

YEAR 7, STAGE 6 - NUMBER, MATHS

Rationale and Context of Unit:	Core curriculum content:	Tier 2 & Tier 3 vocabulary explicitly taught:
<p><u>Numbers and the number system</u></p> <p><u>Key Skills:</u></p> <ul style="list-style-type: none"> Understand and use place value in numbers with up to seven digits Multiply and divide whole numbers by 10, 100, 1000 Multiply and divide numbers with one decimal place by 10, 100, 1000 Know the meaning of 'factor' and 'multiple' and 'prime' <p><u>Calculating</u></p> <p><u>Key Skills:</u></p> <ul style="list-style-type: none"> Recall multiplication facts for multiplication tables up to 12 × 12 Recall division facts for multiplication tables up to 12 × 12 Understand the commutativity of multiplication and addition Multiply a three-digit number by a two-digit number using long multiplication Use column addition and subtraction for numbers with more than four digits 	<p><u>Numbers and the number system</u></p> <p><u>Place Value</u></p> <p>You will work with large numbers up to ten million and decimals up to 3 decimal places</p> <ul style="list-style-type: none"> Write and read numbers up to and including 10 000 000 Compare and order numbers up to and including 10 000 000 Multiply whole numbers by 10 Multiply whole numbers by 100 Multiply whole numbers by 1000 Divide whole numbers by 10 Divide whole numbers by 100 Divide whole numbers by 1000 <p><u>Negative Numbers</u></p> <p>You will explore the use of negative numbers</p> <ul style="list-style-type: none"> Understand and use negative numbers when working in context, such as temperature Calculate intervals across zero 	<p>Tier 2 & Tier 3 vocabulary explicitly taught:</p> <ul style="list-style-type: none"> Place value, Digit, Negative number, (Common) multiple, (Common) factor, Divisible, Prime number and Composite number. Addition, Subtraction, Sum, Total, Difference, Minus, Less, Column addition, Column subtraction, Operation, Multiply, Multiple, Multiplication, Times, Product, Commutative, Factor, Short multiplication, Long multiplication and Estimate. Commutative, Divide, Division, Divisible, Divisor, Dividend, Quotient, Remainder, Factor, Short division, Long division, Remainder, Operation and <i>Estimate</i>. Approximate (noun and verb), Round, Decimal place, Check, Solution, Answer, Estimate (noun and verb), Order of magnitude, Accurate and Accuracy <p><i>Highlighted words MUST be explicitly taught, defined and recorded in student books as they are first met. Other listed words may be introduced verbally or written in a similar format.</i></p>

Bring on the Maths+: Moving on up!

Calculating: #1

Solving problems: #1

Calculating: division

Key Skills:

- Use knowledge of multiplication tables when dividing
- **Know how to use short division**

Exploring fractions, decimals and percentages

Key Skills:

- Understand the concept of a fraction as a proportion
- Understand the concept of equivalent fractions
- Understand the concept of fractions, decimals and percentages being equivalent
- Know standard fraction / decimal equivalences (e.g. $\frac{1}{2} = 0.5$, $\frac{1}{4} = 0.25$, $\frac{1}{10} = 0.1$)
- **Know that a percentage means 'out of 100'**

Multiples, Factors and Primes

You will develop your understanding of multiples and factors and investigate prime numbers

- Find common multiples of two numbers
- **Find common factors of two numbers**

Calculating

Mental arithmetic

You will develop mental calculation skills

- Carry out calculations mentally involving numbers up to 4 digits.
- Solve problems involving addition, subtraction and multiplication

Written methods

You will extend written methods of multiplication

- Multiply a four-digit number by a two-digit number using a suitable written method
- Carry out calculations involving mixture of addition and subtraction
- Carry out calculations involving mixture of multiplication and addition/subtraction

Proportional reasoning

Key Skills:

- Recall multiplication facts for multiplication tables up to 12×12
- Recall division facts for multiplication tables up to 12×12
- Find fractions of an amount
- **Find multiples of a given number**

Calculating fractions, decimals and percentages

Key Skills:

- Convert between mixed numbers and improper fractions
- Find equivalent fractions
- Add and subtract fractions when one denominator is a multiple of the other
- Multiply a proper fraction by a whole number
- Use the formal written method of short multiplication
- Know the effect of multiplying and dividing by 10 and 100
- **Know percentage equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$**

- **Solve multi-step problems involving addition, subtraction and/or multiplication**

Calculating: division

Division

You will develop written methods of short division for numbers up to four-digits divided by a one-digit number

And deal with remainders when carrying out division

- Divide a three-digit number by a two-digit number using a formal written method of division with no remainder
- Divide a three-digit number by a two-digit number using a formal written method of division with a remainder
- Divide a four-digit number by a two-digit number using a formal written method of division with no remainder
- Divide a four-digit number by a two-digit number using a formal written method of division with a remainder
- Understand how to write the remainder to a division problem as a whole number remainder or as a fraction

Checking, approximating and estimating

Key Skills:

- Approximate any number by rounding to the nearest 10, 100 or 1000, 10 000 or 100 000
- Approximate any number with one or two decimal places by rounding to the nearest whole number
- Approximate any number with two decimal places by rounding to the one decimal place
- **Estimate addition (subtraction) calculations with up to four digits**

- Understand how to interpret remainder to a division problem appropriately for the context
- **Solve problems involving division**

Exploring fractions, decimals and percentages

Cancelling fractions

You will explore and use the equivalence between fractions

- Use common factors to simplify fractions
- Use common multiples to find equivalent fractions
- Compare and order fractions
- Compare and order fractions, including fractions > 1

Fractions, decimals and percentages

You will explore the equivalence between fractions, decimals and percentages

- Understand a fraction is associated with division
- Work out the decimal equivalents of fifths, eighths and tenths
- Know simple fractions, decimals and percentages equivalences (e.g. 10%, 20%, 25%, 50%, 75%, 100%)

- **Find equivalencies between fractions, decimals and percentages**

Proportional reasoning

Ratio

You will solve problems involving scaling, sharing and grouping

- Solve simple problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts; e.g. find the value of the parts, given the whole)
- Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts; e.g. find the value of the whole and parts, given one part)
- Use a scale factor to solve problems involving similar shapes
- Find the scale factor of similar shapes
- Solve problems involving unequal sharing or grouping problems using fractions
- Solve problems involving unequal sharing or grouping problems using multiples

Calculating fractions, decimals and percentages

Fractions: Addition and subtraction

- Add fractions with different denominators
- Add a mixed number and a fraction, including with different denominators
- Add mixed numbers, including with different denominators
- Subtract fractions with different denominators
- Subtract a mixed number and a fraction, including with different denominators
- Subtract mixed numbers, including with different denominators

Fractions: Multiplication and division

- Multiply a proper fraction by a proper fraction
- Divide a proper fraction by a whole number

Decimals

- Multiply U.t by U
- Multiply U.th by U

Percentages

- Calculate percentages of a quantity

- **Solve problems involving the use of percentages to make comparisons**

Checking, approximating and estimating

Rounding

You will explore ways of approximating numbers

- Approximate any number by rounding to a specified degree of accuracy; e.g. nearest 1, 10, 100, 1000, decimal place, etc

Estimating

You will explore ways of checking answers

- Understand estimating as the process of finding a rough value of an answer or calculation
- Use estimation to predict the order of magnitude of the solution to a decimal calculation, including decimals
- **Check the order of magnitude of the solution to a calculation, including decimals**

Challenge and Support:	World wide learning/ links to 21 st century:	Cultural capital/ Industry/ Enrichment:
<ul style="list-style-type: none"> • Convince me that 109 is a prime number • Jenny writes $2.54 \times 10 = 25.4$. Kenny writes $2.54 \times 10 = 25.40$. who do you agree with? Explain why. • Look at this number (24 054 028). Show me another number (with 4, 5, 6, 7 digits) that includes a 5 with the same value. And another. And another ... • <i>Convince me a common factor of 12 and 30 is 6.</i> • Find missing digits in otherwise completed long multiplication calculations • Convince me that $2472 \times 12 = 29664$ • Why have you chosen to add (subtract, multiply)? • NCETM: Addition and Subtraction Reasoning • <i>NCETM: <u>Multiplication and Division Reasoning</u></i> • Find missing digits in otherwise completed long / short division calculations • Show me a calculation that is connected to $147 \times 26 = 3822$. And another, and another ... 	<ul style="list-style-type: none"> • Interior designers use square units to work out the area of floors to be tiled or painted. Then they work out how much paint to buy and use the size of tiles to work out how many are needed. • Everyone uses numbers on a daily basis often without really thinking about it, shopping, cooking, working out bills, paying for transport and measuring all rely on a good understanding of number and calculation skills. • Food technologists analyse the contents of different raw a prepared foods to work out what they contain and how much there is of each ingredient. They use decimal fractions to give the quantities correct to tenths, hundredths or even smaller parts of a gram. • Percentages are often used in daily life to express fractions. For example you might see an advert claiming 76% of pets prefer a particular brand of food. Sale prices, reductions, discounts and interest rates are usually given a percentages. 	<p>NRICH website – access current articles and enrichment activities. Search tool: secondary, age 11-14, Number</p> <p>https://nrich.maths.org/public/topic.php?group_id=10</p> <ul style="list-style-type: none"> • NRICH provides thousands of free online mathematics resources for ages 3 to 18 - completely free and available to all via their website (nrich.maths.org/). These resources aim to: <ul style="list-style-type: none"> ○ Enrich and enhance the experience of the mathematics curriculum for all learners ○ Develop mathematical thinking and problem-solving skills ○ Offer challenging, inspiring and engaging activities • <i>Decades Day – Runaround game (1980s).</i>

- Show me a division calculation that has no remainder. Now show me a division by a two-digit number that has no remainder. And now, a four-digit number divided by a two-digit number that has no remainder. And now, with a remainder of 3 ...
- Show me another fraction that is equivalent to this one. And another. And another ...
- Convince me that $\frac{3}{8} = 0.375$
- If you know that $\frac{1}{10} = 0.1 = 10\%$, what else can you work out?
- Jenny is simplifying fractions. She has the fraction $\frac{16}{64}$. Jenny says, 'if I cancel out the sixes then $\frac{16}{64} = \frac{1}{4}$.' Do you agree with Jenny? Why?
- (Given a recipe for 4 people) show me an amount of food that is needed for 8 people, 6 people, 9 people. Show me an amount of food that is needed for a number of people of your choice. And another. And another ...
- Convince me that the second shape is an enlargement of the first shape
- Kenny has no sweets. Jenny gives $\frac{1}{3}$ of her sweets to Kenny. Jenny now has 18 sweets. Kenny thinks that Jenny had 54 sweets to start with. Kenny is wrong. Explain why.

- Nurses and other medical staff work with fractions, decimals and percentages. They calculate medical doses, convert between measuring systems and set patient's drips. It is essential these calculations are accurate.
- When you read that 34000 people attended a football match the actual number is likely to be slightly less or slightly more. When you work out an estimate for how much you spent over a weekend or look at an object and guess it is 2.5m long or say "I live about 3km from school you are using estimating and approximating skills.

<ul style="list-style-type: none"> • Show me an 'easy' ('difficult') pair of fractions to add (subtract). And another. And another. • Kenny thinks that $\frac{7}{10} - \frac{2}{7} = \frac{5}{3} = 1\frac{2}{3}$. Do you agree with Kenny? • Jenny thinks that you can only multiply fractions if they have the same common denominator. Do you agree with Jenny? Explain. • Benny thinks that $\frac{4}{10} \div 2 = \frac{4}{5}$. Do you agree with Kenny? Explain. • Lenny says '20% of £60 is £3 because $60 \div 20 = 3$'. Do you agree? • Convince me that 67 rounds to 60 to the nearest 20 • Convince me that 1 579 234 rounds to 2 million to the nearest million • Jenny writes $1359 \div 18 \square 7.55$. Comment on Jenny's approximation. • Lenny writes $2.74 \times 13 \square 26$. Do you agree with Lenny? Explain your answer. • 		
<p>Historical, Social, Moral, Spiritual, Cultural context:</p>	<p>Cross curricular links/ literacy/numeracy:</p>	<p>Common misconceptions:</p>
<ul style="list-style-type: none"> • <i>Students conducting an opinion survey on a moral issue.</i> • <i>Students having an awareness of sexist or racist, stereotypical bias in materials - e.g. for worksheets to</i> 	<ul style="list-style-type: none"> • <i>It is important that students understand accepted ways to represent numbers dependent on the context. For example, we use fractions, decimals and</i> 	<ul style="list-style-type: none"> • Some pupils confuse factors and multiples. • Some pupils can confuse the language of large (and small) numbers since the prefix 'milli-' means 'one thousandth' (meaning that there are 1000

household and developing personal financial independence.

- *Probability, gambling and the online gaming industry promoting moral debate.*
- *Interest rates, pay day loans and the banking industry promoting moral debate and a sense of personal financial responsibility.*
- *Students to have the ability to use exchange rates for foreign travel.*

follows has been correctly carried out based on an early misunderstanding.

- A fraction can be visualised as divisions of a shape (especially a circle) but some pupils may not recognise that these divisions must be equal in size, or that they can be divisions of any shape.
- Pupils may not make the connection that a percentage is a different way of describing a proportion

Some pupils may think that simplifying a fraction just requires searching for, and removing, a factor of 2 (repeatedly)

- Many pupils will want to identify an additive relationship between two quantities that are in proportion and apply this to other quantities in order to find missing amounts
- When finding a fraction of an amount some pupils may try to use a rule formed without the necessary understanding. As a result, they will muddle the operations, dividing by the numerator and multiplying by the denominator.
- ***When constructing an enlargement some pupils may only apply the scale factor in one dimension; for example, ‘enlarging’ a 2 by 4 rectangle by a scale factor of 2 and drawing a 2 by 8 rectangle.***
- Some pupils may think that you simply can simply add/subtract the whole number part of mixed numbers and add/subtract the fractional part of mixed

		<p>numbers when adding/subtracting mixed numbers, e.g. $3\frac{1}{3} - 2\frac{1}{2} = 1\frac{-1}{6}$</p> <ul style="list-style-type: none"> • Some pupils may make multiplying fractions over complicated by applying the same process for adding and subtracting of finding common denominators. • Some pupils may think that as you divide by 10 to find 10%, you divided by 15 to find 15%, divide by 20 to find 20%, divide by 100 to find 100%, etc. • Some pupils may truncate instead of round • When checking the order of magnitude of a division calculation some pupils may apply incorrect reasoning about the effect of increasing the divisor by a factor of 10, thinking that it also makes the solution greater by a factor of 10; e.g. $1400 \div 20$: $1400 \div 2 = 700$ so $1400 \div 20 = 7000$. • Some pupils may round down at the half way point, rather than round up. •
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Assessment timeline:

- Topic test assessments (BAM tests) are conducted at the end of each topic. These are roughly after 2 weeks per topic, but this may vary.
- Pre-checks are conducted at the start of the topic to test student prior knowledge. This informs lesson planning and delivery.
- Tracking assessments are conducted once a term with end of year formal exams, for reporting and checking cumulative knowledge.
- Testing data leads to discussions about setting, intervention groups and individual in-class intervention.
- All students have access to a wide range of resources to develop their understanding.

Home learning

- Homework is set weekly for each group. This will often be via interactive websites with immediate feedback and support.
- Teachers have the autonomy to use whichever resource they wish within the criteria set for the topic.
- *Students have access to lots of resources at home, including: Kerboodle, MyMaths, Mathswatch, PiXL Maths APP, PiXL Times Table App.*

Feedback

- *Feedback is given after each topic test, tracking assessment and end of year exams. After tracking and end of year exams, this will include "Formative Marking" sheets which give feedback question by question to help support the students with priorities for further work.*

Length of unit (duration indicated in lessons)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Unit:																													