

# 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.

In addition to this we have also created our own network area where teachers from across the country can share their lesson plans and resources that are linked to our schemes.

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

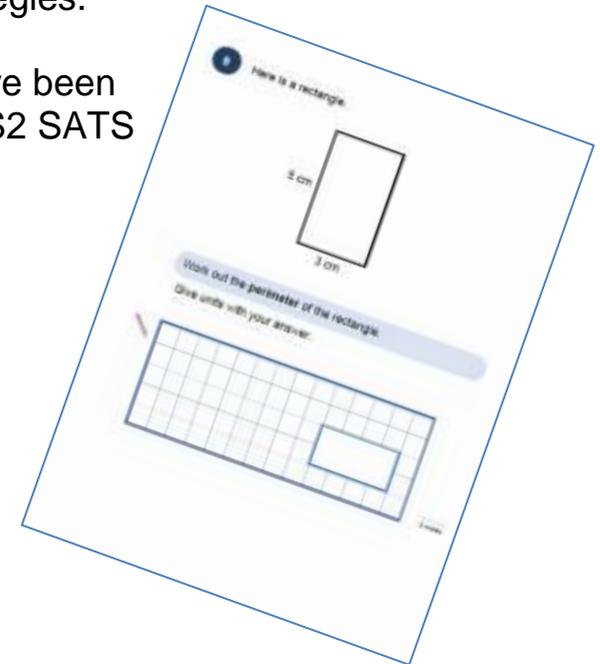
Alongside these curriculum overviews, our aim is also to provide a free assessment for each term's plan. Each assessment will be made up of two parts:

**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. All of the assessments will be ready by 30 November 2015.



## 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;

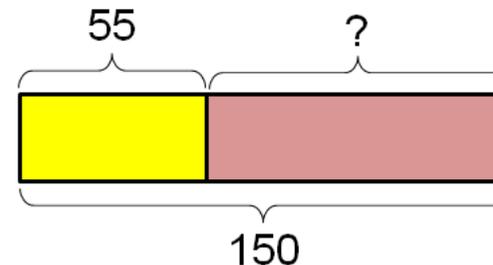
- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole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



## WRMH Primary Network

Over the past 12 months we have been working with a company MyFlo to develop a free online platform where teachers from across our region (and wider) can share their own resources and lesson plans based on this new curriculum. All our overviews, schemes and assessment materials will be made available on the MyFlo network.

## 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](mailto:mathshub@trinityacademyhalifax.org)

We are offering courses on:

- Bar modelling
- Teaching for Mastery
- Year group 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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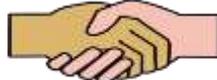
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<p><u>Number: place value</u> Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.</p> <p>Round any whole number to a required degree of accuracy.</p> <p>Use negative numbers 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 <math>&gt; 1</math></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 <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math>]</p> <p>Divide proper fractions by whole numbers [for example <math>\frac{1}{3} \div 2 = \frac{1}{6}</math>]</p> <p>Associate a fraction with division and calculate decimal fraction equivalents [ for example, 0.375] for a simple fraction [for example <math>\frac{3}{8}</math>]</p> <p>Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.</p>					

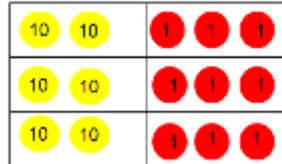
	National Curriculum Statement	All students																																				
		Fluency	Reasoning	Problem Solving																																		
Place Value	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.	<ul style="list-style-type: none"> <li>Which is greater? Seventy six thousand, eight hundred and twenty six or 78626</li> <li>Write the following number in words: 23650118</li> <li>Put a number in the missing space below to make the sentence correct. <math>4\_236460 &gt; 46236460</math></li> </ul>	<ul style="list-style-type: none"> <li>Put a number in the missing space below to make the sentence correct. <math>4\_236460 &gt; 46236460</math> Explain why it is true.</li> <li><b>Do, then explain</b> Show the value of the digit 6 in these numbers? 6787555 95467754 Explain how you know.</li> <li>Put one number in each box so that the list of numbers is ordered largest to smallest.</li> </ul> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td>1</td><td>1</td><td></td><td>3</td><td></td></tr> <tr><td>1</td><td></td><td>2</td><td></td><td>4</td></tr> <tr><td>1</td><td>2</td><td>5</td><td></td><td></td></tr> <tr><td>1</td><td></td><td>5</td><td></td><td>6</td></tr> <tr><td>1</td><td>3</td><td>0</td><td></td><td></td></tr> <tr><td>1</td><td></td><td>1</td><td>5</td><td></td></tr> </tbody> </table>	1	1		3		1		2		4	1	2	5			1		5		6	1	3	0			1		1	5		<ul style="list-style-type: none"> <li><b>Do, then explain</b> Find out the populations in five countries. Order the populations starting with the largest. Explain how you ordered the countries and their populations.</li> <li>Miss Jones, the teacher has four cards. On each card is a number: <table border="1" style="margin-left: 20px;"> <tbody> <tr><td style="background-color: yellow;">42350</td><td style="background-color: lightgreen;">43685</td></tr> <tr><td style="background-color: lightorange;">56995</td><td style="background-color: lightpurple;">56943</td></tr> </tbody> </table> <p>She gives one card to each pupil. They each look at them and say a clue. Alfie says, "My number is 57000 when rounded to the nearest 10." Ben says "My number has exactly 3 hundreds in it." Caleb says "My number is 44000 when rounded to the nearest thousand". Patrick says "My number is exactly 100 less than 57043." Can you solve who had which card and explain how you know this?</p> </li> <li>Claire is given the calculation below to estimate an answer to <math>1912 + 1888 =</math> Claire says "I will just double 1900 which is 3800". Why has Claire done that? Would you do anything differently?</li> </ul>	42350	43685	56995	56943
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		Fluency	Reasoning	Problem Solving				
Place Value	Round any whole number to a required degree of accuracy.	<ul style="list-style-type: none"> <li>Round the following number to the nearest tenth: 0.286</li> <li>Work out the missing number. 362.29 rounded to nearest _____ is 362</li> <li>A number rounded to the nearest 100 is 600. What is the smallest possible number it could be?</li> </ul>	<ul style="list-style-type: none"> <li>Tim says "If I round 26.63 to the nearest 10, I do not need to look at the tenths or hundredths." Do you agree? Explain your reasoning.</li> <li>Give an example of a six digit number which rounds to the same number when rounded to the nearest 10000 and 100000. Explain why this has happened.</li> <li><b>Spot the mistake!</b> Calvin rounded 215678 to the nearest ten thousand and wrote 220678. Can you explain to Calvin what mistake he has made and why he has done it?</li> </ul>	<ul style="list-style-type: none"> <li>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?</li> <li>Mr Langfield gives out the following four cards: <table border="1" style="margin-left: 20px;"> <tr> <td style="background-color: yellow;">59.96</td> <td style="background-color: lightgreen;">59.94</td> </tr> <tr> <td style="background-color: lightorange;">60.26</td> <td style="background-color: lightpurple;">62.32</td> </tr> </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> </li> <li>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?</li> </ul>	59.96	59.94	60.26	62.32
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Place Value	Use negative numbers in context, and calculate intervals across zero.	<ul style="list-style-type: none"> <li>Fill in the missing numbers. 152, 102, 52, 2, ____, ____.</li> <li>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?</li> <li>In a Science experiment, a class videoed a thermometer overnight. At 02:30 it read <math>-12^{\circ}\text{C}</math> and it was <math>15^{\circ}\text{C}</math> at 13:00. What was the difference in temperatures?</li> </ul>	<ul style="list-style-type: none"> <li><b>Spot the mistake:</b> <math>-75, -15, 35, 105</math> What is wrong with this sequence of numbers?</li> <li><b>True or false?</b> When I count backwards in 50s from 10 I will say <math>-150</math>. Explain how you know.</li> <li>A company decided to build offices underground as well as over ground. The manager says "If we build from 100 down to <math>-100</math> then we will have 200 floors." Was he right? Convince me.</li> </ul>	<ul style="list-style-type: none"> <li>The temperature is <math>-6^{\circ}\text{C}</math>. It gets 5 degrees warmer. <b>True or false</b> – it is now <math>-11^{\circ}\text{C}</math>. Explain your answer using a drawing e.g. number line.</li> <li>Here are some number cards:                     <table border="1" data-bbox="1563 598 1937 678" style="margin: 10px 0;"> <tr> <td style="background-color: yellow;">3</td> <td style="background-color: green;">-8</td> <td style="background-color: blue;">-6</td> </tr> <tr> <td style="background-color: pink;">-4</td> <td style="background-color: purple;">2</td> <td style="background-color: orange;">-7</td> </tr> </table> <p>Use the cards to complete the calculations below.</p> <p>___ + ___ = ___</p> <p>___ - ___ = ___</p> </li> <li><b>Connect 3</b> The first to complete a row of three is the winner. Each time a player rolls they then choose if they would like to add or subtract the numbers either way round: ___ +/- ___ =</li> </ul> <table border="1" data-bbox="1563 1149 1937 1292" style="margin-top: 20px;"> <tr> <td></td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> </tr> <tr> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>9</td> <td>10</td> <td>11</td> <td>12</td> <td></td> </tr> </table>	3	-8	-6	-4	2	-7		-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	
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	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
<b>Place Value</b>	Solve number and practical problems that involve all of the above.	Covered above	Covered above	Covered above

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.	<ul style="list-style-type: none"> <li>Work out the missing number:  <math>3210 + 2564 = 9836 - \underline{\hspace{2cm}}</math>  <math>2678 + \underline{\hspace{2cm}} = 9305 - 3789</math></li> <li>The council planted 1500 new flowers on Monday. On Tuesday they doubled what they had planted the day before and on Wednesday they planted half of what they planted on Monday. How many flowers were planted altogether?</li> <li>7208 females attended a concert as well as 8963 males. There were originally 20000 seats on sale. How many empty seats were there at the concert?</li> </ul>	<ul style="list-style-type: none"> <li>Abdul says "If I add any two 4 digit numbers together is will make a 5 digit number." Do you agree? Explain why.</li> <li>Katie was given the calculation below  <math>47326 - 1900 =</math>                      She said "I will just take off 2000 then subtract another 100 so my answer is 45126." Is she correct? Would you use her method? Explain your answer.</li> <li>Nancy is using the inverse operation to solve calculations. She is completing the calculation below:  <math>\underline{\hspace{2cm}} - 3291 = 5382</math>                      She says "I can turn the calculation around to get the correct answer."                      She does the following:  <math>5382 - 3291 =</math>                      Is she correct? Why?</li> </ul>	<ul style="list-style-type: none"> <li>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?  </li> <li>10 people from different countries meet at an international peace ceremony. Each person shakes the hand of each other person. How many handshakes are there altogether?  </li> <li>Javid has six white mice, three males and three females. Each of the three couples has 7 female baby mice. The each of these females has 8 babies. One night Javid's little sister Aisha leaves the mice cage open and 47 escape. How many mice does Javid have left?</li> </ul>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	Multiply multi-digit number up to 4 digits by a 2 digit number using the formal written method of long multiplication.	<ul style="list-style-type: none"> <li>Work out <math>3678 \times 23</math></li> <li>Abby planted 573 bulbs. The packet showed each flower should have 13 petals. How many petals should there be altogether?</li> <li>What is the missing number below? Explain how you know. <math>80 \times \underline{\quad} = 560000</math></li> </ul>	<ul style="list-style-type: none"> <li>Find the mistake in the calculation below. Correct it and explain what you have done.  <math display="block">\begin{array}{r} 4629 \\ \times \quad 12 \\ \hline 108 \\ \quad 24 \\ \hline 72 \\ \underline{36} \\ 204 \end{array}</math> </li> <li>Amy is given the calculation <math>5413 \times 600</math>. She says "I can do this without a written method." Write down the mental steps you think Amy could do.</li> <li>Miss Brown estimates the following: <math>4999 \times 40 = 200000</math> Do you think she was right to that? Explain your reasons.</li> </ul>	<ul style="list-style-type: none"> <li>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?</li> <li><b>Countdown</b> What is the closest you can get to any given number e.g. 256 using only multiplication and a list of numbers given e.g. 10, 7, 6, 2, 25, 4? How do you know this is the closest? What strategy did you use?</li> <li>A class are solving multiplication problems using counters. One child arranges their counters like the diagram below. The question is <math>23 \times 3 =</math>   </li> <li>Is this the only way to represent this calculation? How many ways can you find?</li> </ul>

	National Curriculum Statement	All students																				
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Four Operations	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.	<ul style="list-style-type: none"> <li>2538 people applied to be in a T.V. show audience. 14 people were invited to each show. How many shows did they make with full audiences and how many people were not invited?</li> <li>Work out <math>5834 \div 26</math></li> <li>Work out the missing number: <math>5792 \div 16 =</math></li> </ul>	<ul style="list-style-type: none"> <li>Harry says "Without doing a written method I know <math>7350 \div 7</math> will not have a remainder." Is he correct? Convince me.</li> <li>Belle divides 8541 by 8. She says "I know there will be a remainder before I start." Is she correct? Explain how you know.</li> <li>Megan divides 500 by 8 and gets the answer <math>62r4</math>. She rewrites it as <math>62 \frac{1}{2}</math>. Is she right? Explain your answer.</li> </ul>	<ul style="list-style-type: none"> <li>A class were using place value counter to complete the calculation <math>112 \div 4</math>. One child arranged her counters like this.                     <div style="text-align: center;"> <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>●</td> <td>●</td> <td>●●</td> </tr> <tr> <td></td> <td></td> <td>●●●●</td> </tr> </tbody> </table> </div>                     What mistake has she made? Can you show me how to do it correctly?                 </li> <li>Using the number 4236, how many numbers up to 20 does it divide by without a remainder? Is there a pattern? What can you say about these numbers?</li> <li>Estimate how many people are in the picture below. At half time, a member of the crowd won £9284 in the raffle. They kindly offered to share it equally between the crowd and kept any money left over for themselves. How much would each person get from your estimate?                     <div style="text-align: center;">  </div> </li> </ul>	Hundreds	Tens	Ones	●	●	●●	●	●	●●	●	●	●●	●	●	●●			●●●●
Hundreds	Tens	Ones																				
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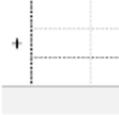
	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
<b>Four Operations</b>	Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division, interpreting remainders according to context.	Covered above	Covered above	Covered above

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	Perform mental calculations, including with mixed operations and large numbers.	<ul style="list-style-type: none"> <li>Work out the missing number: <math>5419 + 2000 = 9836 - \underline{\quad}</math></li> <li>Work out the missing number: <math>200 \times \underline{\quad} = 750 + \underline{\quad}</math></li> <li>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?</li> </ul>	<ul style="list-style-type: none"> <li>Anwar says "If I know all of my times tables up to <math>12 \times 12</math> then I can solve any numbers that are powers of 10 too e.g. <math>700 \times 8 =</math>" Is he correct? Explain why.</li> <li>The following problem was given to the class. <math>\underline{\quad} + 50 = \underline{\quad} - 25</math>  Shellie says "Whatever digits we put in those boxes they will always be positive numbers." Do you agree? Explain your reason.</li> <li>When multiplying whole numbers, decimals and fractions, you will always get a positive, whole number. Is the statement sometimes true, always true or never true? Explain your answer.</li> </ul>	<ul style="list-style-type: none"> <li>Brian had 15 pennies. He divided them into 4 bags. He then knew he could pay any amount of money from 1p to 15p exact without opening them. How much did he put in each bag?</li> <li>Imagine you have 25 beads. You have to make a 3 digit number on an abacus. You must use all 25 beads each time you make a number. How many different 3 digit numbers can you make?</li> <li>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?</li> </ul> 

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	Identify common factors, common multiples and prime numbers.	<ul style="list-style-type: none"> <li>List the first 5 multiples of 7</li> <li>Write down all the factors of 24</li> <li>What is the highest common factor of 24 and 36?</li> </ul>	<ul style="list-style-type: none"> <li>Stefi says "The only prime number between 30 and 40 is 37". Is he correct? Prove it.</li> <li>Explain why a multiple of 80 is also a multiple of 8.</li> <li>Amber works out the HCF of 6 and 8. Here is her working out: 6: 6, 12, 18, <b>24</b>, 32, 40 8: 8, 16, <b>24</b>, 32, 50 The HCF is 24. Is she correct? How do you know?</li> </ul>	<ul style="list-style-type: none"> <li>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?</li> <li>Clare's age is a multiple of 7 and 3 less than a multiple of 8. How old is Clare?</li> <li>Which number is the odd one out? Explain why. 12, 30, 54, 42, 32, 48</li> </ul>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
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"> <li><math>4(72 \div 9) \times (1923 - 382)</math></li> <li>Add brackets to make this calculation correct; <math>25 + 10 - 3 \times 20 - 15 = 20</math></li> <li>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; margin-top: 10px;"> <math>7(5 + 1) = 42</math>  <math>7 \times 5 + 1 = 36</math>  <math>7 \times 5 + 1 = 42</math> </div> </li> </ul>	<ul style="list-style-type: none"> <li>Choose operations to go in the boxes to make the number sentences true:  <math>5 \square 3 \square 8 = 23</math>   <math>5 \square 3 \square 8 = 29</math> </li> <li>Daniel completed the following calculation and got the answer 168  <math>2(30 \div 5) + 14 = 168</math>                       Can you explain what he did and where he made the mistake?                 </li> <li>Amy says "In BODMAS you can do multiplication and division either way round. This is the same for addition and subtraction." Is she correct? Can you include a calculation to support your answer?</li> </ul>	<ul style="list-style-type: none"> <li><b>Countdown</b>                      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.                 </li> <li>Write different number sentences using the digits 3, 4, 5 and 8 before the equals sign that use:                     <ul style="list-style-type: none"> <li>-one operation</li> <li>- two operations, no brackets</li> <li>- two operations, brackets</li> </ul> </li> <li>Can you write a number sentence using the digits 3, 4, 5 and 8 before the equals sign, which has the same answer as another number sentence using the digits 3, 4, 5 and 8 but which is a different sentence?</li> </ul>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	Solve problems involving addition, subtraction, multiplication and division.	<p>Covered above</p> <p>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?</p>	<p>Covered above</p> <p>My way!            Give a group of four a list of sums e.g.  <math>19 \times 24</math>  <math>198 + 997</math>            Half of 57.6  <math>3841 - 665.3</math>  <math>5.2 \div 4</math>  <math>101 \times 16 \times 4</math>            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.</p>	<p>Covered above</p> <p>Letter challenge            Can you solve these calculations by using 0,1,2,3,4,5,6,7,8 &amp; 9</p> <p>E X F = HA            I X H = D            A X B = B            J X D = IG            C X C = EC</p> <p>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:  <math>\pounds 21</math>, <math>\pounds 20</math>, <math>\pounds 19</math>, <math>\pounds 12</math>, <math>\pounds 11</math>, <math>\pounds 10</math>, <math>\pounds 3</math>, <math>\pounds 2</math>, <math>\pounds 1</math>.            You must bury the money in a three by three grid so that each row and column, horizontal, vertical and diagonal has <math>\pounds 33</math>.</p>

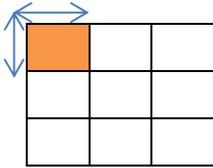
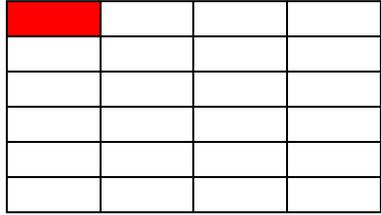
	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Four Operations	Use estimation to check answers to calculations and determine in the context of a problem, an appropriate degree of accuracy.	<ul style="list-style-type: none"> <li>Circle the odd one out:                <math>345 + 452 \approx 800</math>  <math>691 + 113 \approx 800</math>  <math>368 + 482 \approx 800</math> </li> <li>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             </li> </ul> <p>Would it be better for Hannah to overestimate or underestimate her answer? Explain why.</p>	<ul style="list-style-type: none"> <li>Do the following estimates sound about right? Explain your reasoning.               <ol style="list-style-type: none"> <li>Last month the energy costs in my lab were £560. I estimate that my energy costs per year will be £7000.</li> <li>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.</li> <li>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.</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Play a 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;">  </div> <p>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.</p> </li> </ul>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Fractions	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.	<ul style="list-style-type: none"> <li>Simplify the following fraction to its lowest form. <math>\frac{48}{54}</math></li> <li>Convert these fractions to the same denominator. <math>\frac{2}{7}</math> <math>\frac{3}{8}</math></li> <li>Which is greater? <math>\frac{2}{3}</math> or <math>\frac{4}{7}</math></li> </ul>	<ul style="list-style-type: none"> <li>Is the following statement, always, sometimes or never true? ‘To simplify a fraction you divide the numerator and denominator by 2 over and over.’ Explain your answer using examples.</li> <li>Amy thinks that <math>\frac{2}{5}</math> in its simplest terms is <math>\frac{1}{2.5}</math> Do you agree? Convince me.</li> <li>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. Is she right? Explain why. <math>\frac{12}{24}</math> <math>\frac{14}{28}</math></li> </ul>	<ul style="list-style-type: none"> <li>A charity was asking for people to volunteer to help in their shop each day. Samantha said she would do <math>\frac{3}{8}</math> of Monday. Betty said she would do <math>\frac{6}{12}</math> of Monday. Who did more hours and by how many?</li> <li>Find 3 fractions that can be simplified 5 times.</li> <li>What fraction has a denominator of 30 and when it is simplified it becomes <math>\frac{2}{5}</math>?</li> </ul>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Fractions	<p>Compare and order fractions, including fractions <math>&gt; 1</math></p>	<ul style="list-style-type: none"> <li>Order these fractions from smallest to largest  <math>\frac{1}{2}</math> <math>\frac{3}{7}</math> <math>\frac{4}{5}</math> <math>\frac{9}{10}</math></li> <li>Which is greater?  <math>2\frac{4}{5}</math> or <math>2\frac{3}{8}</math></li> <li>Write down 3 fractions that are larger than <math>\frac{2}{5}</math></li> <li>Use diagrams to show the difference in fractions.</li> </ul> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; width: 150px; height: 20px; background-color: red; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 150px; height: 20px;"></div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; width: 150px; height: 20px; background-color: red; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 150px; height: 20px;"></div> </div>	<ul style="list-style-type: none"> <li>Sallie insists she had more pizza than her sister because she had <math>\frac{6}{8}</math> of hers and her sister had <math>\frac{5}{6}</math>. Is she correct? Explain how you know.</li> <li>Kayleigh says "All fractions are less than one". Do you agree? Convince me.</li> <li>Tom says "I have the fraction <math>4\frac{2}{5}</math> so to make it 1 whole I need to add <math>5\frac{3}{5}</math>". Do you agree? Explain your reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>Three friends went shopping. Steve spent <math>\frac{3}{7}</math> of his money.  Alfie spent <math>\frac{4}{12}</math> of his money. Becky spent half of what Alfie spent. Order them from smallest to largest by what they spent.</li> <li>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?</li> <li>From 1 pizza, Michael ate <math>\frac{3}{8}</math> and Kelsey ate <math>\frac{1}{7}</math>. How much pizza was left over?</li> </ul>

	National Curriculum Statement	All students																								
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Fractions	Generate and describe linear number sequences (with fractions)	<ul style="list-style-type: none"> <li>A rule for a sequence is -6. It starts at 49. What term would be the first negative number?</li> <li>Work out the missing fractions in the sequence below.  <math>\frac{5}{7}, \dots, 1, \frac{\quad}{7}, -\frac{4}{7}</math></li> <li>Complete a sequence using a diagram e.g.</li> </ul>	<ul style="list-style-type: none"> <li>Here is the start of a sequence: 1, 2, 4 ... Katie says the next term is 7 but Dan says the next term is 8. They could both be right. Explain why.</li> <li>A sequence starts: 7, 12, 17, 22, 27. Could 724 be in the sequence? Explain how you know.</li> <li>Abdul says "My rule is <math>-50 \times 2</math> if I start at 162, I will never get a negative number even though I am subtracting." Is he correct? Explain why.</li> </ul>	<ul style="list-style-type: none"> <li>In a group of 4, each think of a digit between 1- 100 and write it on a post it note. Share them with the group. Can we create a sequence and a rule?</li> <li>Give pairs a rule e.g. <math>x3 - 1</math>. Taking turns, each child picks a number from the grid and works out the first 5 terms. If they are correct they can place a counter over that number. The first to get three in a row wins.</li> </ul>																						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="background-color: #008000;"></td><td style="width: 50px;"></td></tr> <tr><td style="background-color: #008000;"></td><td></td></tr> <tr><td style="background-color: #008000;"></td><td></td></tr> </table>								<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><td>21</td><td>69</td><td>102</td><td>13</td></tr> <tr><td>56</td><td>140</td><td>26</td><td>64</td></tr> <tr><td>40</td><td>34</td><td>29</td><td>41</td></tr> <tr><td>38</td><td>123</td><td>63</td><td>49</td></tr> </table>	21	69	102	13	56	140	26	64	40	34	29	41	38	123	63	49
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	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Fractions	Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.	<ul style="list-style-type: none"> <li>A jug contains some milk. Josh pours <math>\frac{1}{2}</math> of the milk into a glass. Josh pours <math>\frac{3}{10}</math> of the milk into another glass. What fraction of the milk is left?</li> <li>Work out: <math>5\frac{3}{7} - 2\frac{6}{5}</math></li> <li>Use diagrams to represent a calculation.</li> </ul>	<ul style="list-style-type: none"> <li>Bashir says “I do not need to do any written calculations to solve <math>\frac{4}{8} + \frac{2}{4}</math>,” Do you agree? Explain how you know.</li> <li>Emily says “When you add fractions together the answer is actually smaller because when the numerator is a bigger number the piece is actually smaller.” What mistake has Emily made? Explain your answer using a diagram.</li> <li>Rajesh doesn’t understand why the denominator doesn’t change when adding fractions but the numerator does. Can you explain why?</li> </ul>	<ul style="list-style-type: none"> <li>If the answer to a word problem involving subtracting fractions with different denominators is <math>\frac{14}{32}</math>, what could the question be?</li> <li>Katie subtracted <math>\frac{3}{5}</math> away from a fraction and her answer was <math>\frac{8}{45}</math>. What was the original question?</li> <li>Think of 3 questions for adding fractions with different denominators where the answer is <math>\frac{15}{17}</math>. Could you do it? Why? Why not?</li> </ul>

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Fractions	<p>Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math>]</p>	<ul style="list-style-type: none"> <li>Work out <math>\frac{1}{8} \times \frac{1}{5}</math></li> <li>Use diagrams to represent multiplying fractions.</li> </ul> <p><math>\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}</math></p>  <ul style="list-style-type: none"> <li>What is 1 ninth multiplied by 1 seventh?</li> </ul>	<ul style="list-style-type: none"> <li>Ginny is multiplying the following sum: <math>\frac{1}{5} \times \frac{1}{6}</math>. The answer she gets is <math>\frac{2}{30}</math>. Explain what she has done.</li> <li>Megan sees that when she multiplies 2 fractions together she ends up with a smaller fraction. She thinks she will eventually have a decimal fraction. Do you agree? Explain your answer.</li> <li>Draw a diagram to represent the calculation below. Explain what you have drawn and why. <math>\frac{1}{6} \times \frac{1}{8}</math></li> </ul>	<ul style="list-style-type: none"> <li>Hanna has half a pizza. She cuts it into 4 slices. What fraction of the original pizza is each slice?</li> <li>The shaded square in the grid below is the answer to a multiplying fractions question. If that is the answer, what is the question?</li> </ul>  <ul style="list-style-type: none"> <li>If <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math> is</li> </ul> <p><math>\frac{2}{8} \times \frac{2}{4} = \frac{2}{16}</math>?</p> <p>Explain your answer.</p>

	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"> <li>Work out <math>\frac{4}{7} \div 5</math></li> <li>Solve one seventh divided by six.</li> <li>Alfie has <math>\frac{4}{6}</math> of a pizza left. He shares it between 4 people. How much do they each get?</li> </ul>	<ul style="list-style-type: none"> <li>Roman says "When dividing fractions by a whole number, I just ignore the numerator." Do you agree? Explain why.</li> <li>Betty says "When you divide a fraction by a whole number the answer is bigger than the original fraction." Is she correct? Convince me!</li> <li>Solve the following calculations:               <math display="block">\frac{1}{3} \div 2 = \text{--}</math> <math display="block">\frac{1}{4} \div 2 = \text{--}</math> <math display="block">\frac{1}{5} \div 2 = \text{--}</math> <math display="block">\frac{1}{6} \div 2 = \text{--}</math>               What do you notice? Explain why the pattern has formed.             </li> </ul>	<ul style="list-style-type: none"> <li>Look at the calculation below. Work out the missing parts.               <math display="block">\text{--} \div \text{--} = \frac{4}{36}</math>               How many different ways can you find?             </li> <li>Becky's mum ordered a pizza for her and her friends. By the time they arrived home there was only <math>\frac{7}{12}</math> of it left. When she shared it among her friends they each got <math>\frac{7}{72}</math>. How many friends did Becky have with her?</li> <li>Think of 3 questions for dividing fractions by a whole number where the answer is <math>\frac{1}{20}</math>. Could you do it? Why? Why not?</li> </ul>

	National Curriculum Statement	All students								
		Fluency	Reasoning	Problem Solving						
Fractions	Associate a fraction with division and calculate decimal fraction equivalents [ for example, 0.375] for a simple fraction [for example $\frac{3}{8}$ ]	<ul style="list-style-type: none"> <li>Complete the table.                             <table border="1" style="margin: 10px 0;"> <tr> <td style="text-align: center;">1/8</td> <td style="text-align: center;">2/8</td> <td style="width: 40px;"></td> </tr> <tr> <td style="text-align: center;">0.125</td> <td></td> <td style="text-align: center;">0.375</td> </tr> </table> </li> <li>Charlie divided 1 pizza into 5 pieces. If he ate 2 pieces, what decimal fraction of the pizza did he eat?</li> <li>Use a 1 place value counter. I want to divide this into 2? How can I do it? Exchange your 1 for ten tenths, now I can divide ten tenths into 2 which equals 0.5. So therefore 1 divided by 2 is 0.5 which is why <math>\frac{1}{2} = 0.5</math>.                             <div style="text-align: right; margin-top: 10px;">  </div> <p>Can you divide 1 by 4? What equivalence between fractions and decimal fractions does this show?</p> </li> </ul>	1/8	2/8		0.125		0.375	<ul style="list-style-type: none"> <li>Harry says <math>\frac{1}{2}</math> is equivalent to 1.2. Is he correct? Explain your answer.</li> <li><b>True or False</b> 0.3 is bigger than <math>\frac{1}{4}</math>. Explain your reasoning.</li> <li>Hannah says 'If I divide 2 by 8, I get the same answer as if I divide 1 by 4' Do you agree? Explain your answer using diagrams or counters.</li> </ul>	<ul style="list-style-type: none"> <li>Write a unit fraction which has a value of less than 0.5. Can you find 20 different unit fractions?</li> <li>Curtis used <math>\frac{1}{3}</math> of a can of paint to cover 3.5 square metres of wall. How much wall will one whole can of paint cover?</li> <li>Pete shares 6 bananas between some friends. Each friend gets 0.75 of a banana. How many friends does he share the bananas with?</li> </ul>
1/8	2/8									
0.125		0.375								

	National Curriculum Statement	All students		
		Fluency	Reasoning	Problem Solving
Fractions	Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.	<ul style="list-style-type: none"> <li>What fraction (in its simplest form) and percentage are equal to 0.65?</li> <li>Tom and Sam shared equally one third of a chocolate bar. What fraction of the chocolate bar did each child get?</li> <li>Last month Kira saved <math>\frac{3}{5}</math> of her £10 pocket money. She also saved 15% of her £20 birthday money. How much did she save altogether?</li> </ul>	<ul style="list-style-type: none"> <li>Which is the odd one out? Explain why. <math>\frac{2}{5}</math> <math>\frac{4}{10}</math> <math>\frac{3}{6}</math> <math>\frac{6}{15}</math> 0.4</li> <li>Put the following numbers into groups: <math>\frac{3}{4}</math>, <math>\frac{3}{2}</math>, 0.5, 1.25, <math>\frac{3}{8}</math>, 0.125. Explain your choices.</li> <li>Shafi says “All you do when converting percentages to decimals is put ‘0.’ in front of the number e.g. 78% is 0.78.” Do you agree? Prove it!</li> </ul>	<ul style="list-style-type: none"> <li>Three friends were competing in a race. Billy completed half of the race. Harrison completed 50% of what Billy completed and Charlotte completed 0.25 of what Billy completed. What fraction of the race did they each complete?</li> <li>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.</li> <li><b>Snap!</b> Play the game snap but with equivalent decimals, percentages and fractions.</li> </ul>