



## Number - number and place value

Pupils should be taught to:

- 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 0
- round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1,000 (M) and recognise years written in Roman numerals

**READY TO PROGRESS CRITERIA** These mostly relate to decimals, which is covered later in the year. It is recommended to do these objectives with whole numbers and then repeat with decimals. Two RTPs are related to division and measures so will be covered there.

Year 4 conceptual prerequisite	Year 5 ready-to-progress criteria	Future applications
Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100.	5NPV-1 Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.	Solve multiplication problems that have the scaling structure, such as 'ten times as long'. Understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal fraction.
Recognise the place value of each digit in four-digit numbers, and compose and decompose four-digit numbers using standard and non-standard partitioning.	5NPV-2 Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and nonstandard partitioning.	Compare and order numbers, including those with up to 2 decimal places. Add and subtract using mental and formal written methods.
Reason about the location of any four-digit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each.	5NPV-3 Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.	Compare and order numbers, including those with up to 2 decimal places. Estimate and approximate to the nearest 1 or 0.1.

### SMALL STEPS IN PLACE VALUE

Autumn: place value		
White Rose Maths		NCETM
1000s, 100s, 10s and 1s Numbers to 10 000 Rounding to the nearest 10 Rounding to nearest 10, 100 or 1000 Numbers to 100 000	<b>Objective 1, 2 and 4 are recap of Year 4</b> <b>Negative numbers should also have been covered in Year 4.</b> <b>Rounding is confusing for many children.</b>	1.26 Composition and calculation: multiples of 1000 up to 1 000 000 <ul style="list-style-type: none"> <li>● Understanding of numbers composed of hundreds thousands 10000 and 1000 can be supported</li> </ul>



<p>Compare and order numbers to 100 000                  Round numbers within 100 000                  Numbers to 1 million                  Counting in 10s, 100s, 1000s, 10 000s and 100 000s                  Compare and order to one million                  Negative numbers                  Roman numerals</p>	<p><b>It is a good idea to relate it to the linear number system so that they can see when rounding down that the nearest multiple is in the number to be rounded.</b>  <b>E.g</b>  <b>76 is between 70 and 80 so when rounded it either goes upto 80 or down to 70.</b>  <b>Use the STEM sentences.</b></p> <p><b>Roman numerals are at the end of the block as it is important for children to be secure with their own number system before exploring another. (for Europa it has been removed from Year 4).</b></p>	<p>making links to numbers composed of hundreds tens and one's.</p> <ul style="list-style-type: none"> <li>• Multiples of 1000 up to 1 million can be placed in the linear number system by drawing on knowledge of the place of numbers.</li> <li>• Numbers can be ordered and compared using knowledge of their composition and of their place in the linear number system.</li> <li>• numbers can be rounded to simplify calculations to indicate approximate sizes.</li> </ul> <p>1.27 Negative Numbers: counting, comparing and calculating</p>
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**STEM SENTENCES**

<p>Ten ten thousands make one hundred thousand</p>	
<p>One hundred one thousands make one hundred thousand</p>	
<p>The midpoint of ___ and ___ is ___, so the midpoint of ___ thousand and ___ thousand is ___ thousand</p>	
<p>___ is less than ___, so ___ thousand is less than ___ thousand.</p>	
<p>___ is greater than ___, so ___ thousand is greater than ___ thousand.</p>	
<p>To compare 3-digit numbers we need to compare the hundreds digit; if the hundreds digits are the same we need to compare the tens digits; if the tens digit are the same we need to compare the ones digits.</p>	
<p><b>ROUNDING IN REAL LIFE CONTEXT:</b>                  The number of tickets sold for ___ is between ___ and _____.                  The number of tickets sold to the nearest one thousand is _____.                  The previous multiple of one hundred thousand is _____. The next multiple of one hundred thousand is _____.                  _____ is nearest to _____.                  _____ is _____ when rounded to the nearest one hundred thousand.</p>	<p><b>1 rounding to the nearest one hundred thousand the ten thousand digit is the digit to consider. If it is 4 or less we round down. If it is 5 or more we round up.</b></p>
<p><u>NEGATIVE NUMBERS:</u></p>	
<p>Negative numbers are below zero.                  Negative numbers are less than zero.                  Positive numbers are above zero.                  Positive numbers are greater than zero.</p>	
<p><u>Negative numbers on a linear scale:</u></p>	
<p>Negative numbers are below zero.                  Negative numbers are to the left of zero .                  Positive numbers are above zero.                  Positive numbers are to the right of zero.</p>	
<p>Negative numbers are less than zero.                  Positive numbers are greater than zero.</p>	
<p>For both positive and negative numbers, the larger the value of the number, the further it is from 0.</p>	



<p>For negative temperatures the further the number is from 0 the colder it is. For positive temperatures the further the number is from zero the warmer it is.</p>	
<p>When an object is below sea level the further the number is from zero the deeper the object. When an object is above sea level the further the number is from zero the higher the object.</p>	



# Number - addition and subtraction

Pupils should be taught to:

- 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

## Notes and guidance (non-statutory)

Pupils practice using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see [Mathematics appendix 1](#)).

They practice mental calculations with increasingly large numbers to aid fluency (for example,  $12,462 - 2,300 = 10,162$ ).

**THERE ARE NO READY TO PROGRESS CRITERIA AS BY NOW THE CHILDREN HAVE HOPEFULLY GAINED A SECURE UNDERSTANDING OF ADDITION AND SUBTRACTION. SO YEAR 5 OBJECTIVES RELATE TO RECAP AND IMPROVEMENT.**

HERE ARE THE MAIN OBJECTIVES:

TOPIC	YEAR 5
Addition and Subtraction: Recall, Represent, Use	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Addition and subtraction: calculations	Add and subtract whole numbers with more than four digits, including using formal written methods (column addition and subtraction) Add and subtract numbers mentally with increasingly large numbers.
Addition and subtraction: solve problems	Solve addition and subtraction multi-step problems in contexts deciding which operations and methods to use and why. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.

## SMALL STEPS

Autumn Addition and subtraction	
White Rose Maths	NCETM
Add two 4-digit numbers 1 exchange Add two 4-digit numbers more than one exchange Add whole numbers with more than four digits (column method) Subtract two 4 digit numbers one exchange Subtract two 4-digit numbers more than one exchange Subtract whole numbers with more than four digits (column method) Round to estimate and approximate Inverse operations (addition and subtraction) Multi-step addition and subtraction problems	1.28 Common Structures and the part-part-whole relationship  1.29 Using equivalence and the compensation property to calculate

## STEM SENTENCES

[Enigma-Stem-Sentence-bank-Number-Addition-Subtraction.pdf](#)

A whole split into equal parts can be seen as both an additive and a multiplicative structure. A whole split into two unequal parts can be seen as an additive structure.	
_____ is the whole; _____ is a part, _____ is a part and _____ is a part.	



<p>If a known whole is split into three parts and we know the value of 2 of them we can find the missing part:                  The whole minus the two known parts is equal to the missing part                  The sum of the two parts plus the missing part is equal to the whole.</p>	<p>If we know the value of the whole and all but one of the missing parts we can find the missing part.                  the whole minus the known parts is equal to the missing part.                  The sum of the known parts plus the missing part is equal to the whole.</p>
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<p>The value of the expressions on each side of the equals sign must be equal.</p>	<p>Generalisation</p>	<p>=</p>
<p>If one addend is increased by an amount and the other addend is decreased by the same amount, the sum remains the same.</p>	<p>Generalisation</p>	
<p>(connected with above) I have added ___ to this addend so I must subtract ___ from the other addend to keep the sum the same.</p>	<p>Structure</p>	<p>I have added ten to 520 so I must subtract ten from 290 to keep the sum the same.</p>
<p>If one addend is increased/ decreased by an amount and the other addend remains unchanged, the sum is also increased/ decreased by the same amount.</p>	<p>Generalisation</p>	

<p>(connected with above) I've added/ subtracted ___ to/ from this addend and kept the other addend the same so I must add/ subtract ___ to/ from the sum.</p>	<p>Structure</p>	<p>I have added ten to 4 and kept the other addend the same so I must add ten to 7 also.</p>
<p>If the sum increases/ decreases by an amount and one addend has stayed the same, the other addend must increase/ decrease by the same amount.</p>	<p>Generalisation</p>	
<p>(connected with above) The sum has increased/ decreased by ___; one addend has stayed the same, so the other addend must increase/ decrease by ___.</p>	<p>Structure</p>	<p>The sum has increased by 2; one addend has stayed the same, so the other addend must also increase by 2.</p>

<p>If the minuend and the subtrahend are changed by the same amount, the difference remains the same.</p>	<p>Generalisation</p>	
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<p>I've added/ subtracted ___ to/ from the minuend and the subtrahend so the difference remains the same.</p>	<p>Structure</p>	<p>I've subtracted 1 from the minuend and the subtrahend so the difference remains the same.</p>
<p>In a balanced equation, if I add an amount to the minuend or subtrahend, I need to add the same amount to the subtrahend or minuend to keep the difference the same. In a balanced equation, if I subtract an amount from the minuend or subtrahend, I need to subtract the same amount from the subtrahend or minuend to keep the difference the same.</p>	<p>Generalisation</p>	
<p>I've added ___ to the minuend/ subtrahend, so I need to add ___ to the subtrahend/ minuend to keep the difference the same. I've subtracted ___ from the minuend/ subtrahend so I need to subtract ___ from the subtrahend/ minuend to keep the difference the same.</p>	<p>Structure</p>	<p>I've added 35 to the minuend so I need to add 35 to the subtrahend to keep the difference the same.</p>



# Number - multiplication and division

Pupils should be taught to:

- 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 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
- 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
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

## READY TO PROGRESS CRITERIA

Year 4 conceptual prerequisite	Year 5 ready-to-progress criteria	Future applications
Recall multiplication and division facts up to $12 \times 12$ . Solve division problems, with two-digit dividends and one digit divisors, that involve remainders, for example: $74 \div 9 = 8 \text{ r}2$	5NF-1 Secure fluency in multiplication table facts, and corresponding division facts, through continued practice.	Use multiplication facts during application of formal written layout. Use division facts during short division and long division.
Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to scaling a number by 10 or 100.	5MD-1 Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size. <b>THIS CAN BE COVERED IN FLUENCY SESSIONS</b>	Convert between different metric units of measure.
Recall multiplication and division facts up to $12 \times 12$ , and recognise products in multiplication tables as multiples of the corresponding number. Recognise multiples of 10, 100 and 1,000. Apply place-value knowledge to known additive and multiplicative number facts. Multiply and divide whole numbers by 10 and 100 (keeping to whole	5MD-2 Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors.	Solve contextual division problems. Simplify fractions. Express fractions in the same denomination.



number quotients)		
Recall multiplication facts up to 12 X 12. Manipulate multiplication and division equations.	5MD-3 Multiply any whole number with up to 4 digits by any one-digit number using a formal written method.	Solve contextual and non contextual multiplication problems using a formal written method.
Recall multiplication and division facts up to 12 X 12 . Manipulate multiplication and division equations. Solve division problems, with two-digit dividends and one digit divisors, that involve remainders, for example: 74 ÷ 9 = 8 r2 and interpret remainders appropriately according to the context.	5MD-4 Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context.	Solve contextual and non contextual division problems using a formal written method.

**SMALL STEPS**

Autumn and Spring: multiplication and division	
White Rose Maths	NCETM
<ul style="list-style-type: none"> <li>• Multiples</li> <li>• Factors</li> <li>• Common factors</li> <li>• Prime numbers</li> <li>• Square numbers</li> </ul> Cube numbers <ul style="list-style-type: none"> <li>• Multiply by 10, 100 and 1,000</li> <li>• Divide by 10, 100 and 1,000</li> <li>• Multiples of 10, 100 and 1,000</li> </ul> Spring <ul style="list-style-type: none"> <li>Multiply 2-digits by 1-digit</li> <li>Multiply 3-digits by 1-digit</li> <li>Multiply 4-digits by 1-digit</li> <li>Multiply 2-digits (area model)</li> <li>Multiply 2-digits by 2-digits</li> <li>Multiply 3-digits by 2-digits</li> <li>Multiply 4-digits by 2-digits</li> <li>Divide 2-digits by 1-digit (1)</li> <li>Divide 2-digits by 1-digit (2)</li> <li>Divide 3-digits by 1-digit</li> <li>Divide 4-digits by 1-digit</li> <li>Divide with remainders</li> </ul>	2.18 Using equivalence to calculate 2.19 Calculation x/÷ decimal fractions by whole numbers 2.20 Multiplication with three factors and volume 2.21 Factors, Multiples, prime number and composite numbers 2.22 Combining Multiplication with addition and subtraction

**STEM SENTENCES**

[Enigma-Stem-Sentence-bank-multiplication-and-division-with-links.pdf](#)

<b>Scaling</b>
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<p>The ___ is ___ times the length of the ____.</p>	<p>Structure / language</p>	<p>The plain ribbon is three times the length of the spotty ribbon.  <math>5\text{cm} \times 3 = 15\text{cm}</math></p> <p>The 5cm represents the length of one spotty ribbon The 3 represents the number of spotty ribbons that are equal to the length of the plain ribbon.                      The 15cm represents the length of three spotty ribbins. It also represents the length of the plain ribbon.</p>
<p><b>If two objects are the same length, one object is one times the length of the other.</b></p>	<p><b>Generalisation</b></p>	
<p>___ multiplied by ___ is equal to ___                      ___ is ___ times the size of ___</p>		<p>12 multiplied by 10 is equal to 120                      120 is 10 times the size of 12</p>
<p>___ divided by ___ is equal to ___                      ___ is ___ times the size of ___</p>		<p>5cm is <math>\frac{1}{4}</math> times the size of 20cm</p>
<p>The ___ is ___ times the mass of ____</p>		<p>The mass of the mother bear is four times the mass of her cub.  <math>25\text{kg} \times 4 = 100\text{ kg}</math>                      The mass of the mother bear is one hundred kilograms.                      The mass of the cub is one quarter times the mass of his mother.  <math>100\text{kg} \times \frac{1}{4} = 25\text{kg}</math>  <math>100 \div 4 = 25\text{kg}</math>                      The mass of the bear cub is twenty-five kilograms.</p>



<b>Equivalence</b>		
<b>If I double one factor, I must halve the other factor for the product to stay the same.</b>	<b>Generalisation</b>	
If I multiply ___ by two, I must divide ___ by two for the product to stay the same.	Structure	If I multiply 2 by two, I must divide 6 by two for the product to stay the same.
<b>If I multiply one factor by two , I must divide the other factor by two for the product to stay the same.</b>	<b>Generalisation</b>	
<b>If I multiply one factor by _____ , I must divide the other factor by _____ for the product to stay the same.</b>	<b>Generalisation</b>	
If I multiply the dividend by _____, I must multiply the divisor by _____ for the quotient to stay the same.	Language / structure.	Dividend ÷ divisor = quotient.
If I divide the dividend by _____, I must divide the divisor by _____ for the quotient to stay the same.	Language / structure.	
<b>Calculation x and ÷ decimal fractions by whole numbers.</b>		
___ times ___ ones is equal to ___ ones, so ___ times ___ tenths is equal to ___ tenths.	Structure	3 times 4 ones is equal to 12 ones, so 3 times 4 tenths is equal to 12 tenths.



<p>___ times ___ ones is equal to ___ ones, so ___ times ___ hundredths is equal to ___ hundredths.</p>	<p>Structure</p>	<p>3 times 4 ones is equal to 12 ones, so 3 times 4 hundredths is equal to 12 hundredths.</p>
<p>One tenths of ___ metre(s) is ___ metre(s)</p>	<p>Structure</p>	<p>One tenths of 12 metre(s) is 1.2metre(s)</p>
<p><b>When a number is divided by ten, the digits move one place to the right.</b></p> <p><b>When a number is multiplied by 0.1 or 1/10, the digits more one place to the right. (Because x 0.1 is equal to ÷ 10)</b></p>	<p>Generalisation</p>	
<p><b>When a number is divided by 100, the digits move two places to the right.</b></p> <p><b>When a number is multiplied by 0.01 or 1/100, the digits more one place to the right. (Because x 0.01 is equal to ÷ 100)</b></p>	<p>Generalisation</p>	
<p>___ is one-tenth of the size of ___, so ___ times ___ is one-tenth the size of ___ times ___.</p>	<p>Structure</p>	<p>2.5 is one-tenth of the size of 25, so 4 times 2.5 is one-tenth the size of 4 times 25.</p>
<p>___ is one-hundredth the size of ___, so ___ times ___ is one hundredth the size of ___ times ___.</p>	<p>Structure</p>	<p>0.25 is one-hundredth the size of 25, so 4 times 0.25 is one hundredth the size of 4 times 25.</p>



<p><b>If one factor is made one-tenth times the size, the product will be one-tenth times the size.</b></p> <p><b>If one factor is made one-hundredth times the size, the product will be one-hundredth times the size.</b></p>	<p><b>Generalisation</b></p>	
<p>I move the digits of the number being multiplied ____ places to the left until I get a whole number; then I multiply; then I move the digits of the product ____ places to the right.</p>	<p>Structure</p>	<p>I move the digits of the number being multiplied 2 places to the left until I get a whole number; then I multiply; then I move the digits of the product 2 places to the right.</p>
<p><b>When a number is multiples by one thousand, the digits move three places to the left.</b></p> <p><b>When a number is divided by one thousand, the digits more three places to the right.</b></p>	<p><b>Generalisation</b></p>	
<p><b>Dividing by one thousand is equivalent to multiplying by one thousandth.</b></p>	<p><b>Generalisation</b></p>	
<p><b>When a number is multiplied by a value greater then one, the product is greater then the original number.</b></p> <p><b>When a number is multiplied by a value less than one, the product is less than the original number.</b></p>	<p><b>Generalisation</b></p>	



<p>___ is one-tenth the size of ___ so ___ divided by ___ is one tenth the size of ___ divided by ___</p> <p>___ is one-hundredth the size of ___ so ___ divided by ___ is one hundredth the size of ___ divided by ___</p>	<p>Structure</p>	
<p><b>If the dividend is made one-tenth times the size, the quotient will be one-tenth times the size.</b></p>	<p>Generalisation</p>	
<p><b>If the dividend is made one hundredth times the size, the quotient will be one-hundredth times the size.</b></p>	<p>Generalisation</p>	
<p><b>I move the digits of the dividend ___ places to the left until I get a whole number; then I divide; then I move the digits of the quotient ___ places to the right.</b></p>	<p>Generalisation</p>	
<p>___ ones <math>\div</math> ___ = ___ ones</p> <p>So</p> <p>___ tenths <math>\div</math> ___ = ___ tenths.</p>	<p>Structure</p>	
<p><b>If there is a decimal point in the dividend, put a decimal point in the quotient; line it up with the decimal point in the dividend.</b></p>	<p>Generalisation</p>	



Volume		
<b>You can measure volume in cubic centimetres. You write this as <math>\text{cm}^3</math></b>	<b>Generalisation</b>	
This shape has a volume of ___ $\text{cm}^3$	Language	
This layer has ___ rows of cubes There are ___ $1\text{cm}^3$ cubes in this layer. This layer has a volume of ___ $\text{cm}^3$ . The volume of the cuboid is ___ $\text{cm}^3$ .	Structure	
<b>The volume of a cuboid can be found by multiplying the length by the width by the height.</b>	<b>Generalisation</b>	
Length X width X height ___ cm X ___ cm X ___ cm = ___ $\text{cm}^3$	Structure	Length X width X height. $4\text{cm} \times 3\text{cm} \times 6\text{cm} = 42\text{cm}^3$
The ___ refers to the ___	Structure	
<b>If you change the order of the factors, the product remains the same.</b>	<b>Generalisation</b>	
<b>Factors, multiples, prime numbers and composite numbers.</b>		



There are ___ tiles. There are ___ rows and ___ columns, So ___ and ___ are factors of ____.	Language / structure.	There are 12 tiles. There are 4 rows and 3 columns, So 4 and 3 are factors of 12
<b>1 is a factor of all positive integers. Every positive integer is a factor of itself. The smallest factor of a positive integer is always 1. The largest factor of a positive integer is always itself.</b>	<b>Generalisation</b>	

___ is a factor of ___ because ___ is in the ___ times table.	Structure / language	
<b>Numbers that have more than two factors are composite numbers.</b>	<b>Generalisation</b>	
<b>Numbers that have exactly two factors are prime numbers.</b>	<b>Generalisation</b>	
The common factors of ___ and ___ are _____	Language / structure	Common factors
___ and ___ are prime factors of _____		Prime Factors  2 and 3 are prime factors of 12.

**Combining calculations**

<b>When there are no brackets, multiplication is completed before addition and subtraction.</b>	<b>Generalisation</b>	
<b>When there are no brackets, division is completed before addition and subtraction.</b>	<b>Generalisation</b>	



$a \times c - c \times c = (a - b) \times c$	Structure / generalisation	
When two dividends are divided by the same divisor, we can <u>add</u> the dividends first then divide.	Generalisation	
When two dividends are divided by the same divisor, we can <u>subtract</u> the dividends first then divide.	Generalisation	

## Number - fractions, decimals and percentages

Pupils should be taught to:

- 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,  $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1 \frac{1}{5}$ ]
- 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,  $0.71 = \frac{71}{100}$ ]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with 2 decimal places to the nearest whole number and to 1 decimal place
- read, write, order and compare numbers with up to 3 decimal places
- solve problems involving number up to 3 decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100', and write percentages as a fraction with denominator 100, and as a decimal fraction
- solve problems which require knowing percentage and decimal equivalents of  $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$  and those fractions with a denominator of a multiple of 10 or 25

### READY TO PROGRESS CRITERIA

Year 4 conceptual prerequisite	Year 5 ready-to-progress criteria	Future applications
Recall multiplication and division facts up to 12 X 12. Find unit fractions of	5F-1 Find non-unit fractions of quantities.	Solve multiplication problems that have the scaling structure.



quantities using known division facts (multiplication tables fluency). Unitise using unit fractions (for example, understand that there are 3 one-fifths in three fifths).		
Recall multiplication and division facts up to 12 X 12. Reason about the location of fractions in the linear number system.	5F-2 Find equivalent fractions and understand that they have the same value and the same position in the linear number system.	Compare and order fractions. Use common factors to simplify fractions. Use common multiples to express fractions in the same denominator. Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
Divide powers of 10 into 2, 4, 5 and 10 equal parts.	5F-3 Recall decimal fraction equivalents for $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{5}$ and $\frac{1}{10}$ , and for multiples of these proper fractions.	Read scales on graphs and measuring instruments. Know percentage equivalents of common fractions.
	5NPV-1 Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.	
	5NPV-2 Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and nonstandard partitioning.	
	5NPV-3 Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.	
	5NPV-5 Convert between units of measure, including using common decimals and fractions.	
	5NF-2 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth), for example: $8 + 6 = 14$ $0.8 + 0.6 = 1.4$ $0.08 + 0.06 = 0.14$	

**SMALL STEPS**

Spring: Fractions	
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White Rose Maths	NCETM
What is a fraction? Equivalent fractions (1) Equivalent fractions Fractions greater than 1 Improper fractions to mixed numbers Mixed numbers to improper fractions Number sequences Compare and order fractions less than 1 Compare and order fractions greater than 1 Add and subtract fractions Add fractions within 1 Add 3 or more fractions Add mixed numbers Subtract fractions Subtract mixed numbers Subtract – breaking the whole Subtract 2 mixed numbers Multiply unit fractions by an integer Multiply non-unit fractions by an integer Multiply mixed numbers by integers Calculate fractions of a quantity Fraction of an amount Using fractions as operators	3.7 Finding equivalent fractions and simplifying fractions 3.8 Common denominator: more adding and subtracting

**STEM SENTENCES**

[Enigma-Stem-Sentence-bank-Fractions-with-links.pdf](#)

<b>Equivalent Fractions</b>			
Year 5: 3.7 1:9	<b>When two or more fractions have the same value. We call them equivalent fractions.</b>	Generalisation	
Year 5: 3.7 2:12	The numerator has been scaled up/down by ____ The denominator has been scaled up/down by ____ These fractions are /are not equivalent.	Language / structure	The numerator has been scaled up by 4 The denominator has been scaled up by 4 These fractions are equivalent.
Year 5: 3.7 2:16		Language / structure	




Year 5: 3.7 2:20	is equal  because both the numerator and denominator have been scaled by a factor of ____	Language / structure	$\frac{3}{8}$ is equal $\frac{12}{32}$ because both the numerator and denominator have been scaled by a factor of four.																																																																																				
Year 5: 3.7 2:21	<b>When the numerator and denominator are multiplied or divided by the same number, the value of the fractions remains the same.</b>	Generalisation	<table border="1" style="display: inline-table; margin-right: 20px;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr> <tr><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td><td>22</td><td>24</td></tr> <tr><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td><td>21</td><td>24</td><td>27</td><td>30</td><td>33</td><td>36</td></tr> <tr><td>4</td><td>8</td><td>12</td><td>16</td><td>20</td><td>24</td><td>28</td><td>32</td><td>36</td><td>40</td><td>44</td><td>48</td></tr> <tr><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>55</td><td>60</td></tr> <tr><td>6</td><td>12</td><td>18</td><td>24</td><td>30</td><td>36</td><td>42</td><td>48</td><td>54</td><td>60</td><td>66</td><td>72</td></tr> <tr><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td><td>42</td><td>49</td><td>56</td><td>63</td><td>70</td><td>77</td><td>84</td></tr> </table>	1	2	3	4	5	6	7	8	9	10	11	12	2	4	6	8	10	12	14	16	18	20	22	24	3	6	9	12	15	18	21	24	27	30	33	36	4	8	12	16	20	24	28	32	36	40	44	48	5	10	15	20	25	30	35	40	45	50	55	60	6	12	18	24	30	36	42	48	54	60	66	72	7	14	21	28	35	42	49	56	63	70	77	84
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<b>Simplifying Fractions</b>																																																																																							
Year 5: 3.7	The highest common factor is ____ so divide the numerator and denominator by ____	Language / structure	The highest common factor is 4 so divide the numerator and denominator by 4																																																																																				
Year 5: 3.7 3:5	<b>A fraction can be simplified when the numerator and denominator have a common factor other than one.</b>	Generalisation																																																																																					
Year 5: 3.7 3:5	<b>To write a fraction in its simplest form, divide both the numerator and denominator by their highest common factor.</b>	Generalisation	Highest common factor = 3 																																																																																				
Year 5: 3.7 3:8	is not in its simplest form because ____ is a common factor of ____ and  is in its simplest form because one is the only common factor of ____ and ____	Language / structure.	'Sort the following numbers according to whether they are expressed in their simplest form or not.' $\frac{3}{15}$ $\frac{2}{5}$ $\frac{4}{20}$ $\frac{25}{36}$ $\frac{1}{6}$ $\frac{7}{21}$ $\frac{18}{30}$ $\frac{9}{17}$ $\frac{5}{15}$ $\frac{11}{20}$ $\frac{23}{30}$ 4/20 is not in its simplest form because four is a common factor of 4 and 20 23/50 is in its simplest form because one is the only common factor of 23 and 30.																																																																																				

<b>Comparing Fractions</b>
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<p>Year 5: 3.8 5:1</p>	<p>To compare fractions with different numerators and denominators convert to common denominators.</p>	<p>Generalisation</p>	
<p><b>Adding and subtracting Fractions</b></p>			
<p>Year 5: 3.8 1:6</p>	<p>Related fractions have denominators where one denominator is a multiple of the other.</p>	<p>Generalisation</p>	<p><math>\frac{1}{3}</math> and <math>\frac{1}{9}</math></p> <p>We can change <math>\frac{1}{3}</math> to <math>\frac{3}{9}</math>.</p>
<p>Year 5: 3.8 1:8</p>	<p> and  are related fractions because the denominator ___ is a multiple of the other denominator ___</p>	<p>Structure / language</p>	<p><math>\frac{1}{16}</math> and <math>\frac{1}{4}</math> are related fractions because the denominator, "16", is a multiple of the other denominator, "4".</p>
<p>Year 5: 3.8</p>	<p>Fractions must have the same denominator before they can be added or subtracted.</p>	<p>Generalisation</p>	
<p>Year 5: 3.8</p>	<p>When fractions have the same denominator, we call this a common denominator.</p>	<p>Generalisation</p>	
<p>Year 5: 3.8</p>	<p>To add or subtract fractions with different denominators, first convert to fractions with a common denominator.</p>	<p>Generalisation</p>	$\frac{2}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6} = \frac{1}{2}$ <p>To solve <math>\frac{1}{3} + \frac{1}{6}</math>, convert <math>\frac{1}{3}</math> to <math>\frac{2}{6}</math> by scaling 1 and 3 up by two then add <math>\frac{2}{6}</math> and <math>\frac{1}{6}</math> together.</p>
<p>Year 5: 3.8</p>	<p>To find a common denominator, identify the lowest common multiple of the denominators then create an equivalent fraction.</p>	<p>Generalisation</p>	<p>Multiples of 3: 3, 6, 9, 12, 15          Multiples of 5: 5, 10, 15          The lowest common multiple of 3 and 5 is 15.</p>



<p>Year 5: 3.8</p>	<p><b>We can find a common denominator for two non related fractions by multiplying their denominators.</b></p>	<p><b>Generalisation</b></p>	 <p>If you multiply the two denominators 3 and 5 you will get the common denominator product of 15.</p>
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<p>SUMMER: Decimals and Percentages</p>	
<p>White Rose Maths                  Decimals up to 2 d.p.                  Decimals as fractions                  Understand thousandths                  Thousandths as decimals                  Rounding decimals                  Order and compare decimals                  Understand percentages                  Percentages as fractions and decimals                  Equivalent F.D.P.</p> <p>Adding decimals within 1                  Subtracting decimals within 1                  Complements to 1                  Adding decimals – crossing the whole                  Adding decimals with the same number of decimal places                  Subtracting decimals with the same number of decimal places                  Adding decimals with a different number of decimal places                  Subtracting decimals with a different number of decimal places                  Adding and subtracting wholes and decimals                  Decimal sequences                  Multiplying decimals by 10, 100 and 1,000                  Dividing decimals by 10, 100 and 1,000</p>	<p>NCETM</p>

**STEM SENTENCES**



# Measurement

Pupils should be taught to:

- 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), including using standard units, square centimetres (cm<sup>2</sup>) and square metres (m<sup>2</sup>), and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm<sup>3</sup> 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

Year 4 conceptual prerequisite	Year 5 ready-to-progress criteria	Future applications
Divide 100 and 1,000 into 2, 4, 5 and 10 equal parts. Find unit fractions of quantities using known division facts (multiplication tables fluency).	5NPV- Convert between units of measure, including using common decimals and fractions.	Read scales on measuring instruments, and on graphs related to measures contexts. Solve measures problems involving different units by converting to a common unit.
Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to scaling a number by 10 or 100.	5MD-1 Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size.	Convert between different metric units of measure.

## SMALL STEPS

Measurement: Summer	
White Rose Maths	
Kilometres Kilograms and kilometres Millimetres and millilitres Metric units Imperial units Converting units of time Timetables  What is volume? Compare volume Estimate volume Estimate capacity	<p><b>Notes: Children have converted between metres and kilometres in year 4 and now build on this to look at other conversions. It is a good idea to recap the small step on kilometres to reinforce the idea of the prefix 'kilo-' meaning 'thousand'.</b></p> <p><b>Here children are reintroduced to the idea of volume but in a more formal way than they have seen previously</b></p>

## STEM SENTENCES



# Geometry - properties of shapes

Pupils should be taught to:

- 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 ( $^{\circ}$ )
- identify:
  - angles at a point and 1 whole turn (total  $360^{\circ}$ )
  - angles at a point on a straight line and half a turn (total  $180^{\circ}$ )
  - other multiples of  $90^{\circ}$
  - 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

## READY TO PROGRESS CRITERIA

Year 4 conceptual prerequisite	Year 5 ready-to-progress criteria	Future applications
Recognise right angles as a property of shape or a description of a turn, and identify right angles in 2D shapes presented in different orientations. Identify whether the interior angles of a polygon are equal or not.	5G-1 Compare angles, estimate and measure angles in degrees ( $^{\circ}$ ) and draw angles of a given size.	Solve problems involving missing angles.
Compose polygons from smaller shapes. Recall multiplication facts up to $12 \times 12$	5G-2 Compare areas and calculate the area of rectangles (including squares) using standard units.	Calculate the area of compound rectilinear shapes and other 2D shapes, including triangles and parallelograms, using standard units. Use the relationship between side-length and perimeter, and between side-length and area to calculate unknown values.

## SMALL STEPS

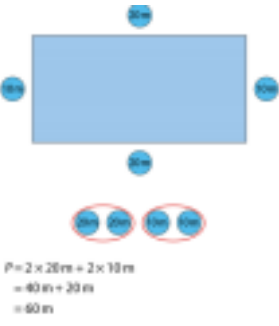
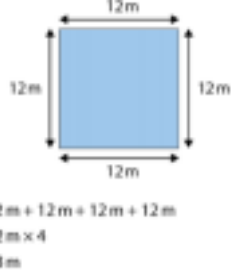
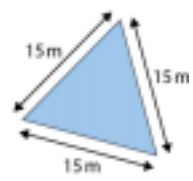
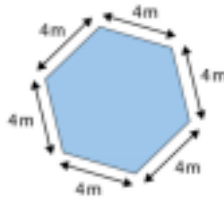
AUTUMN: PERIMETER AND AREA	
White Rose Maths	
Measure perimeter <i>Perimeter on a grid</i> <i>Perimeter of rectangles</i> <i>Perimeter of rectilinear shapes</i> Calculate perimeter <i>Counting squares</i> Area of rectangles Area of compound shapes Area of irregular shapes	<b>A recap of key learning from Year 4 may be useful here. The learning objectives in italics are Recaps of Year 4. It is important that children understand perimeter and area on a grid before moving into shapes with just side lengths marked.</b>

## STEM SENTENCES

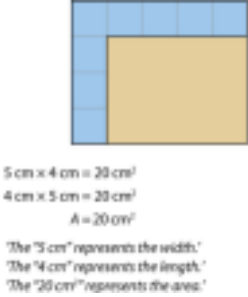
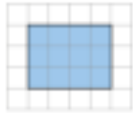

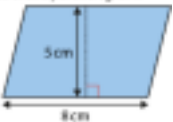
A COLLECTION OF STEM SENTENCES FROM ENIGMA MATHS HUB BASED ON THE NCETM PD MATERIALS

**Area and Perimeter**



<p>Perimeter is equal to two times ____ plus two times ____.</p>	<p>Language / structure.</p>	 <p><math>P = 2 \times 20\text{m} + 2 \times 10\text{m}</math>  <math>= 40\text{m} + 20\text{m}</math>  <math>= 60\text{m}</math></p>
<p><b>The perimeter of a rectangle is equal to two times the length of the long side plus two times the length of the short side.</b></p>	<p><b>Generalisation</b></p>	
<p>Perimeter of the square is ____ + ____ + ____ + ____</p> <p>Or</p> <p>Perimeter of the square is 4 x ____</p>	<p>Structure</p>	 <p><math>P = 12\text{m} + 12\text{m} + 12\text{m} + 12\text{m}</math>  <math>= 12\text{m} \times 4</math>  <math>= 48\text{m}</math></p>
<p><b>The perimeter of a square is four times the length of one of the sides.</b></p>	<p><b>Generalisation</b></p>	
<p>Perimeter of the equilateral triangle is ____ + ____ + ____</p> <p>Or</p> <p>Perimeter of the equilateral triangle is 3 x ____</p>	<p>Structure</p>	 <p><math>P = 15\text{m} + 15\text{m} + 15\text{m}</math>  <math>= 3 \times 15\text{m}</math>  <math>= 45\text{m}</math></p>
<p><b>The perimeter of an equilateral trinagle is three times the length of one of the sides.</b></p>	<p><b>Generalisation</b></p>	
<p>Perimeter of the regular hexagon is ____ + ____ + ____ + ____ + ____ + ____</p> <p>Or</p> <p>Perimeter of the regular hexagon is 6 x ____</p>		 <p><math>P = 4\text{m} + 4\text{m} + 4\text{m} + 4\text{m} + 4\text{m} + 4\text{m}</math>  <math>= 6 \times 4\text{m}</math>  <math>= 24\text{m}</math></p>



<p>To find the perimeter of a regular polygon, you multiply the length one of the sides by the number of sides.</p>	<p>Generalisation</p>	
<p>If you know the perimeter of a regular polygon you divide it by the number of sides to find the length of one of its sides.</p>	<p>Generalisation</p>	
<p>This shape has an area of ____ square units.</p>		<p>This shape has an area of 8 square units.</p>
<p>We can measure area in square centimetres. We write this as <math>\text{cm}^2</math></p>	<p>Generalisation</p>	
<p>The ____ represents the ____</p>	<p>Structure</p>	
<p>To find the area of a rectangle multiply the length by the width.</p>	<p>Generalisation</p>	 <p><math>4 \times 3 = 12\text{cm}^2</math></p>
<p>A parallelogram can be made into a rectangle that has the same area.</p>	<p>Generalisation</p>	
<p>The base is ____ The perpendicular height is ____ The area is ____</p>	<p>Structure/ language</p>	<p>Find the area of this parallelogram.</p>  <ul style="list-style-type: none"> <li>• 'The base is 8 cm.'</li> <li>• 'The perpendicular height is 5 cm.'</li> <li>• 'The area is <math>8 \times 5 = 40 \text{ cm}^2</math>.'</li> </ul>



<p>To find the area of a parallelogram multiply the base by the perpendicular height.</p>	<p><b>Generalisation</b></p>	
<p>Two right-angled triangles that are the same can be joined to make a rectangle.</p> <p>A rectangle can be divided into two right-angled triangles.</p>	<p><b>Generalisation</b></p>	
<p>Two triangles that are the same can be joined to make a parallelogram.</p> <p>A parallelogram can be divided into two triangles.</p>	<p><b>Generalisation</b></p>	
<p>To find the area of a triangle multiply the base by the perpendicular height and then divide by two.</p>	<p><b>Generalisation</b></p>	
<p>Shapes can have the same perimeter but different areas.</p> <p>Shapes can have the same area but different perimeters.</p>	<p><b>Generalisation</b></p>	
<p>When a shape has been transformed by a scale factor, the perimeter is also transformed by the same scale factor.</p>	<p><b>Generalisation</b></p>	

<p>Summer GEOMETRY: PROPERTIES OF SHAPE</p>	
<p>Identify angles Compare and order angles Measure angles in degrees Measuring with a protractor</p>	<p>Learning on properties of shape may have been missed during lockdown or covered remotely. Children should recap the essential prerequisite knowledge from Year 4 before moving on to look at Year 5 content.</p>



Drawing lines and angles accurately Calculating angles on a straight line Calculating angles around a point Triangles Quadrilaterals Calculating lengths and angles in shapes Regular and irregular polygons Reasoning about 3-D shapes	
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## Geometry - position and direction

Pupils should be taught to:

- 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

### SMALL STEPS

Summer: Geometry: Position and Direction	
White Rose Maths	
Describe position Draw on a grid Position in the first quadrant Translation Translation with coordinates Lines of symmetry Complete a symmetric figure Reflection Reflection with coordinates	



# Statistics

Pupils should be taught to:

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

## READY TO PROGRESS CRITERIA

Year 4 conceptual prerequisite	Year 5 ready-to-progress criteria	Future applications
Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts.	5NPV-4 Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts.	Read scales on graphs and measuring instruments.

## SMALL STEPS

Summer: Statistics	
White Rose Maths	
Interpret charts Comparison sum and difference Introduce line graphs Read and interpret line graphs Draw line graphs Use line graphs to solve problems Read and interpret tables Two-way tables Timetables	

## STEM SENTENCES

When the Y coordinate is negative the point is positioned below the x-axis. When the Y coordinate is 0 the point is positioned on the x-axis. When the x-coordinate is negative the point is positioned to the left of the y-axis. When the x-coordinate is 0 the point is positioned on the y-axis.	
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