimate an answer to $1,912 + 1,888 =$ Claire says "I will just double 1,900 which is 3,800" Why has Claire done that? Would you do anything differently? 	42,350	43,685	56,995	56,943																																			
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Place Value	Round any whole number to a required degree of accuracy.	<ul style="list-style-type: none"> Complete the table <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Nearest tenth</th> <th>Nearest 100</th> </tr> </thead> <tbody> <tr> <td>3,423.49</td> <td></td> <td></td> </tr> <tr> <td>4,833.20</td> <td></td> <td></td> </tr> <tr> <td>5,994.67</td> <td></td> <td></td> </tr> </tbody> </table> A number rounded to the nearest 100 is 600. What is the smallest possible number it could be? Circle the card that rounds to 5,000 when rounded to the nearest 100 <div style="display: flex; flex-wrap: wrap; justify-content: space-around; margin-top: 20px;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px 15px; margin: 5px;">5,099</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px 15px; margin: 5px;">4,950</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px 15px; margin: 5px;">4,941</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px 15px; margin: 5px;">4,500</div> </div> 		Nearest tenth	Nearest 100	3,423.49			4,833.20			5,994.67			<ul style="list-style-type: none"> Tim says <div style="border: 2px solid black; border-radius: 15px; padding: 10px; margin: 10px; text-align: center;"> If I round 26.63 to the nearest 10, I do not need to look at the tenths or hundredths </div> <p>Do you agree? Explain your reasoning.</p> Give an example of a six digit number which rounds to the same number when rounded to the nearest 10,000 and 100,000. Explain why this has happened. Spot the mistake! Calvin rounded 215,678 to the nearest ten thousand and wrote 220,678. Can you explain to Calvin what mistake he has made and why he has done it? 	<ul style="list-style-type: none"> Two numbers each with two decimal places round to 41.3 to one decimal place. The total of the numbers is 82.6 What could the numbers be? How many different ways can you find? Mr Langfield gives out the following four cards: <table border="1" style="margin-left: 20px; text-align: center;"> <tbody> <tr> <td>59.96</td> <td>59.94</td> </tr> <tr> <td>60.26</td> <td>62.32</td> </tr> </tbody> </table> <p>Four children each take a card and give a clue to what their number is: Alice says "My number is 60 when rounded to the nearest 10." Beth says "My number has exactly 6 tens in it." Charlie says "My number is 59.9 to the nearest tenth." Daniel says "My number is 60 to the nearest tenth." Can you work out which child has which card? Explain your choices.</p> Two numbers when added together make 100 but when rounded one number rounds to 0 and the other rounds to 100. How many different combinations of numbers can you find? 	59.96	59.94	60.26	62.32
			Nearest tenth	Nearest 100																
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	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Place Value	Use negative numbers in context, and calculate intervals across zero.	<ul style="list-style-type: none"> Fill in the missing numbers. 152, 102, 52, 2, __, __ -6, -4, __, __, 2, 4 __, -1, 5, 11, __ Filip had £17.50 in bank account. He paid for a jumper that was £30. How much did he have in his bank account after? In a Science experiment, a class videoed a thermometer overnight. At 02:30 it read -12°C and it was 15°C at 13:00. What was the difference in temperatures? 	<ul style="list-style-type: none"> Spot the mistake: -75, -15, 35, 105 What is wrong with this sequence of numbers? True or false? When I count backwards in 50s from 10 I will say -150. Explain how you know. A company decided to build offices underground as well as over ground. The manager says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: fit-content; margin: 10px auto;">If we build from 100 down to -100 then we will have 200 floors</div> Is he right? Convince me. 	<ul style="list-style-type: none"> True or false? The temperature is -6°C. It becomes 5 degrees warmer. It is now -11°C. Explain your answer using a drawing. Order the flashcards from what you think will be coldest to hottest areas. After you have ordered them, take the temperature and compare the results with your estimates. Were you correct? Why? <div style="display: flex; flex-wrap: wrap; justify-content: space-around; margin: 10px 0;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;">Playground</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">Kitchen</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">Cloakroom</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">Classroom</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">Hall</div> </div> <ul style="list-style-type: none"> Use $<$, $>$ or $=$ to complete the statements <div style="display: flex; justify-content: space-around; align-items: center; margin: 5px 0;"> -5 <input type="radio"/> 5 </div> <div style="display: flex; justify-content: space-around; align-items: center; margin: 5px 0;"> -4 <input type="radio"/> -20 </div>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Place Value	Solve number and practical problems that involve all of the above.	<ul style="list-style-type: none"> Cut out the thermometer and an arrow.  The temperature is 30°C Show this on the thermometer. My number has exactly 60 thousands. It has 4 hundreds. The digit in the millions column is double the digit in the hundreds column. The digit in the hundred thousand column is half the digit in the ten thousand column. What is my number? 	<ul style="list-style-type: none"> Make the biggest number using 1, 6 and 9 Now make the biggest number using 1, 5, 6 and 9 How did you choose where to order the numbers? What's the same, what's different? <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">45 tenths</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">4.5</div> </div> Put the same digit in all four boxes to make both statements correct $\square\square3 < \square\square65$ $\square\square68 > 3\square\square2$ Find all the options. 	<ul style="list-style-type: none"> In pairs, children have one ladder each and share three 10 sided dice. Use three 0-9 dice to create a number. They choose where to place it on the ladder. The numbers have to be ordered from smallest at the bottom to greatest at the top. Once it has been placed, it cannot be moved. The aim is to fill the ladder first.  Order the statements from smallest to largest $900 - 100 =$ $100 + 100 + 100 + 100 + 200 =$ Double 350 Half of 800 Can you add you add one that would be the middle answer? Can you add one so it is the greatest answer?

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	<p>Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.</p>	<ul style="list-style-type: none"> Work out the missing number: $3,210 + 2,564 = 9,836 - \square$ $2,678 + \square = 9,305 - 3,789$ Draw a bar model to show this problem. The council planted 1,500 new flowers on Monday. On Tuesday they doubled what they had planted the day before. On Wednesday they planted half of what they planted on Monday. How many flowers were planted altogether? Complete the part whole model. 	<ul style="list-style-type: none"> Abdul says "If I add any two 4 digit numbers together is will make a 5 digit number." Do you agree? Explain why. Here is a bar model.  Select two 6-digit numbers to complete the model. How did you select your numbers? Three numbers are marked on a number line.  The difference between A and B is 28 The difference between A and C is 19 D is 10 less than C What is the value of D? How do you know? 	<ul style="list-style-type: none"> Three pandas are eating bamboo sticks. There are 51 altogether. They all eat an odd number of sticks. How many bamboo sticks did they each eat? How many different ways can you do it?  The number in the square in the middle is calculated using the following rule $A + B - C$ Work out the value of the question mark.  Find the difference between A and B 

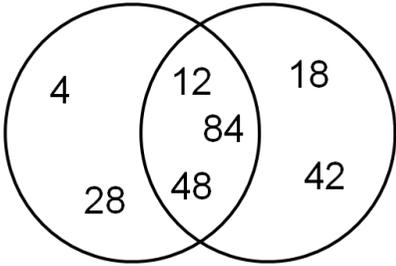
	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	<p>Multiply multi-digit number up to 4 digits by a 2 digit number using the formal written method of long multiplication.</p>	<ul style="list-style-type: none"> Which calculation gives the smallest answer? $3,678 \times 23$ $2,678 \times 230$ $1,598 \times 46$ Abby planted 573 bulbs. The packet showed each flower should have 13 petals. How many petals should there be altogether? Work out the missing number. Explain how you know. $80 \times \square = 560000$ What other facts do you know from this? 	<ul style="list-style-type: none"> Miss Brown estimates the following $4,999 \times 40 = 200,000$ Do you think she was right to that? Explain your reasons. Write true or false next to each statement. Explain your reasons for each answer. 572×6 gives the same answer as 6×572 $3 \times 172 = 172 + 172 + 172$ $10 \times 10 \times 4 = 20 \times 4$ Work out the missing number. $26\square\square \times 8 = 2152$ How did you find the answer? 	<ul style="list-style-type: none"> Craig says "250 ends in a zero therefore, when multiplying, I can only make 250 by multiplying by 5 or 10." Do you agree? How many ways can you find to disprove this? A class are solving multiplication problems using counters. One child arranges their counters like the diagram below. The question is $23 \times 3 =$  Is this the only way to represent this calculation? How many ways can you find? Can you complete the following calculation to create 1432? $\square\square\square \times \square = 1432$ What is the closest answer you can make? How do you know it is the closest?

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Four Operations	<p>Divide numbers up to 4 digits by a 2 digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context.</p>	<ul style="list-style-type: none"> 2,538 people applied to be in a T.V. show audience. 36 people were invited to each show. How many shows did they make with full audiences and how many people were not invited? What is the closest amount to 36 that would have divided without a remainder? Work out $5834 \div 26$ Which calculation will give the largest answer? <p>$1,455 \div 14$</p> <p>$1,910 \div 18$</p> <p>$725 \div 12$</p> 	<ul style="list-style-type: none"> Harry says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> Without doing a written method, I know $7,350 \div 7$ will not have a remainder </div> <p>Is he correct? Convince me.</p> Belle divides 8,541 by 8. She says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> I know there will be a remainder before I start </div> <p>Is she correct? Explain how you know.</p> Megan divides 500 by 8 and gets the answer $62r4$. She re writes it as $62 r \frac{1}{2}$. Is she right? Explain your answer. 	<ul style="list-style-type: none"> A class were using place value counters to complete the calculation $112 \div 4$. One child arranged her counters like this. <table border="1" style="margin: 10px 0;"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●●</td> </tr> <tr> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●●</td> </tr> <tr> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●●</td> </tr> <tr> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●●</td> </tr> </tbody> </table> <p>What mistake has she made? Can you show me how to do it correctly?</p> Using the number 4,236 how many numbers up to 20 does it divide by without a remainder? Is there a pattern? Here are two number cards. <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="border: 1px solid blue; border-radius: 10px; padding: 5px; background-color: #e0f0ff;">A</div> <div style="border: 1px solid blue; border-radius: 10px; padding: 5px; background-color: #e0f0ff;">B</div> </div> <p>Here is some information about the cards.</p> <div style="border: 1px solid blue; border-radius: 10px; padding: 5px; margin: 5px 0; width: fit-content;">When you divide A by B you get 1.5</div> <div style="border: 1px solid blue; border-radius: 10px; padding: 5px; margin: 5px 0; width: fit-content;">The difference between A and B is 7</div> <p>Find the value of A and B</p> 	Hundreds	Tens	Ones	●	●	●●	●	●	●●	●	●	●●	●	●	●●
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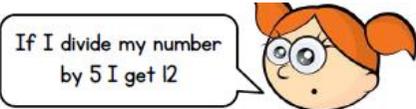
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Four Operations	<p>Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division, interpreting remainders according to context.</p>	<ul style="list-style-type: none"> Use $<$, $>$ or $=$ <p>$1,256 \div 9$ <input type="radio"/> $1,528 \div 6$</p> <p>$2,106 \div 9$ <input type="radio"/> $1,872 \div 8$</p> <p>$3,360 \div 12$ <input type="radio"/> $1,680 \div 12$</p> Find the missing digits <p>$\begin{array}{r} 041 \square r3 \\ 4 \overline{) 1 \square 59} \end{array}$</p> A limousine company allows 14 people per limousine. How many limousines need to be hired for 230 people? 	<ul style="list-style-type: none"> Divide 1248 by <ul style="list-style-type: none"> 48 24 12 <p>What did you do each time? Did you use a strategy?</p> Here is a calculation <p style="text-align: center;">$186 \div 4 =$</p> <p>Adnan thinks that the answer is 46r2 Chad thinks that the answer is 46.2</p> <p>Are they both correct? Explain your answer.</p> 	<ul style="list-style-type: none"> Here are two calculation cards <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; margin: 5px;"> $A = 396 \div 11$ </div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; margin: 5px;"> $B = 832 \div 13$ </div> </div> <p>Find the difference between A and B</p> Mo is thinking of a number <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px; text-align: center;"> <p>When I divide my number by 14, I get 368</p> </div> <p>What does Mo get when he divides his number by 28?</p> To divide a number by 18 you can use the following rule: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; margin: 5px; text-align: center;"> <p>Divide the number by 3 then divide that answer by 6</p> </div> <p>Try it for $387 \div 18$</p> <p>Can you create any similar rules for other numbers?</p>

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Four Operations	<p>Perform mental calculations, including with mixed operations and large numbers.</p>	<ul style="list-style-type: none"> Work out the missing numbers $5,419 + 2,000 = 9,836 - \square$ $200 \times \square = 750 + \square$ Alfie had 70 socks that needed putting into pairs. He bought 5 more packs that each had 6 pairs in. How many pairs of socks did he have altogether? Here is part of a multiplication grid. <table border="1" style="margin: 10px auto;"> <tr> <td>×</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> </tr> <tr> <td>4</td> <td></td> <td>20</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>20</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>Shade in any square that has the same answer as the shaded square.</p> 	×	4	5	6	7	8	9	4		20					5	20						6							7							8							9							<ul style="list-style-type: none"> Anwar says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p>If I know all of my times tables up to 12 x 12 then I can solve any numbers that are powers of 10 too e.g. $700 \times 8 =$</p> </div> <p>Is he correct? Explain why.</p> The following problem was given to the class. <p>$\square + 50 = \square - 25$</p> <p>Shellie says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p>Whatever digits we put in those boxes they will always be positive numbers</p> </div> <p>Do you agree? Explain your reason.</p> </p> 	<ul style="list-style-type: none"> Here is a rule for generating a sequence. <div style="border: 1px solid blue; border-radius: 15px; padding: 10px; margin: 10px 0; text-align: center;"> <p>Multiply the previous term by 3 and subtract 4</p> </div> <p>The second term of the sequence is 5 Find the difference between the first and fourth terms of the sequence.</p> Sally multiplies a number by 100 Here answer has three digits. The hundreds and ones digit are the same. The sum of the digits is 10 What number could Sally have started with? Are there any others? Peter paid £21 for 5 presents. For A and B he paid a total of £6. For B and C he paid a total of £10. For C and D he paid a total of £7. For D and E he paid a total of £9. How much did Peter pay for each present?
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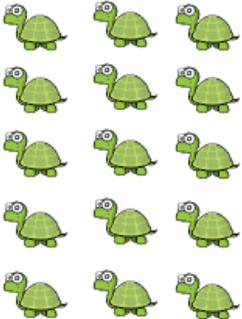
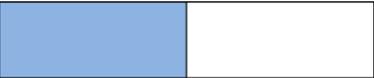
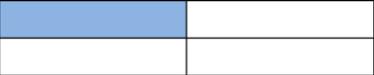
	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	<p>Identify common factors, common multiples and prime numbers.</p>	<ul style="list-style-type: none"> List the first 5 multiples of 7 Write down all the factors of 24 What is the highest common factor of 24 and 36? Work out the headings for this Venn diagram  <p>Add in one more number to each section.</p>	<ul style="list-style-type: none"> Stefi says <div style="border: 1px solid black; border-radius: 15px; padding: 5px; margin: 5px 0;"> The only prime number between 30 and 40 is 37 </div> <p>Is he correct? Prove it.</p> Explain why a multiple of 80 is also a multiple of 8. Can you find two 2-digit numbers that are not prime that don't have a common factor? What do you notice? Kam says <div style="border: 1px solid black; border-radius: 15px; padding: 5px; margin: 5px 0;"> Factors come in pairs so all numbers must have an even number of factors </div> <p>Do you agree?</p> 	<ul style="list-style-type: none"> Nancy is double her sister's age. They are both older than 20 and younger than 50. They are both multiples of 7. How old are they? Clare's age is a multiple of 7 and 3 less than a multiple of 8. How old is Clare? Is this the only possibility? Which number is the odd one out? 12, 30, 54, 42, 32, 48 Explain why. Tahil has £32. He shares the money evenly between his friends. He has more than 1 friend. How many friends could Tahil have?

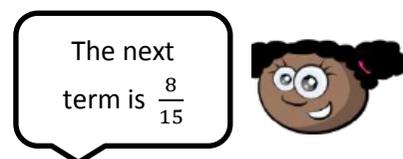
	National Curriculum Statement	All students		
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Four Operations	<p>Use their knowledge of the order of operations to carry out calculations involving the four operations.</p>	<ul style="list-style-type: none"> $4(72 \div 9) \times (1923 - 382)$ Add brackets to make this calculation correct; $25 + 10 - 3 \times 20 - 15 = 20$ Sarah had 7 bags with 5 sweets in each. She added one more to each bag. Circle the calculation below that shows the correct working out. <div style="text-align: center;"> $7(5 + 1) = 42$ $7 \times 5 + 1 = 36$ $7 \times 5 + 1 = 42$ </div> Work out <div style="text-align: center;"> $3 + 4 \times 7$ $6 + (25 \times 9) - 1$ $10 - 32$ $20 + 15 \div 5$ $100 - 17 \times 4$ </div> 	<ul style="list-style-type: none"> Choose operations to go in the boxes to make the number sentences true: $5 \square 3 \square 8 = 23$ $5 \square 3 \square 8 = 29$ Daniel completed the following calculation and got the answer 168 $2(30 \div 5) + 14 = 168$ Can you explain what he did and where he made the mistake? Amy says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p>You can do multiplication and division in any order. This is the same for addition and subtraction.</p> </div> Is she correct? Can you include some calculations to support your answer? 	<ul style="list-style-type: none"> Countdown Ask children to choose 1 or 2 numbers from the 'top' (25/50/75/100) and 4 or 5 numbers from the 'bottom' 1-10. Children make a target number. Write different number sentences using the digits 3, 4, 5 and 8 before the equals sign that use: <ul style="list-style-type: none"> - one operation - two operations, no brackets - two operations, brackets The mass of a box of chocolates is 290g. The box contains 7 identical chocolates. <div style="text-align: center; margin: 10px 0;">  </div> Manish eats 3 chocolates. The mass of the box is now 194g. Find the weight of them empty box.

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Four Operations	<p>Solve problems involving addition, subtraction, multiplication and division.</p>	<ul style="list-style-type: none"> Jessica is rowing along the coast to Sunshine Cove. Each day she rows less because she gets more tired. On the first day she covers 38 kilometres, on the second day 35 kilometres, on the third day 32 kilometres and on the fourth day 29 kilometres. How many days will it take her to cover the distance of 203 kilometres to Sunshine Cove? Work out the missing numbers in these calculations <div style="text-align: center;"> <table border="1" style="margin: 10px auto;"> <tr><td></td><td>5</td><td>8</td><td>1</td><td>□</td></tr> <tr><td>+</td><td>1</td><td>□</td><td>9</td><td>6</td></tr> <tr><td></td><td>□</td><td>5</td><td>□</td><td>2</td></tr> </table> <table border="1" style="margin: 10px auto;"> <tr><td></td><td>1</td><td>5</td><td>□</td><td>9</td></tr> <tr><td>-</td><td></td><td>□</td><td>8</td><td>□</td></tr> <tr><td></td><td>□</td><td>2</td><td>2</td><td>0</td></tr> </table> </div>		5	8	1	□	+	1	□	9	6		□	5	□	2		1	5	□	9	-		□	8	□		□	2	2	0	<ul style="list-style-type: none"> My way! Give a group of four a list of sums e.g. 19×24 $198 + 997$ Half of 57.6 $3841 - 665.3$ $5.2 \div 4$ $101 \times 16 \times 4$ Each child must work out the answers mentally but think about the strategies they are using. After, explain their strategy and discuss why you used it. Jamie has a number. <div style="text-align: center;">  <p>If I divide my number by 5 I get 12</p> </div> <p>What answer does Jamie get if she divides the same number by 15? Explain your answer.</p>	<ul style="list-style-type: none"> Letter challenge Can you solve these calculations by using 0,1,2,3,4,5,6,7,8 & 9 $E \times F = HA$ $I \times H = D$ $A \times B = B$ $J \times D = IG$ $C \times C = EC$ You have been asked to bury some bags of money on an island. The money has been divided into nine separate bags containing these amounts: £21, £20, £19, £12, £11, £10, £3, £2, £1. You must bury the money in a three by three grid so that each row and column, horizontal, vertical and diagonal has £33. Three chicks lay some eggs.  Beth lays twice as many as Kelsey. Caroline lays 4 more than Beth. They lay 44 eggs in total. How many eggs does Caroline lay? (You may find it useful to draw a bar model)
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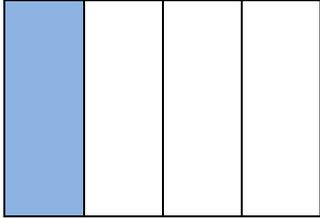
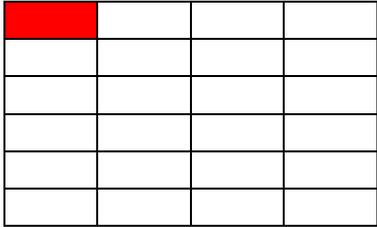
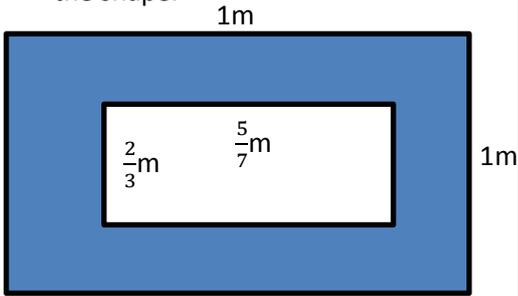
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Four Operations	<p>Use estimation to check answers to calculations and determine in the context of a problem, an appropriate degree of accuracy.</p>	<ul style="list-style-type: none"> Circle the odd one out: $345 + 452 = 800$ $691 + 113 = 800$ $368 + 482 = 800$ Hannah goes to the shop. She has got a £5.00 note. As she goes round the shop she estimates how much she has spent to make sure she has enough money. Below is a list of what Hannah bought. Estimate what she has spent. Has she got enough? Chocolate bar- 79p Can of pop- 65p Magazine- £1.50 Crisps- 45p Puzzle book - £1.80 Would it be better for Hannah to overestimate or underestimate her answer? Explain why. 	<ul style="list-style-type: none"> Do the following estimates sound correct? Explain your reasoning. <ol style="list-style-type: none"> Last month the energy costs in my lab were £560. I estimate that my energy costs per year will be £7000. Today I ate a 30g packet of crisps at morning break time, as I always do, so I estimate that I eat almost 11kg of crisps a year. My round trip to work each day is about 22 miles, but I can claim mileage from work. I estimate that I can claim for 8000 miles each year. 	<ul style="list-style-type: none"> Play this game in pairs. Use the addition grid, the aim is to make a total as close to 1000 as possible. <div style="text-align: center;"> <table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> <tr> <td style="border: none; text-align: center; vertical-align: middle;">+</td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> <td style="border: 1px solid black; width: 40px; height: 40px;"></td> </tr> </table> </div> Take turns to throw the dice and decide which of your cells to fill. This can be done in two ways: either fill in each cell as you throw the dice, or collect all your numbers and then decide where to place them. Whoever has the sum closest to 1000 wins. 					+							
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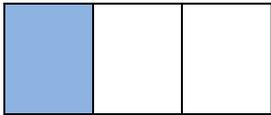
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Fractions	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.	<ul style="list-style-type: none"> Simplify the following fraction to its lowest form. $\frac{48}{54}$ Convert these fractions to the same denominator. $\frac{2}{7}$ $\frac{3}{8}$ Which is greater? $\frac{2}{3}$ or $\frac{4}{7}$ 	<ul style="list-style-type: none"> Is the following statement, always, sometimes or never true? <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0; text-align: center;"> To simplify a fraction you divide the numerator and denominator by 2 over and over </div> Explain your answer using examples. Amy thinks that $\frac{2}{5}$ in its simplest terms is $\frac{1}{2.5}$. Do you agree? Convince me. Sara and her friend are adding fractions. Her friend is trying to put the following fractions into the same denominator. Sara tells her she doesn't need because the answer is 1. $\frac{12}{24}$ $\frac{14}{28}$ Is she right? Explain why. 	<ul style="list-style-type: none"> A charity was asking for people to volunteer to help in their shop each day. Samantha said she would do $\frac{3}{8}$ of Monday. Betty said she would do $\frac{6}{12}$ of Monday. Who did more hours and by how many? What fraction has a denominator of 30 and when it is simplified it becomes $\frac{2}{5}$? How many ways can you split this shape into quarters? <div style="border: 1px solid black; width: 100px; height: 100px; margin: 10px 0;"> <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table> </div> 																

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Fractions	Compare and order fractions, including fractions > 1	<ul style="list-style-type: none"> Use the diagram to show that $\frac{1}{3}$ is greater than $\frac{1}{5}$  <ul style="list-style-type: none"> Which is greater? $2\frac{4}{5}$ or $2\frac{3}{8}$ Look at the two diagrams. Which fraction is greater?   <p>Draw a diagram that would go between the two above if ordered from smallest to greatest.</p>	<ul style="list-style-type: none"> Sallie insists she had more pizza than her sister because she had $\frac{6}{8}$ of hers and her sister had $\frac{5}{6}$. Is she correct? Explain how you know. Kayleigh says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p>All fractions are less than one.</p> </div> <p>Do you agree? Convince me.</p> Tom says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p>I have the fraction $4\frac{2}{5}$ so to make it 1 whole I need to add $5\frac{3}{5}$</p> </div> <p>Do you agree? Explain your reasoning.</p> 	<ul style="list-style-type: none"> Three friends went shopping. Steve spent $\frac{3}{7}$ of his money. Alfie spent $\frac{4}{12}$ of his money. Becky spent half of what Alfie spent. Order them from smallest to largest by what they spent. A family were eating tea. The dad ate everything on his plate; the mum ate half of what Dad ate. The sister ate a quarter of what Mum ate and the brother ate a half of what the sister ate. What fraction of their food did each person eat? Here is a fraction of two pieces of wood. <div style="display: flex; align-items: center; margin: 10px 0;">  <div style="margin-left: 10px;">$\frac{5}{6}$</div> </div> <div style="display: flex; align-items: center; margin: 10px 0;">  <div style="margin-left: 10px;">$\frac{3}{4}$</div> </div> <p>Which piece of wood is the longest?</p>

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Fractions	<p>Generate and describe linear number sequences (with fractions)</p>	<ul style="list-style-type: none"> Work out the missing fractions in the sequence below. $\frac{5}{7}, \text{---}, 1, \frac{\text{---}}{7}, \text{---}$ Draw the next three in the following sequence <table border="1" style="margin-bottom: 10px;"> <tr><td style="background-color: #008000;"></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table> <table border="1" style="margin-bottom: 10px;"> <tr><td style="background-color: #008000;"></td><td></td></tr> <tr><td style="background-color: #008000;"></td><td></td></tr> <tr><td></td><td></td></tr> </table> <table border="1"> <tr><td style="background-color: #008000;"></td><td></td></tr> <tr><td style="background-color: #008000;"></td><td></td></tr> <tr><td style="background-color: #008000;"></td><td></td></tr> </table>																			<ul style="list-style-type: none"> Here is the start of a sequence $\frac{1}{15}, \frac{2}{15}, \frac{4}{15}$ <p>Katie says</p>  <p>Dan says</p>  <p>Could they both be right? Explain why.</p> <ul style="list-style-type: none"> Spot and correct the mistake. <p>$\frac{6}{10}, \frac{8}{10}, 1, \frac{12}{10}, \frac{16}{10}$</p>	<ul style="list-style-type: none"> The rule for the sequence below is <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;"> <p>Double the fraction and subtract $\frac{2}{7}$</p> </div> <p>Complete the sequence</p> <p>$\frac{3}{7}, \frac{4}{7}, \frac{6}{7}, \text{---}, \text{---}$</p> <p>Can you create your own rule and sequence?</p> <ul style="list-style-type: none"> There is a whole cake. Baldesh eats half of the cake. Cimran eats half of the remaining cake. Dave eats half of the remaining cake. <p>Write down the fractions each person eats. Create a rule for this sequence.</p>

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Fractions	Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.	<ul style="list-style-type: none"> A jug contains some milk. Josh pours $\frac{1}{2}$ of the milk into a glass. Josh pours $\frac{3}{10}$ of the milk into another glass. What fraction of the milk is left? Work out: $5\frac{3}{7} - 2\frac{6}{5}$ Add these diagrams together. 	<ul style="list-style-type: none"> Bashir says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> I do not need to do any written calculations to solve $\frac{4}{8} + \frac{2}{4}$ </div> Do you agree? Explain how you know. Rajesh says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> I don't understand why the denominators do not change when you add and subtract fractions </div> Can you explain why? 	<ul style="list-style-type: none"> Katie subtracted $\frac{3}{5}$ from a fraction and her answer was $\frac{8}{45}$. What was the original question? Koby buys two identical chocolate bars. He ate part of one on Saturday and part of one on Sunday. Each day he gives the left over chocolate to his mum. The blue squares show the fraction he ate each day.
		<div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="text-align: center;"> <p>Saturday</p> </div> <div style="text-align: center;"> <p>Sunday</p> </div> </div> <p>How much chocolate did he give to his mum on Saturday? How much chocolate did he give to his mum on Sunday? How much more, as a fraction did Koby eat on Sunday?</p>		

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Fractions	<p>Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]</p>	<ul style="list-style-type: none"> Use the diagram to show $\frac{1}{3} \times \frac{1}{4}$  <ul style="list-style-type: none"> What is 1 ninth multiplied by 1 seventh? Work out $\frac{1}{4} \times \frac{1}{2} =$ <div style="border: 1px solid black; display: inline-block; padding: 2px;"> $\square \times \frac{1}{2} = 1$ </div>	<ul style="list-style-type: none"> Ginny is multiplying the following calculation $\frac{1}{5} \times \frac{1}{6}$. The answer she gets is $\frac{2}{30}$. Explain what she has done. Megan says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> When I multiply two fractions together my answer is always a smaller fraction </div> Do you agree? Explain your answer. Draw a diagram to represent the calculation below. $\frac{1}{6} \times \frac{1}{8}$ Explain what you have drawn and why. 	<ul style="list-style-type: none"> Hanna has half a pizza. She cuts it into 4 slices. What fraction of the original pizza is each new slice? The shaded square in the grid below is the answer to a multiplying fractions question. If that is the answer, what is the question?  <ul style="list-style-type: none"> Find the area of the coloured part of the shape. 

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Fractions	Divide proper fractions by whole numbers [for example $\frac{1}{3} \div 2 = \frac{1}{6}$]	<ul style="list-style-type: none"> Work out four sevenths divided by 5 Use the diagram to show $\frac{1}{3} \div 2$ <div style="text-align: center;">  </div> Alfie has $\frac{4}{6}$ of a pizza left. He shares it between 4 people. How much do they each get? Beth shares $\frac{3}{4}$ kg of sweets into 3 equal piles so that she can share them with her friends. What fraction of a kg is in each pile? 	<ul style="list-style-type: none"> Roman says <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> When dividing fractions by a whole number, I just ignore the numerator </div> <p>Do you agree? Explain why.</p> Think of 3 questions for dividing fractions by an integer where the answer is $\frac{1}{20}$. Could you do it? Why? Why not? Solve the following calculations: $\frac{1}{3} \div 2 = \text{--}$ $\frac{1}{4} \div 2 = \text{--}$ $\frac{1}{5} \div 2 = \text{--}$ $\frac{1}{6} \div 2 = \text{--}$ <p>What do you notice? Explain why the pattern has formed.</p> 	<ul style="list-style-type: none"> Look at the calculation below. Work out the missing parts. $\text{--} \div \square = \frac{4}{36}$ <p>How many different ways can you find?</p> Becky's mum ordered a pizza for her and her friends. By the time they arrived home there was only $\frac{7}{12}$ of it left. When she shared it among her friends they each got $\frac{7}{72}$. How many friends did Becky have with her? Fill in the missing boxes with a whole number $\frac{9}{10} \div \square = \frac{9}{40}$ $\frac{4}{5} \div \square = \frac{2}{5}$

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Fractions	<p>Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example $\frac{3}{8}$]</p>	<ul style="list-style-type: none"> Complete the table. <table border="1" style="margin: 10px 0;"> <tr> <td>$\frac{1}{8}$</td> <td>$\frac{2}{8}$</td> <td></td> </tr> <tr> <td>0.125</td> <td></td> <td>0.375</td> </tr> </table> Charlie divided 1 pizza into 5 pieces. If he ate 2 pieces, what decimal fraction of the pizza did he eat? Use a 1 place value counter. 1 I want to divide this by 2 How can I do it? Exchange your 1 for ten tenths, now I can divide ten tenths into 2 groups which equals 0.5 Therefore 1 divided by 2 is 0.5 which is why $\frac{1}{2} = 0.5$ Can you divide 1 by 4? What equivalence between fractions and decimal fractions does this show? 	$\frac{1}{8}$	$\frac{2}{8}$		0.125		0.375	<ul style="list-style-type: none"> Harry says <div style="border: 2px solid black; border-radius: 15px; padding: 10px; margin: 10px 0; text-align: center;"> $\frac{1}{2}$ is equivalent to 1.2 </div> Do you agree? Explain your answer. True or False 0.3 is bigger than $\frac{1}{4}$ Explain your reasoning. Hannah says <div style="border: 2px solid black; border-radius: 15px; padding: 10px; margin: 10px 0; text-align: center;"> If I divide 2 by 8 I get the same answer as if I divide 1 by 4 </div> Do you agree? Explain your answer using diagrams or counters. 	<ul style="list-style-type: none"> Write a unit fraction which has a value of less than 0.5. Can you find 20 different unit fractions? Curtis used $\frac{1}{3}$ of a can of paint to cover 3.5 square metres of wall. How much wall will one whole can of paint cover? Pete shares 6 bananas between some friends. Each friend gets 0.75 of a banana. How many friends does he share the bananas with?
$\frac{1}{8}$	$\frac{2}{8}$									
0.125		0.375								

	National Curriculum Statement	All students		
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Fractions	<p>Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.</p>	<ul style="list-style-type: none"> What fraction (in its simplest form) and percentage are equal to 0.65? Work out the missing values in these fractions. $\frac{2}{5} = \frac{10}{\quad} = \frac{\quad}{45}$ Last month Kira saved $\frac{3}{5}$ of her £10 pocket money. She also saved 15% of her £20 birthday money. How much did she save altogether? 	<ul style="list-style-type: none"> Which is the odd one out? Explain why. $\frac{2}{5} \quad \frac{4}{10} \quad \frac{3}{6} \quad \frac{6}{15} \quad 0.4$ Put the following cards in groups. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">$\frac{3}{2}$</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">0.5</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">$\frac{3}{8}$</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">0.125</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">$\frac{3}{4}$</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">1.25</div> </div> Here is a statement <div style="border: 2px solid black; border-radius: 15px; padding: 10px; text-align: center; margin: 10px 0;"> $\frac{3}{5} < \frac{11}{15}$ </div> <p>Is this statement true or false? Explain your reasoning.</p>	<ul style="list-style-type: none"> Here are some fraction cards. <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;">$\frac{6}{A}$</div> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;">$\frac{10}{15}$</div> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;">$\frac{12}{B}$</div> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;">$\frac{C}{30}$</div> </div> All of the fractions are equal. Find the values of A, B and C. Write decimal and percentages on flash cards and have them face down. In pairs, turn one over at a time. The first person to write down 5 equivalent fractions to the decimal/percentage wins a point. In the pyramid the two numbers below add to make the number above. Complete the number pyramid. <div style="text-align: center; margin-top: 20px;"> </div>