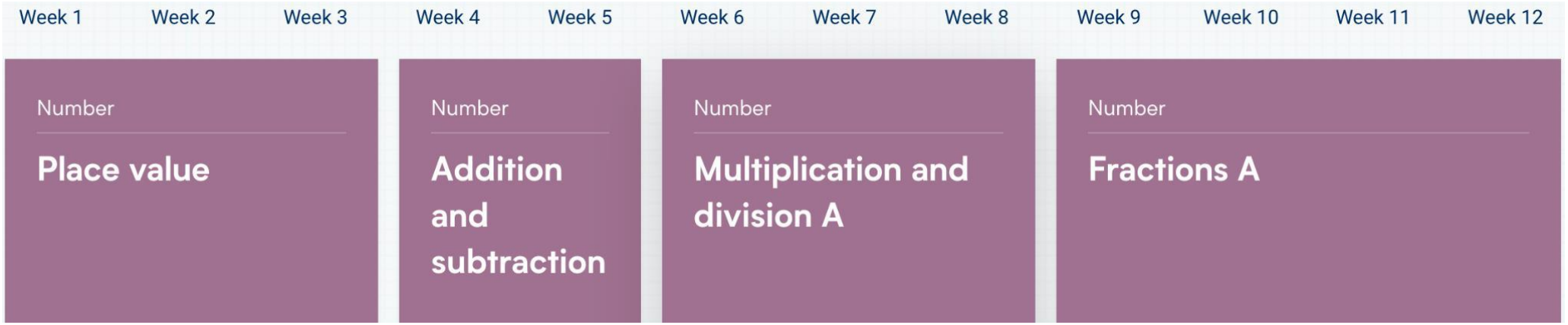
Autumn Term Overview



Notes for guidance

- Timescales may vary depending upon the emergent needs of the children/class. However, teachers are encouraged to ensure that coverage is achieved prior to commencement of Summer Term learning.
- In each sequence, time has been blocked for the completion of a baseline assessment at the beginning of each new block of learning. Teachers should use this assessment to inform planning – e.g. groups for pre-teaching, intervention and differentiation.
- Likewise, in each sequence, time has been blocked for the completion of an 'end of unit' assessment, to ensure that children are ready for progression and to plan any necessary interventions.
- Included in these medium-term-plans are references to prior learning objectives, teachers are encouraged to use these to help inform assessments, the planning for their inputs and potential interventions. Teachers may wish to make use of starters that revisit these areas of learning prior to the commencement of that block of learning (e.g. completing addition and subtraction questions related to learning from the previous year/term prior to beginning a new block of addition and subtraction) – examples are included in the 'starters' box for each unit.
- At the beginning of each block of learning, there is a table showing the progression of vocabulary in this area of Mathematics across all year groups.

Number - Place Value

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS

- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant prior learning/previous statutory objectives:

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.
- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation

- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

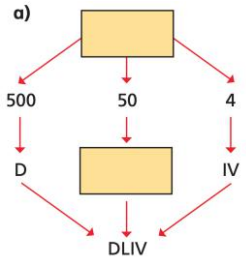
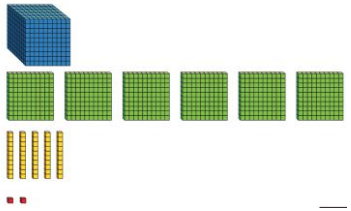
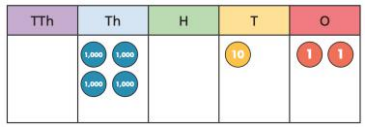
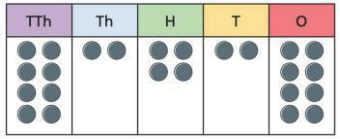
- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

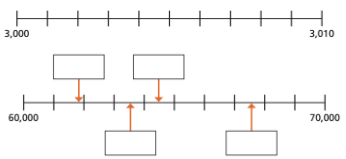
Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

- Chn may not recognise that columns to the left get progressively larger (10 times larger) and vice versa.
- Chn may struggle to interpret regular intervals on a numberline.
- Chn may look in the wrong place value column(s) when rounding – such as, believing that 1s and 10s are involved in rounding to the nearest 1000.
- Chn may struggle to use conceptual resources accurately, especially when using blank counters on a place value chart.
- Chn may not recognise that columns to the left get progressively larger (10 times larger) and vice versa.
- Chn may struggle to interpret regular intervals on a numberline.
- Chn may lack accuracy in their placement of commas.
- Chn may believe that larger numbers in lower value columns make numbers larger than numbers with larger numbers in higher value columns.
- Chn may lack consistency with use and understanding of symbols (<, > and =), despite demonstrating good understanding of key knowledge.
- Chn may not recognise that columns to the left get progressively larger (10 times larger) and vice versa.
- Chn may struggle to interpret regular intervals on a numberline.
- Chn may struggle to conceptualise values below 0.
- Chn may be confused by use of lower value symbols to right or left to signify smaller or larger values, especially when combined with other symbols to make larger numbers.

Vocabulary - Number - Number and place value						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
count	sort	count in steps	ascending	negative numbers	ten thousands	millions
subitise	represent	count in multiples	descending	roman numerals	one hundred thousands	ten millions
order/ordinal	multiples	place value	10 or 100 more	1000 more	powers of	
compare	partitioning	estimate	10 or 100 less	1000 less	integer	
forwards	ones	compare	hundreds	thousands		
backwards	tens			round		
numerals						
digit						
one more						
one less						
equal to						
more than						
less than (fewer)						

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Key Questions
Number Place Value **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To recognise and represent Roman numerals to 1,000 - To recognise and represent numbers to 1,000 - To recognise and represent numbers to 100,000 - To recognise and represent numbers to 1,000,000	- Roman numeral display (to use for date daily) - Partitioning with Roman numerals  - Dienes Blocks  - Singaporean counters  - Place value charts 	**Suggested grey tasks:**
		Key Questions: *What patterns can you see in the Roman number system? • What rules do we use when converting numbers to Roman numerals? • What letters are used in the Roman number system? What does each letter represent? • How do you know what order to write the letters when using Roman numerals? • What is the same and what is different about representing the number "five hundred and three" in the Roman number system and in our number system? What is the value of each digit in the number? • How can you represent the number in a different way? • Which digit or digits would change in value if you added a 10/100/1,000 counter? • How do you write the number in words? Counting in 1,000s, what would you say after "nine thousand"? • Counting in 10,000s, what would you say after "sixty thousand"? • How can you represent the number 65,000 using a number line? • What is the value of each digit in the number? • If 100,000 is the whole, what could the parts be?*		**Useful sentence stems:**

<table>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Number line
 
</td>
<td></td>
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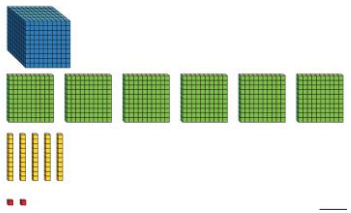
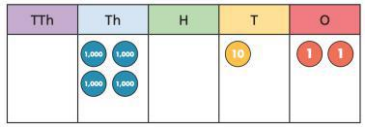
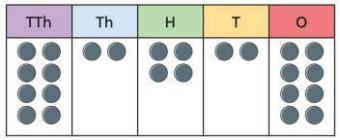
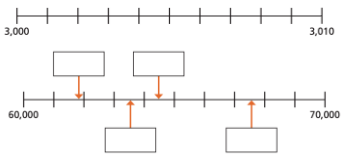
<tr>
<td rowspan="2">Number

Place Value

Week 2</td>
<td rowspan="2">5</td>
<td>Suggested sequence of learning:
- To read and write numbers to 1,000,000
- To multiply and divide by 10, 100 and 1,000
- To calculate 10/100/1,000/10,000/100,000 more or less
- To partition numbers to 1,000,000
- To represent numbers to 1,000,000 on a number line</td>
<td rowspan="2">- Dienes Blocks
 
- Singaporean counters
 

- Place value charts
 

- Number line
 
</td>
<td>Suggested grey tasks:</td>
</tr>
<tr>
<td>Key Questions:
Where do the commas go when writing one million in numerals? • How does a place value chart help you to represent large numbers? • What is the value of each digit in this number? • Are 6-digit numbers always greater in value than 5-digit numbers? • When do you use placeholders in numbers? • If one million is the whole, what could the parts be? When a number is written with commas, what do the numbers before/after each comma represent? • How can this number be represented using a part-whole model? What parts would it be sensible to use? • How do you write "1,000,000" in words? • When do you use the word "and" when reading or writing a number? How can you tell if a number is a power of 10? • Is this number a multiple of a power of 10? How can you tell? • If you move a digit one place to the left in a place value chart, how many times greater is the value of the digit? • If you move a digit two places to the left in a place value chart, how many times greater is the value of the digit? • What patterns can you see in the Gattegno chart? What number is being represented? • How can place value cards be used to help partition a number? • If you have 10 hundreds/thousands/ten-thousands, what can these be exchanged for? • How does knowing that 9 + 5 = 14 help you to work out 9 tens + 5 tens? What about 9 thousands + 5 thousands? • How else can you say/write "14 tens" or "14 thousands"?</td>
<td>Useful sentence stems:</td>
</tr>
</table>

Number Place Value **Week 3**	5	**Suggested sequence of learning:** - To compare and order numbers to 100,000 - To compare and order numbers to 1,000,000 - To round to the nearest 10, 100 or 1,000 - To round within 100,000 - To round within 1,000,000 - End of Unit Assessment		**Suggested grey tasks:**
		Key Questions: *What are the values at the start and the end of the number line? • How many large intervals are there in the whole number line? What is each large interval worth? • How many small intervals are there between each of the large intervals on the number line? What is each small interval worth? • What is the midpoint between and ?* *Which digit in each number has the greatest value? What are the values of these digits? • When comparing two numbers with the same number of digits, if their first digits are equal in value, what do you look at next? • What is the difference between ascending and descending order? • What is different about comparing numbers with the same number of digits and comparing numbers with different numbers of digits?* *Which digit in each number has the greatest value? What are the values of these digits? • When comparing two numbers with the same number of digits, if their first digits are equal in value, what do you look at next? • What is the difference between ascending and descending order? • What is different about comparing numbers with the same number of digits and comparing numbers with different numbers of digits?* *Which multiples of 10/100/1,000 does the number lie between? • Which multiple on the number line is the number closer to? • What is the number rounded to the nearest 10/100/1,000? • Which place value column should you look at to round the number to the nearest 10/100/1,000? • What happens when a number is exactly halfway between two numbers on a number line?* *Which multiples of 10,000 does the number lie between? • Which division on the number line is the number closer to? • What is the number rounded to the nearest 10,000? • Which place value column should you look at to round the number to the nearest 10/100/1,000/10,000? • What happens if a number lies exactly halfway between two multiples of 10,000?*		**Useful sentence stems:**

Number - Addition and Subtraction

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant prior learning/previous statutory objectives:

- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

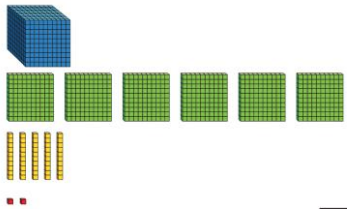
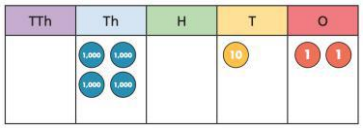
Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

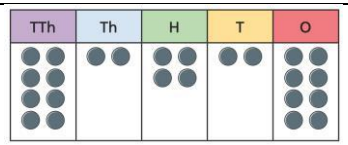
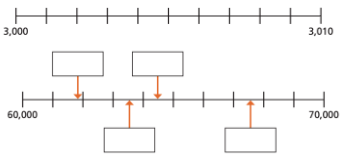
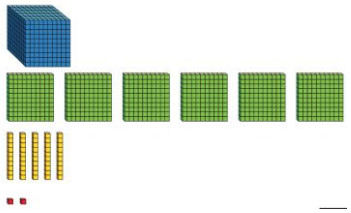
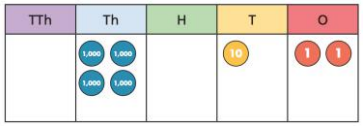
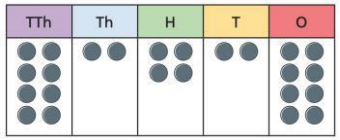
Potential misconceptions:

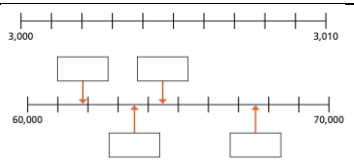
- Children need to be fluent in their knowledge of number bonds to support the mental strategies.
- Children may opt to use a formal method even when this is time-consuming and/or inappropriate.
- Children may not line up the numbers in the columns correctly.
- Children may write the exchanged digits in the wrong column(s).
- Children who are not secure in their number bonds may make numerical errors within columns.
- Children may always subtract the smaller digit from the larger digit instead of making an exchange when needed.
- The need for repeated exchanges may cause difficulty.
- When using the column method, children may arrange the numbers incorrectly.

Vocabulary - Addition and subtraction						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
add	addition/add	sum	column addition	4-digit number		
plus	subtraction	3-digit number	column subtraction	operations		
altogether	difference	commutative	exchange	methods		

total	equals		estimate			
take away /minus	facts					
number bonds	problems					
part	missing number problems					
whole	2-digit number					
digit	inverse					

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Key Questions
Number Addition and Subtraction **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To use mental strategies for addition and subtraction - To add whole number with more than four digits - To subtract whole numbers with more than four digits - To round to check answers **Key Questions:** *How does knowing that 2 + 5 = 7 help you to work out 20,000 + 50,000? • How can the numbers be partitioned to help add/subtract them? • Are any of the numbers multiples of powers of 10? How does this help you to add/subtract them? • What number is 999 close to? How does that help you to add/subtract 999 from another number? Does it matter which number goes at the top when using the column method? • Will you need to make an exchange? Which columns will be affected if you do? How do you know? • Does it matter if the numbers have different numbers of digits? • How do you know which digits to "line up" in the calculation? • How do you know if the calculation is an addition? Which number goes at the top when using the*	- Dienes Blocks  - Singaporean counters  - Place value charts	**Suggested grey tasks:** **Useful sentence stems:**

		column method? Does this affect the final answer? • Will you need to make an exchange? Which columns will be affected if you do? How do you know? • Does it matter if the numbers have different numbers of digits? • How do you know which digits to "line up" in the calculation? • How do you know if the calculation is a subtraction?	 - Number line 	
Number Addition and Subtraction **Week 2**	5	**Suggested sequence of learning:** - To use inverse operations (addition and subtraction) - To solve multi-step addition and subtraction problems - To compare calculations - To find missing numbers - End of Unit Assessment	- Dienes Blocks  - Singaporean counters  - Place value charts  - Number line	**Suggested grey tasks:**
		Key Questions: *Which multiples of does the number lie between? • Which division on the number line is the number closer to? • What is the number rounded to the nearest ? • What place value column should we look at to round the number to the nearest 10/100/1,000/10,000/100,000? • How could you use your estimates to check your answers? • Is the actual answer going to be greater or less than your estimate? Why? If I add a number to another to get a total, what do you need to do to the total to find my original number? • If I subtract a number from another to find the difference, what do you need to do to the difference to find my original number? • What does an inverse operation do? • What operation is the inverse of addition? • What operation is the inverse of subtraction? What is the key information in the question? • What can you work out straight away? How does this help you to answer the question? • How can you represent this problem using a bar model? Which bar will be longer? Why? • Do you need to add or subtract the numbers at this stage? How do you know? • How can you check your answer?*		**Useful sentence stems:**

Number - Multiplication and Division

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers – see Google Sheet - WHOLE CLASS
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- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant prior learning/previous statutory objectives:

Year Four

- *recall multiplication and division facts for multiplication tables up to 12 × 12*
- *use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers*
- *recognise and use factor pairs and commutativity in mental calculations*
- *multiply two-digit and three-digit numbers by a one-digit number using formal written layout*
- *solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects*

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Current statutory objectives:

- *identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers*
- *know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers*
- *establish whether a number up to 100 is prime and recall prime numbers up to 19*
- *multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000*

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

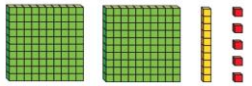
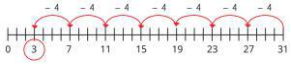
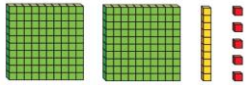
Potential misconceptions:

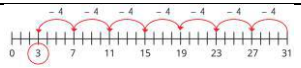
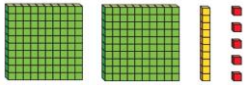
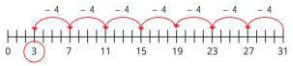
- • *Children may confuse factors and multiples.*
- *Errors may be made with times-tables facts.*
- *Children may omit the number itself when listing multiples.*
- *Children may find it more difficult to identify and find multiples that go beyond the facts in the 12 times-table.*
- *Children may confuse factors and multiples.*
- *Children may not be familiar with the use of the word "common" in this context.*
- *Children often think that the first common multiple of a pair of numbers is the product of the numbers.*
- *Children may confuse factors and multiples.*
- *Errors may be made with times-tables facts.*
- *Children may omit 1, the number itself or both when listing the factors of a number.*

- Children may confuse factors and multiples.
- Children may not be familiar with the use of the word "common" in this context.
- Children may over-generalise the idea of pairs and think that a set of numbers can only have two common factors.
- It is common to omit 1 when listing factors, leading to an incorrect conclusion that a pair of numbers does not have a common factor.

Vocabulary - Multiplication and division						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
double	multiplication	multiplication tables	exchange	factor pairs	multiples	multi-digit numbers
half	division	commutative	mathematical statements	formal written layout	factors	long division
twice as many	arrays	repeated addition	missing number problems	distributive law	prime numbers	
equal			integer scaling problems	remainders	square numbers	
unequal			correspondence problems		cube numbers	
share			derived facts		short division	
group					product	
odd					dividend	
even					divisor	
					quotient	

					operations	

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Key Questions
Number Multiplication and Division **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To find and recognise sets of multiples of given numbers - To find common multiples of given numbers - To find factors of a given number - To find common factors of given numbers **Key Questions:** *How do you find the multiples of a number? • What multiples do _ and _ have in common? • What is the first multiple that _ and _ have in common? • How can you tell if a number is a multiple of ? • Given any two numbers, can you always find a common multiple? How?*	- Arrays  - Deines Blocks  - Singaporean counters  - Number line  - Place value charts/Arrays  	**Suggested grey tasks:** **Useful sentence stems:**
Number Multiplication and Division **Week 2**	5	**Suggested sequence of learning:** - To find and recognise prime numbers - To find and represent square numbers - To find and represent cube numbers **Key Questions:** *Why are square numbers called "square" numbers? • How do you work out squared? • How do you write squared? • Is 1 a square number? Why or why not? • Are the squares of odd numbers even or odd? • Are the squares of even numbers even or odd? Why are cube numbers called "cube" numbers? • How do you work out cubed? • How do you write cubed? • Is 1 a cube*	- Arrays  - Deines Blocks  - Singaporean counters  - Number line	**Suggested grey tasks:** **Useful sentence stems:**

		number? Explain your answer. • Are the cubes of odd numbers even or odd? • Are the cubes of even numbers even or odd?	 - Place value charts/Arrays 	
Number Multiplication and Division **Week 3**	5	**Suggested sequence of learning:** - To multiply by 10, 100 and 1,000 - To divine by 10, 100 and 1,000 - To recognise and represent multiples of 10, 100 and 1,000 - End of Unit Assessment **Key Questions:** *In what direction do the digits move when you multiply by 10/100/1,000? • How many places to the left do the digits move when you multiply by 10/100/1,000? • When you have an empty place value column, what digit do you use as a placeholder? • How can you use the result of multiplying by 100 to help you multiply a number by 1,000?*	- Arrays  - Deines Blocks  - Singaporean counters  - Number line  - Place value charts/Arrays 	**Suggested grey tasks:** **Useful sentence stems:**

Number - Fractions

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS

- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant prior learning/previous statutory objectives:

Year Four

- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- add and subtract fractions with the same denominator
- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to ¼, ½, ¾
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

ST JOHN THE DIVINE PRIMARY SCHOOL

Medium Term Plans for Mathematics (revised 2022) - Year Five

Current statutory objectives:

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually,including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number[for example,2/5+4/5=6/5= 1 1/5]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, 0.71 =71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4,1/5, 2/5 and those fractions with a denominator of a multiple of 10 or 25.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

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Vocabulary - Fractions/Decimals/Percentages						
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	whole	three quarters	tenths	decimal equivalence	fifth	
	half	third		hundredths	thousandths	
	quarter	equivalent fractions		convert	mixed numbers	

	equal parts	unit fractions		proper fractions	per cent %	
		non unit fractions		improper fractions	factors	
		numerator		decimal point	integer	
		denominator			complements	
		one whole				

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Key Questions
Number Fractions **Week 1**	5	***Suggested sequence of learning:*** - *Baseline Assessment* - *To find fractions equivalent to a unit fraction* - *To find fractions equivalent to a non-unit fraction* - *To recognise equivalent fractions* - *To convert improper fractions to mixed numbers*		***Suggested grey tasks:***
		Key Questions:		***Useful sentence stems:***
Number Fractions	5	***Suggested sequence of learning:*** - *To convert mixed numbers to improper factions* - *To compare fractions less than 1* - *To order fractions less than 1* - *To compare and order fractions greater than 1* - *To add and subtract fractions with the same denominator*		***Suggested grey tasks:***

Week 2		Key Questions:		Useful sentence stems:
Number Fractions Week 3	5	Suggested sequence of learning: - To add fractions within 1 - To add fractions within 1 - To add fractions with a total greater than 1 - To add to a mixed number - To subtract fractions		Suggested grey tasks:
		Key Questions:		Useful sentence stems:
Number Fractions Week 4	5	Suggested sequence of learning: - To subtract from a mixed number - To subtract from a mixed number – breaking the whole - To subtract two mixed numbers - End of Unit Assessment		Suggested grey tasks:
		Key Questions:		Useful sentence stems:

Spring Term 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
Number Multiplication and division B VIEW			Number Fractions B VIEW		Number Decimals and percentages VIEW			Measurement Perimeter and area VIEW		Statistics VIEW	

Notes for guidance

- Timescales may vary depending upon the emergent needs of the children/class. However, teachers are encouraged to ensure that coverage is achieved prior to commencement of Summer Term learning.
- In each sequence, time has been blocked for the completion of a baseline assessment at the beginning of each new block of learning. Teachers should use this assessment to inform planning – e.g. groups for pre-teaching, intervention and differentiation.
- Likewise, in each sequence, time has been blocked for the completion of an 'end of unit' assessment, to ensure that children are ready for progression and to plan any necessary interventions.
- Included in these medium-term-plans are references to prior learning objectives, teachers are encouraged to use these to help inform assessments, the planning for their inputs and potential interventions. Teachers may wish to make use of starters that revisit these areas of learning prior to the commencement of that block of learning (e.g. completing addition and subtraction questions related to learning from the previous year/term prior to beginning a new block of addition and subtraction) – examples are included in the 'starters' box for each unit.
- At the beginning of each block of learning, there is a table showing the progression of vocabulary in this area of Mathematics across all year groups.

Number - Multiplication and Division

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS

- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant prior learning/previous statutory objectives:

Year Five (Autumn Term)

- identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers

- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000
- recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)
- solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes

Year Four

- recall multiplication and division facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally, drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

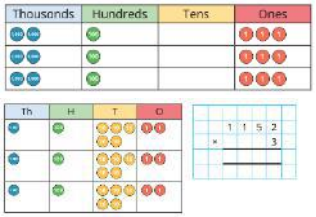
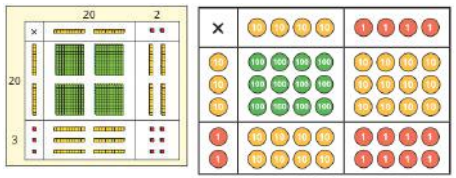
- Children may omit the exchange or include the exchange in an incorrect column in the formal written method.
- Children may write more than one digit in a single column rather than make an exchange.
- Children may complete the area model and then forget to add together the parts.
- When moving away from using concrete resources, children may make errors when multiplying by powers of 10, for example thinking that 30 × 40 = 120 instead of 1,200
- Children may omit the zero as a placeholder when multiplying by the tens digit.
- When an exchange is needed in the multiplication steps, children may accidently also add the exchanged number in the final addition. Crossing out the exchange once it has been used may help to prevent this.

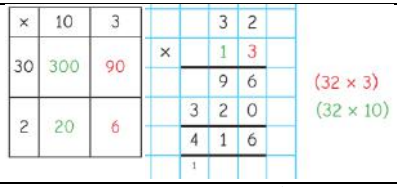
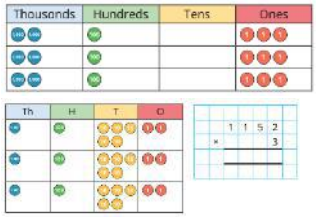
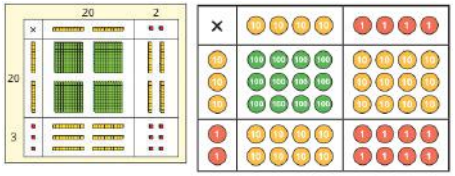
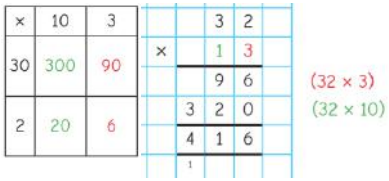
- *Children may omit the zero as a placeholder when multiplying by the tens digit.*
- *Children may forget to include exchanges in their calculations.*
- *If children write the 3-digit number below the 2-digit number in the formal method, they may struggle to work out the answer.*
- *Children may omit the zero as a placeholder when multiplying by the tens digit.*
- *Children may forget to include exchanges in their calculations.*
- *If children write the 2-digit number on top when setting up their formal method, they may struggle to complete the calculation.*
- *Children may not identify the correct order in which to complete the different calculations.*
- *Children may become over-reliant on the formal multiplication method even when there is a more efficient mental strategy.*
- *If children are not confident with their times-tables, they may find it harder to derive unknown facts.*
- *Children may need support to understand the process of exchanging in this new format.*
- *Children may work from right to left, as with addition, subtraction and multiplication.*
- *When dividing numbers that include zeros as placeholders, children may make errors with place value.*
- *Children may need support to understand the process of exchanging in divisions.*
- *Children may work from right to left, as with addition, subtraction and multiplication.*
- *When dividing numbers that include zeros as placeholders, children may make errors with place value.*
- *Children may make the incorrect generalisation that the remainder is always 1*
- *Errors in calculation may lead to children writing remainders that are greater than the number being divided by.*
- *Children may become over-reliant on the formal written method instead of considering alternative approaches that may be more efficient.*
- *Children may partition the number being divided by, rather than using factors to break up the calculation, for example 12 ÷ 6 = 12 ÷ 4 ÷ 2 rather than 12 ÷ 6 = 12 ÷ 2 ÷ 3*
- *Children may be unsure which operation is needed to solve a problem.*
- *Children may be able to divide using a procedure, but lack understanding of the remainder in a particular context.*

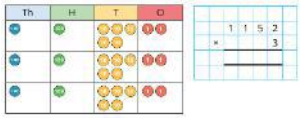
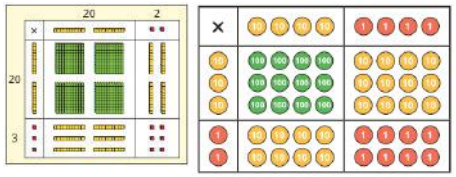
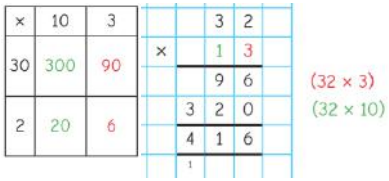
Vocabulary - Multiplication and division

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
double	multiplication	multiplication tables	exchange	factor pairs	multiples	multi-digit numbers
half	division	commutative	mathematical statements	formal written layout	factors	long division
twice as many	arrays	repeated addition	missing number problems	distributive law	prime numbers	
equal			integer scaling problems	remainders	square numbers	
unequal			correspondence problems		cube numbers	

share			derived facts		short division	
group					product	
odd					dividend	
even					divisor	
					quotient	
					operations	

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Key Questions
Number Multiplication and Division **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To multiply up to a 4-digit number by a 1-digit number - To multiply a 2-digit number by a 2-digit number (area model) - To multiply a 2-digit number by a 2-digit number - To multiply a 3-digit number by a 2-digit number	- Place value charts/Arrays  - Area Model  - Written methods	**Suggested grey tasks:** https://nrich.maths.org/7405 What Numbers Can We Make? https://nrich.maths.org/5714 Shape Times Shape https://nrich.maths.org/13261 Dicey Operations (see GS slides) (Game)
		Key Questions: *How does multiplication link to addition? How could you represent the multiplication using counters? Which column do you start with? Do you need to make an exchange? How could you estimate the answer to check your calculation? How can you partition the numbers? What is the same and what is different about 2 × 3 and 20 × 30? Does it matter what order*		**Useful sentence stems:** • ones × = ones + tens • tens × = tens + hundreds • hundreds × = hundreds + thousands • thousands × = thousands + ten-thousands ones × = ones, so tens × = tens • The products in my area model are , , and , so the total product is + + + =

		you complete the area model in? Why is there a zero in the ones column when multiplying by ____? (for example, when multiplying 14 by 30) How can you use rounding to find an estimate for the answer to the calculation?		*First, I multiply by ones. Then I multiply by tens. Finally, I add together and* *First, I multiply by ones. Then I multiply by tens. Finally, I add together and*
Number *Multiplication and Division* **Week 2**	5	**Suggested sequence of learning:** - *To multiply a 4-digit number by a 2-digit number* - *To solve problems with multiplication* - *To use short division* - *To divide a 4-digit number by a 1-digit number* **Key Questions:** *What operation do you need to do? How do you know? Why can you multiply the numbers in any order? What strategy can you use to solve this problem? How do the words in the problem tell you what to do? Is there a more efficient method? Could you have worked it out a different way? Which digit do you divide first? How many groups of hundreds/tens/ones are there? When using short division, do you start from the left or the right? When do you need to make an exchange?*	- *Place value charts/Arrays*  - *Area Model*  - *Written methods* 	**Suggested grey tasks:** https://nrich.maths.org/7218 (Curious Number) https://nrich.maths.org/5633 Four Go (game) https://nrich.maths.org/13261 Dicey Operations (see GS slides) (Game) **Useful sentence stems:** *First, I multiply by ones. Then I multiply by tens. Finally, I add together and* *To calculate × 24, I can do × × • To calculate 9,999 × , I can do 10,000 × – • The most efficient strategy to calculate × is …* *hundreds divided by is equal to hundreds with a remainder of • Exchange the remainder, then tens divided by is equal to tens with a remainder of • Exchange the remainder, then ones divided by is equal to ones.* *To use the formal method of division, I start with the digit on the and work from to • There are groups of thousands/hundreds/tens/ ones in thousands/hundreds/tens/ones.*
Number *Multiplication and Division*	5	**Suggested sequence of learning:** - *To divide with remainders* - *To use efficient division* - *To solve problems with multiplication and division* - *End of Unit Assessment*	- *Place value charts/Arrays*	**Suggested grey tasks:** https://nrich.maths.org/1070 Mystery Matrix https://nrich.maths.org/1783 Remainders https://nrich.maths.org/6402 Remainders Game

Week 3			  - Area Model  - Written methods 	(interactive)https://nrich.maths.org/13261 Dicey Operations (see GS slides) (Game)
		Key Questions: *What does "remainder" mean? • How can you use your times-tables to know if a division by 2/5 will have a remainder? What other divisibility rules do you know? What is the greatest possible remainder you can get when dividing by ____? What happens if you double one factor and halve the other?*		**Useful sentence stems:** *ones divided by = ones remainder • When dividing by , the greatest possible remainder Things to look out for is • To divide by 4, I can divide by and then divide the result by • To divide by 8, I can divide by 2 times. • To divide by 6, I can divide by and then divide the result by ÷ = remainder • There are left over, so are needed altogether.*

Fractions

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS

- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Five – Autumn Term

See current statutory outcomes.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually,including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number[for example,2/5+4/5=6/5= 1 1/5]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, 0.71 =71⁄100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1⁄2, 1⁄4,1⁄5, 2⁄5 and those fractions with a denominator of a multiple of 10 or 25.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

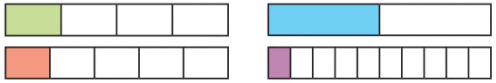
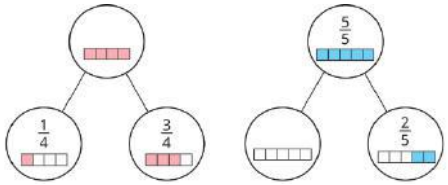
- Children may think that when multiplying, the answer is always greater than both of the numbers. For example, they may think the result of 3 × 1 10 must be greater than 3
- Children may multiply both the numerator and the denominator by the integer, and not recognise that this is the process for finding equivalent fractions, not for multiplying fractions by integers.
- Children may think that when multiplying, the answer is always greater than both of the numbers. For example, they may think the result of 3 × 3 10 must be greater than 3
- Children need to be confident in converting between improper fractions and mixed numbers.
- Children may write their answer as a whole number and an improper fraction rather than a mixed number.
- Children may use an inefficient method to solve a calculation, for example using improper fractions to work out 4 × 8 3 15
- Children may make errors converting between improper fractions and mixed numbers.
- Children may divide by the numerator rather than by the denominator.
- Children may find it more difficult to find non-unit fractions of amounts, as it involves more than one step and requires more cognitive load.
- If using place value counters, children may not exchange and may believe they cannot find, for example, 1 4 of 52
- Children may divide by the numerator and not by the denominator.
- Children may find it more difficult to find non-unit fractions of amounts, as this involves more than one step and greater cognitive load.
- Children may need support to find fractions of amounts that go beyond known times-table facts.
- Children may misinterpret the question by trying to find the fraction of the number given, instead of using the number to find the whole.
- Children may mix up finding one part with finding the whole.
- When dealing with a non-unit fraction, children may divide by the denominator to find one part, rather than dividing by the numerator.
- Children may need support to recognise the link between "of" and ×.
- Children may make errors if their times-tables knowledge is insecure.
- Children may choose the less appropriate method and face difficult calculations as a result.

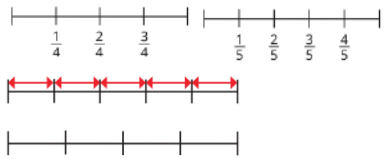
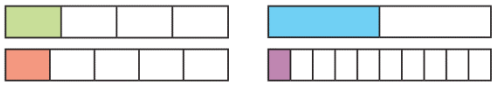
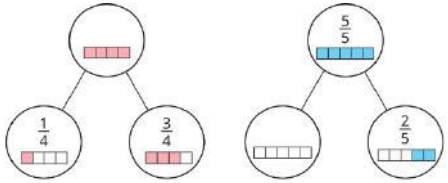
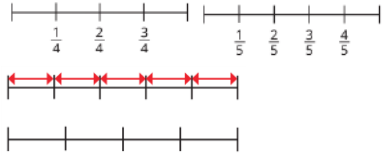
Vocabulary - Fractions/Decimals/Percentages

ST JOHN THE DIVINE PRIMARY SCHOOL

Medium Term Plans for Mathematics (revised 2022) - Year Five

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	whole	three quarters	tenths	decimal equivalence	fifth	
	half	third		hundredths	thousandths	
	quarter	equivalent fractions		convert	mixed numbers	
	equal parts	unit fractions		proper fractions	per cent %	
		non unit fractions		improper fractions	factors	
		numerator		decimal point	integer	
		denominator			complements	
		one whole				

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension tasks
Number Fractions **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - Multiply a unit fraction by an integer - Multiply a non-unit fraction by an integer - Multiply a mixed number by an integer - Calculate a fraction of a quantity	- Bar Models  - Part whole models 	**Suggested grey tasks:** Tarsia Puzzle Fraction – Link to Puzzles Fractions Jigaw – https://nrich.maths.org/5467 https://nrich.maths.org/6937 Number Match (challenging rules) (group of 4) https://nrich.maths.org/6938 Fraction Match (as above)

		Key Questions: *How can you write this multiplication as a repeated addition? How can you represent this question as a bar model? When you multiply a fraction by an integer, what happens to the numerator? What happens to the denominator? What is your answer as a mixed number? What is it as an improper fraction? How could you partition this mixed number? What do you need to do if you have an improper fraction in your answer? Could you work it out another way? Which way is most efficient? Have you written your answer in its simplest form?*	- Number lines 	**Useful sentence stems:** • *1 × = 1 + … + 1* • *To multiply a fraction by an integer, I multiply the by the integer and the remains the same.* • *× = + … +* • *To multiply a fraction by an integer, I multiply the by the integer and the remains the same.* • *I can partition into and* • *When I multiply a fraction by an integer, I multiply the by the integer and the remains the same.* • *To multiply a mixed number by an integer, I multiply the by the integer and the by the integer* • *If I know 1 of a quantity, then to find I need to multiply by* • *To find 3 4 of , I need to divide by and multiply by* • *I need to divide by the and multiply by the*
Number *Fractions* **Week 2**	5	**Suggested sequence of learning:** - *Fraction of an amount* - *Find the whole* - *Use fractions as operators* - *End of Unit Assessment*	- Bar Models  - Part whole models  - Number lines 	**Suggested grey tasks:** *Tarsia Puzzle Fraction – Link to Puzzles* *Fractions Jigaw – https://nrich.maths.org/5467* *https://nrich.maths.org/6937 Number Match (challenging rules) (group of 4)* *https://nrich.maths.org/6938 Fraction Match (as above)*
		Key Questions: *How do you find a fraction of an amount? How can you find a fraction of a 3-digit number? If you know one equal part, how can you work out the whole? Is your answer going to be greater or less than _____? How do you know? Is the denominator of the fraction a factor of the number you are multiplying by? Why is this important?*		**Useful sentence stems:** • *To find of , I need to divide by and multiply by* • *To find a fraction of an amount, I need to divide by the and multiply the result by the* • *If is one equal part, all the parts must be* • *If 1 is , then the whole is × =* • *If is parts, then one part is* • *× is the same as of* • *is a factor of , so I can divide by*

Decimals and Percentages

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Four

- recognise and show, using diagrams, families of common equivalent fractions

- count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- add and subtract fractions with the same denominator
- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to ¼, ½, ¾
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually,including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number[for example,2/5+4/5=6/5= 1 1/5]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, 0.71 =71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4,1/5, 2/5 and those fractions with a denominator of a multiple of 10 or 25.

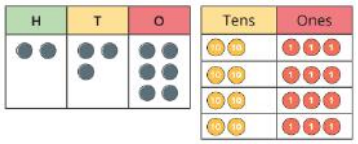
Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

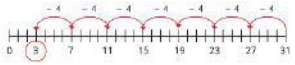
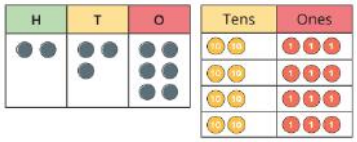
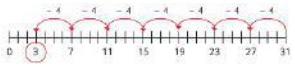
Potential misconceptions:

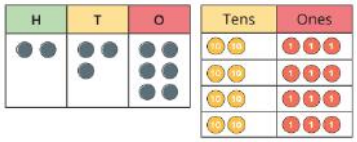
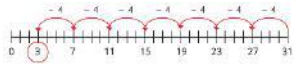
- When reading or writing a number, children may say "one point thirty-five" instead of "one point three five".
- When there are hundredths but no tenths in a number, children may forget to include the zero placeholder in the tenths column.
- Children may count up in 0.1s to 0.10 ("zero point ten").
- Children may confuse the words "tens" and "tenths".
- With numbers greater than 1, children may find mixed numbers easier than improper fractions, or vice versa.
- Children may confuse the words "hundreds" and "hundredths".
- When converting a decimal into tenths and hundredths, children may confuse the two, for example 0.23 = 2 100 + 3 10
- When counting up in 0.01s or 1 100 s, at 1 whole, children may incorrectly say, for example, 0.23 as "zero point twenty-three".
- Children may not count the intervals on a number line correctly and confuse the number of divisions with the number of intervals.
- Children may misinterpret numerators and denominators, for example writing 1 5 as 1.5 or 3 4 as 3.4
- Children may confuse the words "thousand" and "thousandth".
- As 1,000 is greater than 100, children may think that 1 1000 is greater than 1 100
- Children may confuse the words "thousand" and "thousandth".
- Children may use the incorrect number of placeholders, leading to the incorrect number being written.
- Children may think that, for example, 0.01 + 0.004 = 0.0005 because they just add the non-zero digits.
- Children may be unsure how to use placeholders if there is an empty column, for example 5 tenths and 7 thousandths = 0.507
- Children may see, for example, 23 1000 and start by putting 2 in the thousandths column and then 3 in the ten-thousandths column (0.0023).
- Children may not appreciate that they must start with the column with the greatest value, leading to misconceptions such as thinking 0.299 is greater than 0.312
- Children may have forgotten the terms "ascending" and "descending".
- Children may read 1.234 as "one point two hundred and thirty-four" and therefore assume it is greater than 1.3
- When ordering decimals, children may not write all of the numbers from the question in their answer.
- Children may see 6.15 as "six point fifteen" and round to 7 because 15 is greater than 5
- Children may not think of zero as a whole number.
- The words "round down" can result in children rounding incorrectly, for example rounding 7.2 to 6 rather than 7
- Children may not think of zero as a whole number.
- Children may round to the whole number rather than 1 decimal place.
- The phrase "round down" can lead children to round too low, for example rounding 6.91 down to 6.8 rather than 6.9
- Children may think that 1% means 1 part, regardless of whether there are 100 parts in total or not.
- Children may forget to write the % symbol. • When seeing 1 part out of a whole that has been split into 10 parts, children may believe this is 1% rather than 10%.
- Children may think that the numerator of any fraction is the same as the percentage, for example 9 10 = 9%.
- Not knowing common equivalent fractions to those with a denominator of 100 will make finding those percentages hard, for example not knowing 1 4 = 25 100 will make finding 1 4 = 25% difficult.
- Children may see single-digit percentages as tenths rather than hundredths, for example 6% = 0.6
- Children may confuse percentages and decimals, for example 1 2 = 0.50%
- If children do not have a secure understanding of the concept that the whole can be made up of 100 parts, some common errors can occur, particularly when converting fractions to percentages, for example writing 1 5 as 5% or 7 10 as 7%.

Vocabulary - Fractions/Decimals/Percentages						
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

	whole	three quarters	tenths	decimal equivalence	fifth	
	half	third		hundredths	thousandths	
	quarter	equivalent fractions		convert	mixed numbers	
	equal parts	unit fractions		proper fractions	per cent %	
		non unit fractions		improper fractions	factors	
		numerator		decimal point	integer	
		denominator			complements	
		one whole				

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension tasks
Number Decimals and Percentages	5	**Suggested sequence of learning:** - Baseline Assessment - To recognise decimals up to 2 decimal places - To recognise and find equivalent fractions and decimals (tenths) - To recognise and find equivalent fractions and decimals (hundredths) - To recognise and find equivalent fractions and decimals - To recognise thousandths as fractions	- Singaporean counters  - Place value charts 	**Suggested grey tasks:** https://nrich.maths.org/6945 Doughnuts Percents https://nrich.maths.org/91 Maze 100 https://nrich.maths.org/1130 Reach 100

Week 1		**Key Questions:** *How can you represent this number using a place value chart? What is the same and what is different about a tenth and a hundredth? How many tens are there in 100? How many ones are there in 10/100? How many 0.1s are there in 1? How many 0.01s are there in 0.1/1?*	- Number line 	**Useful sentence stems:** • *tenths/hundredths are equivalent to wholes/tenths.* • *The value of the digit in the number is* • *The fraction is equivalent to the decimal* • *The decimal is equivalent to the fraction* • *There are ten in 1 whole. The fraction/decimal is equivalent to the decimal/fraction* • *There are tenths and hundredths in* • *hundredths is equivalent to tenths* • *The decimal is equivalent to the fraction* • *hundredths is equivalent to* • *If I know that is equivalent to , then I also know that is equivalent to* • *There are thousandths in* • *1000 is equivalent to 10 + 100 + 1000*
Number *Decimals and Percentages*	5	**Suggested sequence of learning:** - *To recognise thousandths as decimals* - *To represent thousandths on a place value chart* - *To order and compare decimals (same number of decimal places)* - *To order and compare any decimals with up to 3 decimal places* - *To round to the nearest whole number*	- Singaporean counters  - Place value charts  - Number line 	**Suggested grey tasks:** https://nrich.maths.org/6945 Doughnuts Percents https://nrich.maths.org/91 Maze 100 https://nrich.maths.org/1130 Reach 100
Week 2		**Key Questions:**		**Useful sentence stems:** *is greater/smaller than because …* • *The decimal has a greater value than the decimal* • *tenths/hundredths/thousandths are greater than tenths/hundredths/thousandths, so is greater than* *The whole numbers either side of are and* • *is closer to than* • *rounded to the nearest whole number is*
Number *Decimals and Percentages*	5	**Suggested sequence of learning:** - *To round to 1 decimal place* - *To understand percentages* - *To recognise and find percentages as fractions* - *To recognise and find percentages as decimals*	- Singaporean counters  - Place value charts	**Suggested grey tasks:** https://nrich.maths.org/6945 Doughnuts Percents https://nrich.maths.org/91 Maze 100

Week 3		- To recognise and find equivalent fractions, decimals and percentages - End of Unit Assessment		https://nrich.maths.org/1130 Reach 100
		Key Questions:	- Number line 	***Useful sentence stems:*** *The whole numbers either side of are and • is closer to than • rounded to the nearest whole number is • If the whole is shared into 100 equal parts, then each part represents %. • If the whole is shared into 10 equal parts, then each part represents %. • out of equal parts are shaded. The percentage shaded is %. • % is equivalent to 100 • The fraction is equivalent to %. = % • There are tenths/hundredths in 1 whole. • % is equivalent to 1 whole • The whole has been split into equal parts, so each part is worth 1 • If the whole is equal to 100%, then each part is worth %.*

Measurement - Perimeter and Area

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers – see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS

- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year 4

- Convert between different units of measure [for example, kilometre to metre; hour to minute]
- measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
- find the area of rectilinear shapes by counting squares
- estimate, compare and calculate different measures, including money in pounds and pence
- read, write and convert time between analogue and digital 12- and 24-hour clocks
- solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

- *convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)*
- *understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints*
- *measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres*
- *calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes*
- *estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]*
- *solve problems involving converting between units of time*
- *use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.*
- *use the properties of rectangles to deduce related facts and find missing lengths and angles*
- *distinguish between regular and irregular polygons based on reasoning about equal sides and angles.*

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

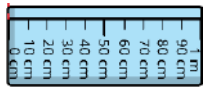
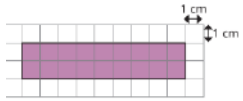
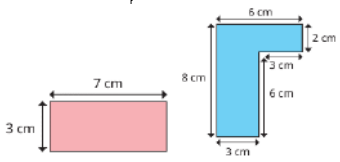
- *Children may line up the object they are measuring with the end of the ruler rather than the zero mark.*
- *When given the length and width of a rectangle, children may just add the two amounts.*
- *When measuring sides on a rectangle, children may get different dimensions for sides that should be equal.*
- *Children may miscount when adding the sides of rectilinear shapes.*
- *If children do not have a secure understanding of addition and subtraction, they may struggle when finding missing sides.*
- *Children may find it difficult to see that the two shorter sides are equal to the longer opposite side on the rectilinear shape.*
- *Children may not be able to identify the relationship between the given length, width or perimeter in the problems.*
- *Children may confuse the terms "regular" and "straight" and think that all rectangles are regular.*
- *When counting squares, children may count a square twice or miss a square out when counting.*
- *Children may rely on counting squares to find area, instead of multiplying the length by the width.*
- *Children may confuse the concepts of area and perimeter.*
- *Children may rely on counting squares to find area, instead of multiplying the length by the width for the area of each rectangle.*
- *Children need to be secure in finding missing lengths of shapes by adding or subtracting known lengths.*
- *Children need to be careful when splitting up compound shapes to make sure they know which lengths correspond to which shape.*
- *Children may struggle to identify which part-covered squares are more than half covered.*
- *Children may miscount or include the same square twice.*

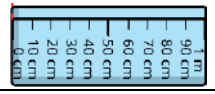
Vocabulary - Measurement (Measure and Length)

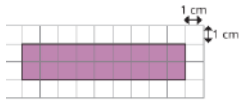
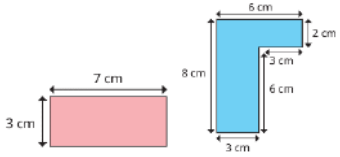
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
measure	compare	standard units	millimetre mm	kilometres km	decimal notation	conversion
wide(er)		estimate	perimeter	rectilinear figure	scaling	miles
narrow(er)		order		area	metric units	formulae
compare		record results			imperial units	parallelograms
long(er)(est)		centimetre cm			inches	triangles
short(er)(est)		metre m			compound shape	feet
length					irregular shapes	
					square centimetres	
					square metres	

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension tasks

<table>
<tr>
<td rowspan="2">Number

Week 1</td>
<td rowspan="2">5</td>
<td>Suggested sequence of learning:
- Baseline Assessment
- To measure and calculate the perimeter of rectangles
- To calculate the perimeter of rectilinear shapes
- To calculate the perimeter of polygons</td>
<td rowspan="2">- Ruler with centimetres and millimetres clearly marked
 
- Metres rulers
 
- Shapes on cm grid
 
- Shapes with dimensions
  </td>
<td>Suggested grey tasks:
https://nrich.maths.org/4963 Torn Shapes

https://nrich.maths.org/10344 Through the Window (connected with above)</td>
</tr>
<tr>
<td>Key Questions:
• What does “perimeter” mean? • If a rectangle has a perimeter of 16 cm, could its length be 10 cm? Why or why not? • Once you have measured the sides, how do you work out the perimeter? • If you know the length and width of a rectangle, do you need to measure the other two sides? • Which method do you think is more efficient?
• What does “perimeter” mean? • What are the properties of a square/rectangle? • Why is this a rectilinear shape? • How can you use the labelled sides to find the unknown side of the rectilinear shape? Do you need to add or subtract? • What strategies can you use to work out the perimeter? • How do you know that you have included all the sides? • What is the perimeter of the shape?
• What is a regular shape? • What is the difference between a square and a rectangle? • Are all rectangles regular? • How many sides does the shape have? What calculation will give you its perimeter? • Would drawing the shape help you to solve the problem? • What operation are you going to use? Why?</td>
<td>Useful sentence stems:
The length is and the width is , so the perimeter is • + + + = 2 × + 2 × • The perimieter of the rectangle is + = , so the longer side = • − = , so the other shorter side = • The perimeter of the shape is
A shape has equal sides and angles. • The regular shape has sides and each side is Therefore, the perimeter is × = • To find the perimeter of the shape, I need to... • The perimeter of the shape is</td>
</tr>
<tr>
<td>Number</td>
<td>5</td>
<td>Suggested sequence of learning:
- To calculate the area of rectangles
- To calculate the area of compound shapes
- To estimate area
- End of Unit Assessment</td>
<td rowspan="2">- Ruler with centimetres and millimetres clearly marked
 
- Metres rulers
  </td>
<td>Suggested grey tasks:
https://nrich.maths.org/10333 Dicey Perimeter/Area</td>
</tr>
<tr>
<td>Key Questions:</td>
<td>Useful sentence stems:</td>
</tr>
</table>

Week 2		• *What is area?* • *What is the difference between 1 cm and 1 cm2?* • *Which shape has the greater/greatest area? Can you tell just by looking?* • *How can you work out area in a more efficient way?* • *Will multiplying the length by the width calculate the area of any shape? Why/why not?* • *How do you work out the area of a rectangle?* • *Are there any rectangles within the shape?* • *How can you split the shape?* • *Is there more than one way to split the shape?* • *Do you get a different total area if you split the shape differently?* • *What does "approximate" mean?* • *What does "estimate" mean?* • *How many whole squares are covered?* • *How many part squares are more than half covered?* • *Are there any part-covered squares that you could combine to make a full square?* • *Does it matter if your answer is not exactly the same as a partner's? Why/why not?*	- *Shapes on cm grid*  - *Shapes with dimensions* 	*There are squares inside the shape, so the area of the shape is squares.* • *Area = × • × = , so the area of the shape is* • *To find the area of the compound shape, I need to split it into and then …* • *Area of rectangle A = Area of rectangle B = Total area = + =* *whole squares are covered.* • *squares are more than half covered.* • *Estimate of the total area = + = cm2*

Statistics

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)

- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year 4

- interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
- solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Ratio Current statutory objectives:

- solve comparison, sum and difference problems using information presented in a line graph
- complete, read and interpret information in tables, including timetables.

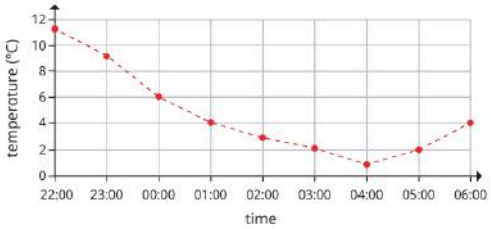
Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

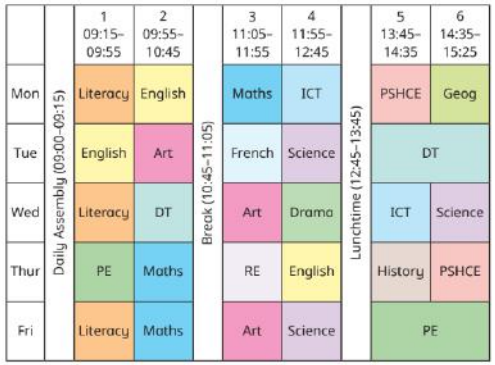
Potential misconceptions:

- *Children may need support in choosing appropriate intervals for the vertical axis.*
- *Children may begin a scale from zero even if the lowest value is considerably greater than this.*
- *Children may not estimate accurately between two given values.*
- *Children may not draw straight lines from the axis to the graph when reading off, so give inaccurate answers "by eye".*
- *Children may choose an inappropriate estimate when the point is between two intervals.*
- *Children may use the incorrect operation when answering questions about a table, especially for questions such as "How many more ... ?"*
- *Tables with more than two categories of information can be harder to interpret.*
- *When finding the overall total, children may add the totals of the columns and the rows, and so find double the answer.*
- *Children may use the incorrect operation when finding missing numbers, for example adding instead of subtracting.*
- *Children may need support to identify the correct cell in a table that has the information they need.*
- *Children may assume that blank spaces need filling in, rather than understanding that buses or trains do not stop at that stop.*
- *Difficulties with times presented in digital form may hamper children interpreting timetables.*

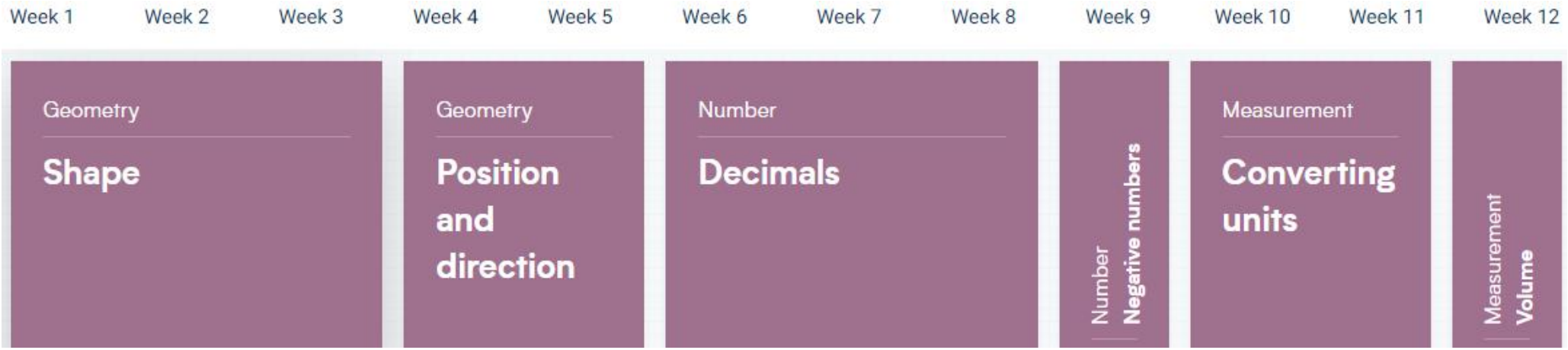
Vocabulary - Statistics						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
		pictograms	table	time graph	timetable	pie chart
		tally chart	bar chart	discrete data	two-way tables	mean
		block diagram	one-step problem	continuous data		
		category	two-step problem	line graph		
		sorting		comparison problem		
		totalling		sum problem		

		comparing		difference problem		
		horizontal		calculate		
		vertical		interpret		

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension tasks
Number Week 1	5	**Suggested sequence of learning:** - Baseline Assessment - To draw line graphs - To read and interpret line graphs - To read and interpret tables - To read and interpret two-way tables **Key Questions:** • *What information do you want to show with your line graph?* • *What does the vertical/horizontal axis on the graph represent?* • *What information will go on which axis? Why?* • *Will you join the points with a solid line or a dashed line? Why?* • *What scale would be most appropriate for the vertical axis?* • *How can you use multiples to support your choice of intervals for the vertical axis?* • *What information is being presented on the line graph?* • *What does each axis on the line graph show?* • *How can you summarise what the graph shows?* • *What lines can you draw to help read the graph?* • *Why do you think the direction of the line changes at this point in the line graph?* • *Is your answer exact or an estimate?*	- Line graphs  - Tables (inc. two way tables) |	No glasses	Glasses	Total
---	---	---	---
Constable	55	24	79
Sergeant	8	5	13
Inspector	2	4	6
Chief Inspector	1	1	2
Total	66	34	100		**Suggested grey tasks:** https://nrich.maths.org/7725 *If the World Were a Village* **Useful sentence stems:** *The horizontal axis shows The vertical axis shows • The intervals on the vertical axis go up in* *• The horizontal axis shows and the vertical axis shows • At , the graph reads At , the graph reads The difference between the two points is* *The value in is The value in is The difference between the values is • The with the most/least is* *The columns show and the rows show • Where the column meets the row, this shows • To find a missing total, I need to the numbers in a or • To find a missing value, I need to from*

		• *What information is given in this table?* • *What are the column/row headings of the table?* • *Why is it important to include the units of measure in the table?* • *What is the total of ?* • *How can you find the difference between two pieces of information given in the table?* • *How is a table similar to/different from a line graph?* • *What information is given by this table?* • *What are the column/row headings of the table?* • *How can you find the difference between two pieces of information given in the table?* • *How can you work out missing information in the table?* • *Do you need to add or subtract? How do you know?* • *What conclusions can you draw from the table?*		
Number **Week 2**	5	**Suggested sequence of learning:** - To read and interpret timetables - End of Unit Assessment **NB** – *Additional time can be used to consolidate learning from this unit or learning from across this term.* **Key Questions:** • *What information does this timetable tell you?* • *How is a timetable the same as/different from a two-way table?* • *What is the same and what is different about each row/column of the timetable?* • *What does the row/column tell you?* • *At what time does the from get to ?* • *How many are there?* • *What does a blank space in a timetable mean?*	- Timetables  	**Suggested grey tasks:** https://nrich.maths.org/7725 *If the World Were a Village* *Allow access to previous grey tasks from Aut and Spr.* **Useful sentence stems:** *The train from gets to at* • *The next available is at* • *The journey/lesson/programme starts at and ends at*

Summer Term Overview



Notes for guidance

- *Timescales may vary depending upon the emergent needs of the children/class. However, teachers are encouraged to ensure that coverage is achieved prior to commencement of Summer Term learning.*
- *In each sequence, time has been blocked for the completion of a baseline assessment at the beginning of each new block of learning. Teachers should use this assessment to inform planning – e.g. groups for pre-teaching, intervention and differentiation.*
- *Likewise, in each sequence, time has been blocked for the completion of an 'end of unit' assessment, to ensure that children are ready for progression and to plan any necessary interventions.*
- *Included in these medium-term-plans are references to prior learning objectives, teachers are encouraged to use these to help inform assessments, the planning for their inputs and potential interventions. Teachers may wish to make use of starters that revisit these areas of learning prior to the commencement of that block of learning (e.g. completing addition and subtraction questions related to learning from the previous year/term prior to beginning a new block of addition and subtraction) – examples are included in the 'starters' box for each unit.*
- *At the beginning of each block of learning, there is a table showing the progression of vocabulary in this area of Mathematics across all year groups.*

Geometry - Shape

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- *Whiterose Flashback 4 - WHOLE CLASS*
- *Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS*
- *Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS*
- *Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS*
- *Tug Harder - https://nrich.maths.org/5898 - PAIRS*

- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers – see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Four

- compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- identify acute and obtuse angles and compare and order angles up to two right angles by size
- identify lines of symmetry in 2-D shapes presented in different orientations
- complete a simple symmetric figure with respect to a specific line of symmetry

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Place Value Current statutory objectives:

- *identify 3-D shapes, including cubes and other cuboids, from 2-D representations*
- *know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles*
- *draw given angles, and measure them in degrees (°)*
- *use the properties of rectangles to deduce related facts and find missing lengths and angles*
- *distinguish between regular and irregular polygons based on reasoning about equal sides and angles.*

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

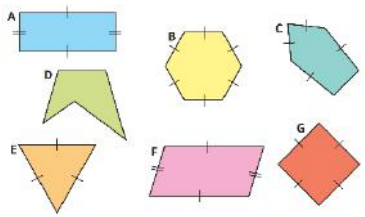
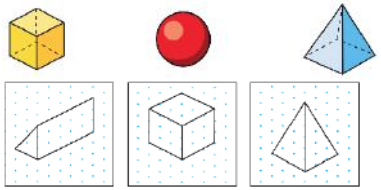
Potential misconceptions:

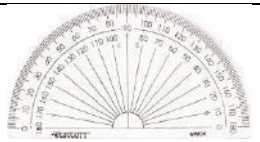
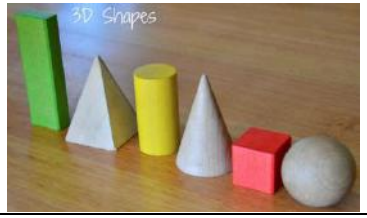
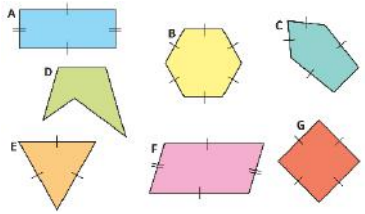
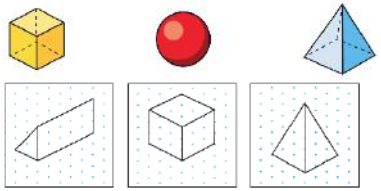
- *Children may confuse the terms clockwise and anticlockwise.*
- *Children may believe that angles can only be measured/identified in/from a standard orientation and may find it trickier to identify angles that are not shown in a standard orientation, for example a 3 4 turn from north-east to north-west. NB - Chn may need to turn the paper to help classify these angles.*
- *Children may misclassify angles that are close to 90° or 180° as right angles or straight lines.*
- *Children may misclassify right angles or straight lines as acute or obtuse angles.*
- *Children may want to find exact measurements rather than estimates, and may need support to realise that different answers are acceptable.*
- *Children may place the protractor incorrectly.*
- *Children may read the incorrect scale on the protractor or ruler.*
- *When using a ruler, children may start their line at the edge rather than at zero on the scale.*
- *Children may believe that you always have to measure angles/lengths, not realising that some can be calculated from given information.*
- *Children may not see or understand the notation for a right angle and exclude this from any calculations.*
- *Children may misapply the degrees in a full/half turn and calculate using 360° rather than 180° (or vice versa).*
- *Children may assume that angles that look similar are equal in size.*
- *Children may think that a polygon with equal angles but different length sides, or with equal length sides and different angles, is regular.*
- *Children may only count the faces, vertices and edges that they can see on the 2-D representation of a 3D shape.*
- *Children may confuse some 3-D shapes, such as triangular-based pyramids and triangular prisms.*

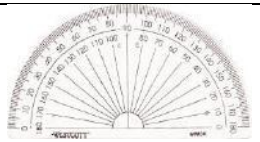
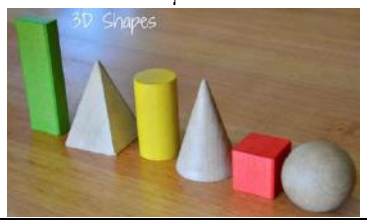
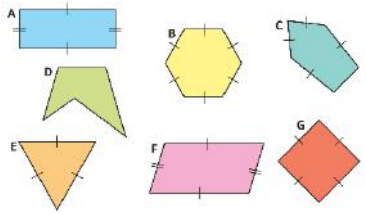
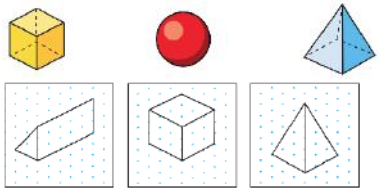
Vocabulary - Geometry – Properties of Shape						
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

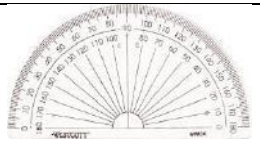
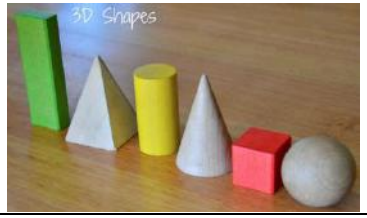
2-d shapes	sides	pentagon	right-angle triangle	isosceles	regular polygon	radius
rectangle	corners	hexagon	heptagon	equilateral	irregular polygon	diameter
square	properties	line of symmetry	octagon	scalene	**reflex angles**	circumference
circle	pyramids	properties	polygon	trapezium	**degrees**	dimensions
triangle	faces	cylinder	properties	rhombus	**one whole turn**	
characteristics		edges	prism	parallelogram	**angles on straight line**	
3-d shapes		vertices	**orientations**	kite	**angles around a point**	
cuboids		vertex	**angles**	geometric shapes	**vertically opposite**	
cubes			**acute angle**	quadrilaterals	**missing angles**	
cone			**obtuse angle**			
spheres			**turn**			
curved			**right angles**			
straight			**half turn**			
flat			**three quarters of a turn**			
			greater than right angle			

			less than right angle			
			horizontal lines			
			vertical lines			
			perpendicular lines			
			parallel lines			

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension Tasks and Sentence Stems
Number Week 1	5	**Suggested sequence of learning:** - Baseline Assessment - To understand and use degrees - To classify angles - To estimate angles	- Representations of regular and irregular polygons (**NB** – avoid representations with third dimension)  - 2D representations of 3D shapes (inc. isometric paper)  - Protractors (and angle measurers)	**Suggested grey tasks:** https://nrich.maths.org/13125 Seeing Squares (i or r) (game) https://nrich.maths.org/1140 A Puzzling Cube https://nrich.maths.org/2315 Cut Nets https://nrich.maths.org/6522 Baravelle
		Key Questions: *L1: What does a full/half/quarter/three-quarter turn look like? What does "clockwise"/"anticlockwise" mean? What is a right angle? How many right angles are there in a full turn? If there are 360° in a full turn, how many degrees are there in a right angle/quarter turn/half turn/three-quarter turn? If you are performing a full/half/quarter turn, does it matter if you turn clockwise or anticlockwise?* *L2: What does a right angle look like? What does the angle on a straight line look like? How many degrees are there in a right angle/on a straight line? Is the*		**Useful sentence stems:** *There are _° in a full turn, so there are _° in a turn.* *There are _° in a right angle.* *Turning _° is the same as turning _°* *Angles less than _° are called angles.* *Angles greater than _° but less than _° are called _ angles.* *Angles greater than _° are called _angles.*

		drawn angle less than or greater than a right angle? What does "acute"/"obtuse" mean? Can an angle be greater than 180°? What do you call an angle such as this? If an angle is _ degrees, what type of angle is it? ***L3:*** *What does a right angle/straight line look like? How many degrees are there in a right angle/on a straight line? What angle is halfway between 0° and 90°/90° and 180°? Is the angle acute, obtuse or reflex? How do you know? Is the angle closer to 0° or 90°/90° or 180°? Is the angle closer to 45° or 90°/90° or 135°?*	 - Rulers  - 3D shapes 	*The angle is a _ angle, so it must be …* *The angle is closer to _ than _, so it could be _°.*
Number **Week 2**	5	**Suggested sequence of learning:** - To measure angles up to 180° - To draw lines and angles accurately - To calculate angles around a point - To calculate angles on a straight line	- Representations of regular and irregular polygons (**NB** – avoid representations with third dimension)  - 2D representations of 3D shapes (inc. isometric paper)  - Protractors (and angle measurers)	**Suggested grey tasks:** https://nrich.maths.org/13125 Seeing Squares (i or r) (game) https://nrich.maths.org/1140 A Puzzling Cube https://nrich.maths.org/2315 Cut Nets https://nrich.maths.org/6522 Baravelle
		Key Questions: ***L4:*** *What is an angle? What unit do you use to measure an angle? What can you use to measure the size of an angle? How can you tell the difference between an acute angle and an obtuse angle? Where should you put the protractor when measuring an angle? Which scale will you use when reading the protractor? How does moving the paper help you to measure some angles?* ***L5:*** *What are the steps to draw a straight line of a given length with a ruler? Are you drawing the line in millimetres, centimetres or inches? How can you use a protractor to draw a given angle accurately? Where on the line should you place the protractor? Is the angle you want to draw acute or obtuse? Which scale on the protractor should you use? Why? How can you accurately draw a polygon if*		**Useful sentence stems:** *The angle is an _ angle, so the number of degrees must be more/less than _* *When drawing an angle of _ degrees, I know it will be greater/smaller than a right angle, so I will use the Things to look out for inner/outer scale.* *A full turn is degrees and is made up of right angles.* *Angles around a point sum to _°.* *Angles on a straight line sum to _°.*

		you know the measurements? What are the features of a rhombus/isosceles triangle? ***L6:*** *What is a full turn? How many right angles are there in a full turn? How many degrees are there in a full turn? If you know three out of four angles around a point, how can you work out the fourth angle? Do you need to add or subtract to find the unknown angle? How do you know? If all the angles around a point are equal in size, how can you work out the size of each one?* ***L7:*** *How many right angles are there in a half turn? How many degrees are there in a half turn? How can you work out a missing angle on a straight line if you know the size of the other angle/angles? What strategies can you use to work out missing angles? Do you need to add or subtract to find the unknown angle? Why? If there is more than one missing angle but they are equal, how can division help you to work them out?*	 - Rulers  - 3D shapes 	*The missing angle is _° subtract the total of _°, _° and _°.*
Number **Week 3**	5	**Suggested sequence of learning:** - To calculate missing lengths and angles - To identify and draw regular and irregular polygons - To identify 3D shapes from 2D representations - End of Unit Assessment	- Representations of regular and irregular polygons (**NB** – avoid representations with third dimension)  - 2D representations of 3D shapes (inc. isometric paper)  - Protractors (and angle measurers)	**Suggested grey tasks:** https://nrich.maths.org/13125 Seeing Squares (i or r) (game) https://nrich.maths.org/1140 A Puzzling Cube https://nrich.maths.org/2315 Cut Nets https://nrich.maths.org/6522 Baravelle
		Key Questions: ***L8:*** *What is the perimeter of the shape? If two of these shapes are joined together, does the perimeter double? What is the perimeter of the compound shape? If you know the size of angle x in the shape, how can you work out the sizes of other angles in the shape? If the perimeter of the shape is _, what is the length of the line marked _?* ***L9:*** *What is a polygon? What are the features of a polygon? Can a polygon have a curved side? How can you measure the perimeter of a polygon? What is a regular polygon? Is a shape with all equal sides always a regular polygon? How do you know that the shape is regular/irregular?* ***L10:*** *What is the mathematical name for this 3-D shape? How many faces/edges/vertices are there on this 3-D shape? What 3-D shape is shown by*		**Useful sentence stems:** *If the perimeter is _cm and the sides I know sum to _cm, then the missing side is _cm.* *In a regular polygon, all angles are _ and all sides are _* *In a regular polygon, if one side is _ then the perimeter can be found by …* *This shape has _ faces, _ edges and _ vertices.* *This shape is made up of a _ and a _*

		this 2-D representation? How can you tell how many faces/edges/vertices there are on this 3-D shape when they are not all visible? What 2-D shapes can you see on the faces of the 3-D shape? What 3-D shapes is this compound shape made up of?	 - Rulers  - 3D shapes 	

Geometry - Position and Direction

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6

- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Four

- describe positions on a 2-D grid as coordinates in the first quadrant
- describe movements between positions as translations of a given unit to the left/right and up/down
- plot specified points and draw sides to complete a given polygon.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Place Value Current statutory objectives:

- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

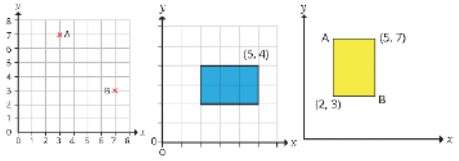
Potential misconceptions:

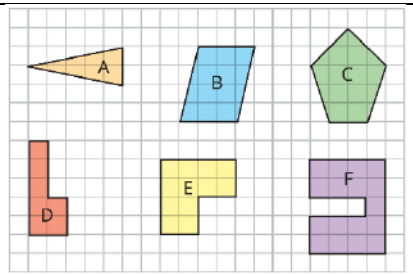
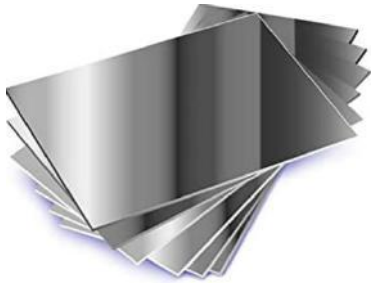
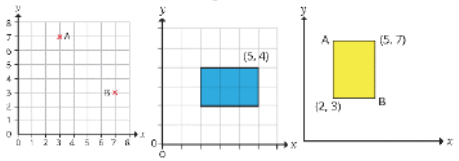
- Children may confuse the x- and y-values of the coordinates and read or plot them in the wrong order.

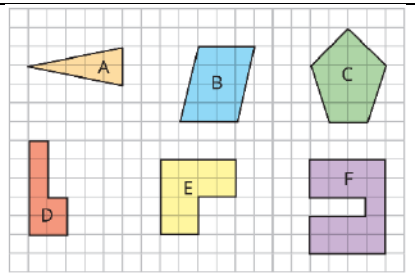
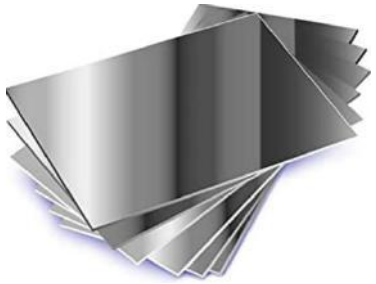
- *Children may assume that the intervals on the axes always go up in 1s, leading to errors.*
- *Children may confuse left and right.*
- *When describing a translation, children may look at the gap between shapes rather than how the vertices have been translated.*
- *Children may count the square the point starts on as "1", meaning that they do not translate by enough squares.*
- *Children may only look for a vertical line of symmetry.*
- *Children may find only one line of symmetry when there are more.*
- *Children may draw a line of symmetry where there is an equal amount of shape on both sides, rather than a mirror image.*
- *Children may translate a shape, rather than reflect it.*
- *Children may copy the shape, rather than reflecting it to face the opposite way.*

Vocabulary - Geometry – Position and direction						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
over	position	clockwise/anti-clockwise		co-ordinates	reflection	four quadrants
under	direction	straight line		first quadrant		co-ordinate plane
between	movement	rotation		grid		
around	whole turn	arrange		translation		
through	quarter turn	sequences		plot		
on	half turn			polygon		
into	three-quarter turn			axis		
next to						

behind						
beneath						
order						
repeat						
patterns						
on top of						

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension Tasks and Sentence Stems
Number **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To read and plot coordinates - To solve problems involving coordinates - To translate shapes - To identify the new coordinates after a translation **Key Questions:** *L1: What is a coordinate grid? • What are the two axes called? • What are coordinates? • When reading or plotting coordinates, which axis do you look at first? • Does it matter which way round the values of coordinates are written? • If the point moves up/down/left/right one place, what happens to the coordinates of the point?* *L2: Which axis do you look at first when writing coordinates? • If the coordinates of this point are _, what does that tell you about the coordinates of the points directly above/ below/to the right/to the left? • Do horizontal/vertical lines share a part of their coordinates? • What happens to the x-/y-value of the*	- Coordinate grids (axes)  (NB – See Geogebra Classic for interactive version) - Table Coordinates / Translation / New coordinates (1, 3) / 2 right and 1 down / (3, 2) (5, 2) / 3 left and 2 up / (6, 7) / / 1 left and 1 down / (5, 5) - Representations of 2D shapes (**NB** – Do not use representations of 2D shapes with 3rd dimension)	**Suggested grey tasks:** https://nrich.maths.org/6288 Treasure Hunt (interactive) (coordinates) https://nrich.maths.org/6280 Eight Hidden Squares (coordinates) **Useful sentence stems:** *Read the _-axis before the _-axis.* *The x-coordinate of the point is _ and the y-coordinate is _.* *The point has the coordinates (_,_).* *The _-coordinates of points on a vertical line are equal.* *The _-coordinates of points on a horizontal line are equal.*

		coordinates when you move a point to the left/right/up/down by 1 square? • If the perimeter/area of the shape is _, what could the missing coordinates be? ***L3:** What does it mean to translate a shape? • How does a shape change when it is translated? How does it stay the same? • How can you translate a shape to the left/right/up/down? • Can you translate a shape both left/right and up/down? Does it matter which you do first? • Does translating the shape one vertex at a time make it easier? Why/why not? • How has the shape been translated?* ***L4:** If a point on a coordinate grid moves up or down, what happens to the coordinates? • What do you notice about the x-/y-coordinate when a point is translated up/down or left/right? • If you know how a point is translated, how can you work out what the new coordinates will be?*	 - Plastic mirrors 	*Shape A has been translated _ squares to the left/right and _ squares up/down.* *When a shape has been translated, the position of the shape _ but the size of the shape _* *When a point is translated up/down, the _-coordinate stays the same and the _-coordinate changes.* *When a point is translated _left/right, the _-coordinate stays the same and the _-coordinate changes.* *When the point with coordinates _ is translated _ left/right and _ up/down, the new coordinates are _*
Number **Week 2**	5	**Suggested sequence of learning:** - To identify and represent lines of symmetry - To reflect shapes in horizontal and vertical mirror lines - End of Unit Assessment **Key Questions:** ***L5:** What does "symmetrical" mean? What is a line of symmetry? • What does "vertical"/"horizontal"/"diagonal" mean? • How can you show a line of symmetry on a shape? • What will each side of a shape look like either side of a mirror line? • Can a shape have more than one line of symmetry? • How can grid lines help you to find lines of symmetry on a shape? • Does using a mirror help you to find a line of symmetry?* ***L6:** What is reflection? • What does a shape look like when it has been reflected? • How can using a mirror help you to reflect shapes? • How could reflecting one vertex of a shape at a time help? • If the coordinates of vertex A are _, what are the coordinates of the corresponding vertex when it has been reflected? • How is reflection different from translation?*	- Coordinate grids (axes)  (NB – See Geogebra Classic for interactive version) - Table | Coordinates	Translation	New coordinates | |---|---|---| | (1, 3) | 2 right and 1 down | (3, 2) | | (5, 2) | 3 left and 2 up | | | (6, 7) | | (2, 5) | | | 1 left and 1 down | (5, 5) | - Representations of 2D shapes (**NB** – Do not use representations of 2D shapes with 3rd dimension)	**Suggested grey tasks:** https://nrich.maths.org/6288 Treasure Hunt (interactive) (coordinates) https://nrich.maths.org/6280 Eight Hidden Squares (coordinates) **Useful sentence stems:** *The shape has _ lines of symmetry.* *Either side of a mirror line, the shapes are _* *Vertex A is _ squares away from the mirror line, so the corresponding vertex needs to be _ squares away from the mirror line.* *The coordinates of the vertices of the reflected shape will be …*

			 - Plastic mirrors 	

Number - Decimals

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers – see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Four

- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to ¼, ½, ¾
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places

Year Five Autumn and Spring Terms

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually,including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number[for example,2/5+4/5=6/5= 1 1/5]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, 0.71 =71⁄100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1⁄2, 1⁄4,1⁄5, 2⁄5 and those fractions with a denominator of a multiple of 10 or 25.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Place Value Current statutory objectives:

- read and write decimal numbers as fractions [for example, 0.71 =71⁄100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1⁄2, 1⁄4,1⁄5, 2⁄5 and those fractions with a denominator of a multiple of 10 or 25.

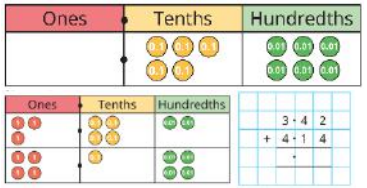
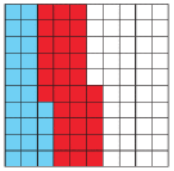
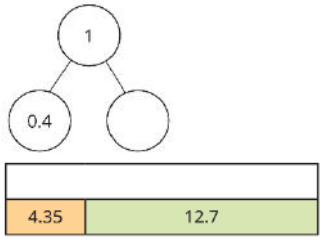
Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

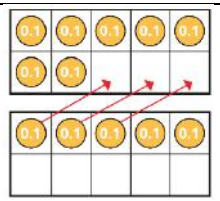
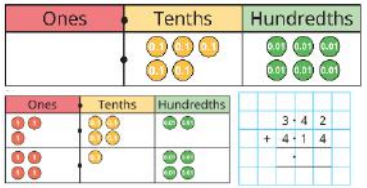
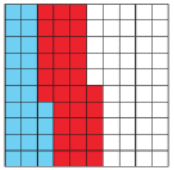
Potential misconceptions:

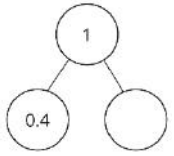
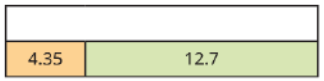
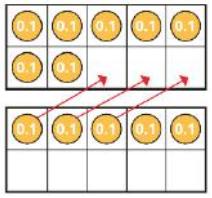
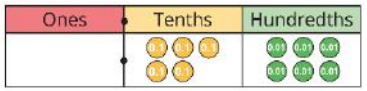
- Children may add digits together irrespective of which place value column they are in, e.g. 0.45 + 0.3 = 0.48
- Children may rely on using formal written methods to add/ subtract decimals within 1 instead of using known facts.
- When finding a complement to 1, children may assume that they need to find the bond to 10 in each place value column, for example 0.365 + 0.745 = 1
- Children may try to use a formal written method to find complements to 1 instead of using known number bonds.
- Children may make errors with complements to 1 by looking at columns individually, for example thinking that adding 0.38 to 0.72 makes 1
- Children may make place value errors, for example using 6 + 7 = 13 to deduce 0.6 + 0.7 = 0.13
- Children may not line up the columns correctly, particularly if the calculation involves zero as a placeholder.
- Children may position the decimal point incorrectly.
- Children may forget to add the exchanged digit.
- When subtracting using the column method, children may just find the difference between the digits, rather than making an exchange when necessary, for example 4.5 − 3.8 = 1.3
- Children may put trailing zeros in the wrong place, for example writing 8.6 as 8.06 instead of 8.60

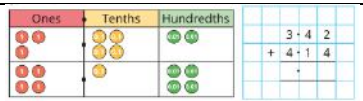
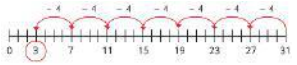
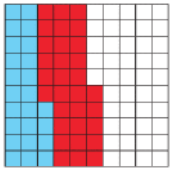
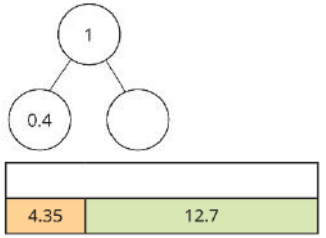
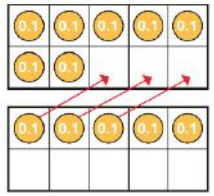
- *In calculations such as 7.6 – 2.38, children may subtract where there are pairs of numbers but just write the last digit, giving the answer of 5.38, instead of writing 7.60 – 2.38 and making an exchange.*
- *Children may automatically use formal written methods, even when they are less efficient.*
- *Children may not transfer strategies used with integers to decimals without explicit teaching.*
- *Children may make errors when crossing an integer boundary, for example 0.3, 0.6, 0.9, 0.12*
- *When looking for terms earlier in a sequence, children may use the operation for the rule instead of the inverse operation, for example adding when they need to subtract.*
- *Children may assume that they add a zero to the original number when multiplying by 10*
- *Children may "move the decimal point" instead of recognising that it is the digits that increase in value when multiplying by 10, 100 and 1,000*
- *Children may make errors with zero placeholders, for example 30.4 ÷ 10 = 3.4*
- *Children may mix up multiplication and division and move counters or digits in the wrong direction.*

Vocabulary - Fractions/Decimals/Percentages						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
	whole	three quarters	tenths	decimal equivalence	fifth	
	half	third		hundredths	thousandths	
	quarter	equivalent fractions		convert	mixed numbers	
	equal parts	unit fractions		proper fractions	per cent %	
		non unit fractions		improper fractions	factors	
		numerator		decimal point	integer	
		denominator			complements	
		one whole				

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension Tasks and Sentence Stems
Number **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To use known facts to add and subtract decimals within 1 - To find complements to 1 for numbers up to 3 decimals places - To add and subtract decimals across 1 - To add decimals with the same number of decimals places	- Singaporean counters  - Place value charts  - Number line  - Blank 100 square  - Part-whole models (inc. bar models)  - Tens frames	**Suggested grey tasks:** https://nrich.maths.org/10326 Spiralling Decimals
		Key Questions: *L1: How can you use the hundred square to help you with the addition/subtraction? • What whole number calculation can you compare this calculation to? • How can you convert between tenths and hundredths? • Which known facts can help you with this calculation? • What is 1 hundredth more than your number? • What is 2 tenths less than your number?* *L2: What number bonds can you use to help you? • What is the missing number in 64 + _ = 100? How does this help you to work out the missing number in 0.64 + _ = 1? • What do you need to add to to make 10/100/1,000? So what do you need to add to _ to make 1? • What is the same and what is different about finding complements to 10/100/1,000 and complements to 1?* *L3: How could partitioning one of the numbers help you? • How do you decide which number to partition? • How could you partition this number to help find a complement to 1? What number is left? • How can you use your number bond knowledge to help you? • What is the*		**Useful sentence stems:** *_ tenths = _ hundredths* *_ones + _ones = _ones, so _tenths + _tenths = _tenths* *_ hundredths – _ hundredths = _hundredths* *1 = _ tenths = _hundredths = _thousandths* *_ones + _ones = 10 ones, so _tenths + _ tenths = 10 tenths = 1* *_ hundredths/thousandths + _ hundredths/thousandths = 1* *_ can be partitioned into _ and _* *The first number is _ away from 1. The second number can be partitioned into _ and _. The total is 1 + _ = _* *I can subtract _ to get to 1 and then subtract _ from 1* *The greatest number I can have in any column is _*

		same and what is different about crossing 1 when adding and subtracting decimals? ***L4:*** *How can you represent this calculation using a place value chart? • What happens when there are 10 or more counters in a place value column? What is the same and what is different in the formal written method? • Why is the position of the decimal point important? • Why is it important to line up the columns? • Will this addition involve an exchange? How do you know?*		*If the total is greater than _, I need to make an _*
Number **Week 2**	5	**Suggested sequence of learning:** - To subtract decimals with the same number of decimals places - To add decimals with different numbers of decimals places - To subtract decimals with different numbers of decimals places - To use and determine efficient methods for adding and subtracting decimals - To identify and create sequences using decimals	- Singaporean counters  - Place value charts  - Number line  - Blank 100 square  - Part-whole models (inc. bar models)	**Suggested grey tasks:** https://nrich.maths.org/10326 Spiralling Decimals
		Key Questions: ***L5:*** *What are _ ones/tenths/hundredths subtract _ ones/tenths/hundredths? Will you need to make an exchange in this subtraction? How do you know? What can you exchange 1 one/tenth/hundredth for? Why is the position of the decimal point important? What does zero in a place value column mean? How does this affect a subtraction?* ***L6:*** *How can you show this addition on a place value chart? What happens when there are 10 or more counters in a place value column? Why is the position of the decimal point important? Why is it important to line up the columns? Will this addition involve an exchange? How do you*		**Useful sentence stems:** *_ ones/tenths subtract _ ones/tenths is equal to _ ones/tenths.* *I need to make an exchange because …* *I need to exchange 1 _ for 10 _* *When adding two decimal numbers, I need to keep the _ in line.* *_ tenths + _ tenths = _ tenths, so I do/do not need to make an exchange.* *If I need to subtract hundredths and there is no digit in the hundredths column, I can put in a _ and then make an _*

		know? What could you add to the spaces that do not contain a digit, to help you? ***L7:*** *How should the digits be lined up in a column subtraction? How do you show that there is nothing in a place value column? Do you need to make an exchange? How do you know? How do you make an exchange if there is a zero in the column that you want to make the exchange from? Is the column subtraction method the most efficient method to use in this example?* ***L8:*** *Do you need to make an exchange? What methods could you use? Which is most efficient for this calculation? When would you use a mental method? When would you use an informal jotting such as a number line? When would a formal method be more efficient? What integer is 9.9 close to? How can this help with the calculation? How could partitioning help with this calculation?* ***L9:*** *Are the terms increasing or decreasing in value? Are the terms increasing or decreasing by the same amount each time? If so, by how much? What will the next term in the sequence be? What will the term in the sequence be? How can you tell if you need to make an exchange? How can you work out the previous term in a sequence? Does it make a difference if the sequence is increasing or decreasing?*	  - Tens frames 	*_ is close to _, so I can change the calculation to _* *I will work this out using _ because …* *Each term is _ than the previous term. The difference between the terms is _. As the sequence is increasing/decreasing, I need to add/ subtract _ to work out the next term.*
Number **Week 3**	5	***Suggested sequence of learning:*** - To multiply by 10, 100 and 1000 - To divide by 10, 100 and 1000 - To use multiplication and division to solve missing number problems with decimals - End of Unit Assessment	- Singaporean counters  - Place value charts 	***Suggested grey tasks:*** https://nrich.maths.org/10326 Spiralling Decimals

		Key Questions: ***L10:*** *What is the value of each digit in the number? How many places to the left do the counters move when you multiply by 10/100/1,000? Where would the digits move to if you multiplied the number by 10/100/1,000? How many times greater than _ is _? If you multiply a number by 10 and then multiply the answer by 10, how many times greater than the original number is your final answer?* ***L11:*** *What is the value of each digit in the number? If you divide by 10/100/1,000, how many places to the right do the counters move? Where would the digits move to if you divided the number by 10/100/1,000? How many times smaller is _ than _? If you divide a number by 10 and then divide the answer by 10, how many times smaller than the original number is your final answer?* ***L12:*** *What is the value of each digit? How many times smaller is _ than _? How many times greater is _ than _? How have the values of the digits changed? Has the number been multiplied or divided? How do you know? In which direction have the digits moved? How many places have the digits moved? What does this tell you?*	 - Number line  - Blank 100 square  - Part-whole models (inc. bar models)  - Tens frames 	**Useful sentence stems:** *To multiply/divide by 10/100/1,000, I move all the digits _ places to the left/right.* *10 times greater than _ is _* *_ is one-tenth the size of _* *Multiplying/dividing by 100/1,000 is the same as multiplying/dividing by _10 times.* *The digits have moved _ places to the left/right, so the number has been _ by _* *The digits have moved _ places to the left/right, so the number is _ times greater/smaller.*

Number - Negative Numbers

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers – see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Four

- Count backwards through zero to include negative numbers

Year Five

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Place Value Current statutory objectives:

- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- solve number problems and practical problems that involve all of the above

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

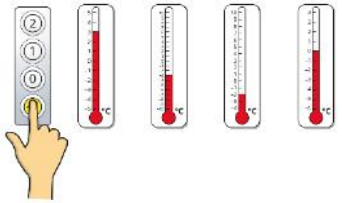
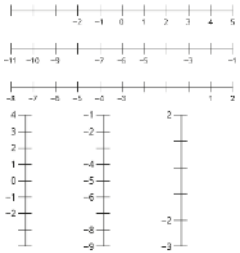
- As children are often shown scales from positive 10 to negative 10, they may count incorrectly across zero, for example 3, 2, 1, 0, −10, −9, −8 etc.
- Children may only look at the digit and think that, for example, −7 is greater than −2
- Children may forget to include zero in a count, for example 3, 2, 1, −1, −2 , −3
- Children may not see the reflective nature of negative numbers and count after zero with the negative partner of the first positive number, for example 3, 2, 1, 0, −3, −2, −1
- In counts that include zero, children may forget to include it.
- Children may just reflect a given sequence rather than counting through zero, for example −8, −5, −2, 2, 5, 8
- When counting through zero, children may continue the count from zero, for example 5, 3, 1, 0, −2, −4, −6
- Directly applying knowledge of comparing and ordering positive numbers can lead children to think that, for example, −7 > −3
- When using number lines, children may count the numbers rather than the jumps, resulting in a difference that is 1 greater than it should be.
- Children may rely on always counting individual jumps rather than using the more efficient strategy of jumping to and from zero.

Vocabulary - Number - Number and place value						
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

count	sort	count in steps	ascending	negative numbers	ten thousands	millions
subitise	represent	count in multiples	descending	roman numerals	one hundred thousands	ten millions
order/ordinal	multiples	place value	10 or 100 more	1000 more	powers of	
compare	partitioning	estimate	10 or 100 less	1000 less	integer	
forwards	ones	compare	hundreds	thousands		
backwards	tens			round		
numerals						
digit						
one more						
one less						
equal to						
more than						
less than (fewer)						

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension Tasks and Sentence Stems

<table>
<tr>
<td rowspan="2">Number

Week 1</td>
<td rowspan="2">5</td>
<td>Suggested sequence of learning:
- Baseline Assessment
- To recognise and represent negative numbers
- To count through zero in ones
- To count through zero in multiples
- To compare and order negative numbers
- To find the difference between given negative and positive numbers
- End of Unit Assessment</td>
<td rowspan="2">- Representations of negative numbers in context (inc. thermometers)
 
- Numberlines (vertical and horizontal)
  </td>
<td>Suggested grey tasks:</td>
</tr>
<tr>
<td>Key Questions:
L1: What are negative numbers? How do you write them? As the temperature gets warmer/colder, do the numbers get greater or smaller? If zero degrees Celsius is freezing point, how do you write temperatures that are colder than freezing? Is −5 colder or warmer than −2? Which temperature is closer to freezing point (zero degrees Celsius)? If the ground floor is zero and the first floor is 1, what number represents the basement? Which of these floors are above/below the ground floor, −3 and 3? If 5 m represents 5 metres above sea level, how do you write 5 metres below sea level?
L2: What is a negative number? How do you write negative numbers? What is the next number in this count: 3, 2, 1? What is the number after that? Are the numbers counting forwards or backwards? What is the sequence counting forwards/backwards in? What number comes before/after when counting forwards/backwards in 1s?
L3: What is the next number in this count: 6, 4, 2? What is the number after that? Are the numbers counting forwards or backwards? What is the sequence counting forwards/backwards in? What number comes before/after when counting</td>
<td>Useful sentence stems:</td>
</tr>
</table>

		forwards/backwards in s? How does partitioning the multiple help when counting through zero? ***L4:*** *Where is the number on the number line? How can you use a number line to compare numbers? When comparing numbers on a number line, are the greater/smaller numbers on the right or the left? Are negative numbers greater or less than positive numbers? What temperature is warmer/colder, or ? So which number is greater? How do you know that –8 is less than –3?* ***L5:*** *Where is the number on the number line? How can you use a number line to find the difference between two numbers? How many jumps are there from to ? Does it matter if you count forwards or backwards? How far away from zero is ? If the jump from to zero is and the jump from zero to is , what is the overall difference?*		

Measurement - Converting Units

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- Whiterose Flashback 4 - WHOLE CLASS
- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)

- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Five (Spring Term)

- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Place Value Current statutory objectives:

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Potential misconceptions:

- Children may perform the wrong operation, for example multiplying instead of dividing.
- Children may confuse "kilo-" with "centi-" and use the factor of 100 instead of 1,000
- Children may perform the wrong operation, for example multiplying instead of dividing.
- Children may confuse the different prefixes "kilo-", "milli-" and "centi-".
- Children may confuse when to multiply or divide and/or when to use 10, 100 or 1,000
- Children may confuse the units of measure or omit them from their answers.
- Children may confuse ≈ and =.
- Children may forget to include units of measure in their answers.
- Children may be confused when converting measures that involve division (for example, days to weeks) if there is a remainder.
- Children may think that time conversions behave like decimals, for example 0.25 minutes = 25 seconds.
- Children may confuse 12-hour and 24-hour clock times.
- Children may try to subtract times using the column method, misinterpreting times as decimals.

Measurement (Measure and Length)						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
measure	compare	standard units	millimetre mm	kilometres km	decimal notation	conversion
wide(er)		estimate	perimeter	rectilinear figure	scaling	miles
narrow(er)		order		area	metric units	formulae
compare		record results			imperial units	parallelograms
long(er)(est)		centimetre cm			inches	triangles
short(er)(est)		metre m			compound shape	feet
length					irregular shapes	

					square centimetres	
					square metres	

Vocabulary - Measurement (Height, Weight and Capacity)						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
height	mass	kilogram kg			cubic centimetre	cubic metre
long(er)/short(er)	volume	gram g			pounds	cubic millimetre
tall(er)/short(er)		quarter full			pints	cubic kilometre
weight		three quarters full				gallons
capacity		litres l				stones
heavy/light		millilitres ml				ounces
heavier than		temperature				
lighter than		Celsius				
big/bigger/biggest						
full/empty						

more than						
less than						
half/half full						

Vocabulary - Measurement (Time)						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
time	chronological order	intervals of time	analogue clock	convert		
quicker	days of the week	quarter past/to	roman numerals			
slower	months of the year	duration	12-hour clock			
earlier	month		24-hour clock			
later	year		a.m./p.m.			
before	o'clock		noon			
after	half past		midnight			
first	second		leap year			

next			digital			
today						
yesterday						
tomorrow						
morning						
afternoon						
evening						
day						
week						
hour						
minutes						

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension Tasks and Sentence Stems

Measurement **Week 1**	5	**Suggested sequence of learning:** - Baseline Assessment - To represent and use kilometres and kilograms - To convert between millimetres and metres and between millilitres and litres - To convert units of length		**Suggested grey tasks:**
		Key Questions: ***L1:*** *What are units of measure? What might you measure using kilograms/kilometres? What is the same about kilograms and kilometres? What is different? What does the prefix "kilo-" mean? How many grams are there in kilograms? How can you convert from kilometres to metres? What is the same and what is different about converting from metres to kilometres?* ***L2:*** *What might you measure in metres/litres? What might you measure in millimetres/millilitres? What does the prefix "milli-" mean? What is the same and what is different about the prefixes "milli-" and "kilo-"? How can you convert from litres/metres to millilitres/ millimetres? How many litres are equivalent to millilitres? Which is the greatest length, 1 mm, 1 km or 1 m? What unit of measure would you use for measuring ?* ***L3:*** *What units of length do you know? What objects would you measure with millimetres/ centimetres/metres? Which unit of measure would you use to measure ? How many mm/cm are there in cm/m? How can you convert from mm/cm/m to mm/cm/m? When do you need to divide/multiply by 10/100/1,000?*		**Useful sentence stems:**
Measurement	5	**Suggested sequence of learning:** - To convert between metric and imperial units - To convert units of time		**Suggested grey tasks:**

Week 2		- To calculate with timetables - End of Unit Assessment		
		Key Questions: ***L4:*** *What different types of units of measure do you know? How can you sort the units of measure into groups? What is the difference between imperial and metric units of measure? What does "approximately equal to" mean? What symbol is used to mean "approximately equal to"? How can you convert from cm/kg/ml to inches/lb/pints? How can you convert from inches/lb/pints to cm/kg/ml?* ***L5:*** *What units of measure do we use for time? How can you put the units of measure for time in order from shortest to longest? How many seconds/minutes/hours are there in minutes/hours/days? • How can you convert from to ? When using division to convert times, what happens if there is a remainder?* ***L6:*** *What information can a timetable give you? Why are some parts of the timetable blank? How do you convert between times given using 12-hour and 24-hour clocks? How long does take? How many minutes are there between and ? How can a number line help you to find the difference between two times? What questions could you ask about this timetable?*		***Useful sentence stems:***

Measurement - Volume

Suggested starters (ongoing, throughout the term) with links to relevant resources:

- *Whiterose Flashback 4 - WHOLE CLASS*

- Daily 10 - Level 4 or 5 - https://www.topmarks.co.uk/maths-games/daily10 - WHOLE CLASS
- Times tables dice game - children roll dice; first to multiply together gets a point; keep score on mini whiteboard - PAIRS
- Rocket rounding - https://www.topmarks.co.uk/maths-games/rocket-rounding - WHOLE CLASS
- Tug Harder - https://nrich.maths.org/5898 - PAIRS
- Roman numeral matching pairs - PAIRS
- Column addition and subtraction with 4 and 3 digit numbers -- see Google Sheet - WHOLE CLASS
- Dicey Addition - https://nrich.maths.org/11863 - PAIRS
- Count from (and back to) 0 in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 25, 50, 100 and 1000 (consolidation from previous years)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 times tables (up to the 12th multiple)
- Find all factor pairs of a given number
- Multiply and divide numbers mentally drawing upon known facts e.g. 7 x 6 = 42; 7 x 60 = 420; 420 ÷ 70 = 6
- Multiply numbers with up to two decimal places by 10 and 100 and divide corresponding numbers by 10 and 100
- Read, write, compare and order whole numbers up to 10,000 (and then 100,000)
- Read, write, compare and order numbers with up to two decimal places
- Recall and use addition and subtraction facts for multiples of 5 to 1000 (e.g. 485 + 515 = 1000, 1000 – 775 = 225)
- Given a number, identify the number that is 10/100/1,000 more or less within 100,000
- Add three two- digit numbers together mentally (using jottings) e.g. 78 + 19 + 12 = 90 + 19 = 109
- Find doubles of three-digit and four-digit numbers (using knowledge of partitioning and place value) and find corresponding halves
- Count forwards **and** backwards with positive and negative whole numbers (in steps other than one, including through zero -refer to number line
- Convert between different units of measurement e.g. km to m, cm to mm, l to ml, kg to g, hours to minutes, weeks to days
- Compare and order fractions whose denominators are all multiples of the same number (using diagrams, resources and fraction walls to support)
- Consolidate telling the time to the nearest minute on an analogue clock and relate this to 12/24 hour digital clocks
- Reason about numbers and place value

Relevant learning/previous statutory objectives:

Year Five (Spring Term)

- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints

- *solve problems involving converting between units of time*
- *use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.*
- *calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes*

Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

Place Value Current statutory objectives:

- *estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]*

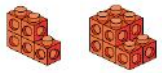
Also see NCETM National Curriculum resource tool: https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/

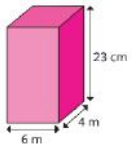
Potential misconceptions:

- *Children may only count the visible cubes when working out the volume of a 3-D shape.*
- *Children may omit units from their answer.*
- *Children may assume that a taller shape always has a greater volume.*
- *Children may say that a shape with more cubes in it has a greater volume than one with fewer cubes, without considering the sizes of the cubes.*
- *Some objects will be harder to recreate using interlocking cubes than others.*
- *Children may need support to decide if the estimated volume is greater or less than the actual volume.*
- *Children may confuse volume and capacity.*
- *Children may need support to identify which units to use.*

Vocabulary - Measurement (Height, Weight and Capacity)						
Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
height	mass	kilogram kg			cubic centimetre	cubic metre
long(er)/short(er)	volume	gram g			pounds	cubic millimetre
tall(er)/short(er)		quarter full			pints	cubic kilometre

weight		three quarters full				gallons
capacity		litres l				stones
heavy/light		millilitres ml				ounces
heavier than		temperature				
lighter than		Celsius				
big/bigger/biggest						
full/empty						
more than						
less than						
half/half full						

Area of Study	No of hrs	Suggested Sequence and Key Questions for Assessment	Suggested Concrete and Pictorial Resources	Extension Tasks and Sentence Stems
Measurement	5	Suggested sequence of learning: - Baseline Assessment - To recognise and measure volume in cubic centimetres - To compare volume - To estimate volume - To estimate capacity - End of Unit Assessment	- Link cubes  - Cuboids	Suggested grey tasks:

Week 1		Key Questions: *L1: What is volume? What unit can you use to measure volume? What is the difference between one square centimetre and one cubic centimetre? How many cubes is the shape made up of? What is the volume of the shape/cuboid? How can you make a cuboid that has 16 cubes? Is there more than one way?* *L2: What is volume? What is a cubic centimetre? How can you find the total volume of the shape? What is the volume of shape A? How can you tell which shape has the greater volume? Which has the greater volume, shape A or shape B? Are the cubes the same size? Why does this matter?* *L3: What is volume? How could you estimate the volume of the shape? Which of these two objects has the greater volume? How can you use cubes to estimate the volume of an object? If object A has a volume of , what do you estimate the volume of object B will be? Is the actual volume greater or less than the estimated volume?* *L4: What is capacity? What is the difference between capacity and volume? Which of these containers has the greater capacity? How do you know? If there is ml in the jug now, approximately how much will it hold when full? What units of measure are used for the capacity of bottles? How many millilitres are there in a litre? About how many times bigger is the than the ?*		Useful sentence stems: