Edward Peake Church of England Middle School		
Topic: Sequences	**Year: 7**	**NC Strand: Algebra**

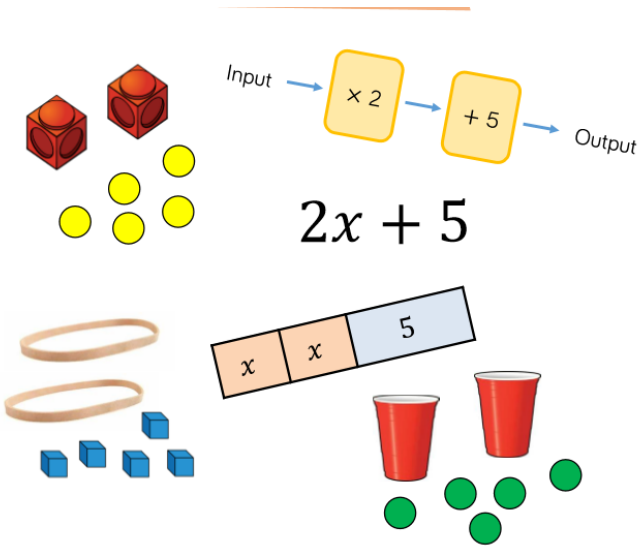
What should I already know?
● How to generate linear number sequences ● How to describe linear number sequences ● How to describe positions on the full coordinate grid (all four quadrants)

What will I know by the end of the unit?
● How to describe and continue a sequence given diagrammatically ● How to predict and check the next term(s) of a sequence ● How to represent sequences in tables and graphs ● How to recognise the difference between a linear and non-linear sequence ● How to continue numerical sequences ● How to continue non-numerical sequences ● How to explain the term to term rule of numerical sequences in words ● How to find missing numbers within sequences

Vocabulary			
Sequence	ordered sets of numbers, shapes or other mathematical objects, arranged according to a rule.	**Difference**	the difference between two quantities or values involves subtraction.
Rule	the pattern a sequence follows	**Constant difference**	the difference between two numbers does not change after adding or subtracting the same quantity to both numbers.
Position	the comparison of where something is related to another object or its surroundings.	**Ascending**	arranged from smallest to largest.
Term	one of the numbers in a sequence, e.g. 1, 3, 5, 7, ...	**Descending**	arranged from largest to smallest.
Term to term	a rule that defines the value of each term in a sequence if the previous terms are known.	**Arithmetic**	a common number sequence where ... the same value is added each time.
Table	mathematical information organised in columns and rows.	**Second difference**	is obtained by taking the difference between consecutive first differences
Graph	a visual diagram used to represent statistical information or functions and equations.	**Geometric**	a number sequence where successive numbers are multiplied by the same value each time.
Linear	number pattern is a sequence of numbers whose difference between all the terms is the same	**Fibonacci sequence**	in a Fibonacci sequence each number is the sum of the two numbers before it
Non-Linear	do not increase from term to term by a constant amount	**Axis**	real or imaginary reference line.(Axes –plural)

Edward Peake Church of England Middle School		
Topic: Sequences	**Year: 7**	**NC Strand: Algebra**

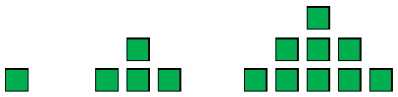
Diagram



Key Information

In lessons we will explore sequences in detail using diagrams and lists of numbers.
Technology will be used to produce graphs so we can appreciate and use the word linear and non-linear linking to the patterns we have spotted in the sequences.
Students will practice using calculators when finding the changes between terms or subsequent terms

What would the fifth term in this sequence look like?.



How might this sequence continue?

Describe the ways in which your sequences are similar and how they are different.

Investigate/Homework tasks

Edward Peake Church of England Middle School		
Topic: Sequences	**Year: 7**	**NC Strand: Algebra**

- Homework will be set from the booklet issued by your teacher
- You should complete at least 30 minutes of maths tasks on Maths Whizz (not games). Please attend help sessions if you do not have access to the internet at home
- Additional work you could complete:
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- To challenge yourself:
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  - Explain the key questions typed in purple text

Key skills/Timeline/Topic Questions

- Is there a quick way of counting the squares/circles/lines in each diagram? Does this help you predict how many squares/circles/lines there are in the 10^{th} term? The 100^{th} term?
- Why does it make sense to join up the dots up on the graphs we have produced in lessons?
- Make up your own sequence and represent it as many ways as you can
- How is a linear sequence different from a non-linear sequence?
- What do you look for in a sequence to decide if it is linear?
- Can a linear sequence be decreasing?
- How many terms do you need to be able to write a linear sequence?
- Why does the common difference help us work out the next term in a linear sequence?
- Do geometric sequences always grow faster than arithmetic sequences?
- How would you explain the difference between an arithmetic sequence and a geometric sequence?
- How many terms are there between the first and the third term?
- How many differences are there between the first and the third term?

Edward Peake Church of England Middle School		
Topic: Understand and Use Notation	**Year: 7**	**NC Strand: Algebra**

What should I already know?	
• How to express missing number problems algebraically • Use simple formula • How to describe and continue a sequence given diagrammatically • How to predict and check the next term(s) of a sequence	• How to represent sequences in tables and graphs • How to recognise the difference between a linear and non-linear sequence • How to continue numerical sequences • How to continue non-numerical sequences • How to explain the term to term rule of numerical sequences in words • How to find missing numbers within sequences

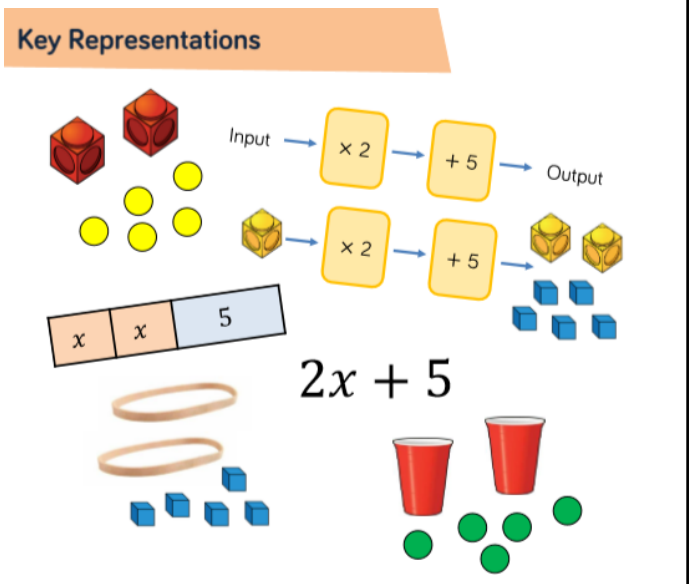
What will I know by the end of the unit?	
• How to use a single function machine • How to use inverse operations to find the input given the output • How to use diagrams and letters to generalise number operations • How to use diagrams and letters with single function machines	• How to find the function machine given a simple expression • How to substitute values into single operation expressions • How to find numerical inputs and outputs for a series of two function machines • How to find the function machine given a two-step expression • How to substitute values into two-step expressions • How to generate sequences given an algebraic rule • How to represent one and two step functions graphically

Vocabulary			
Function	a mathematical relationship from a set of inputs to a set of outputs.	**Order**	arrangement according to size, amount or value.
Input	what is put in, taken in, or operated on by any process or system.	**Constant difference**	the difference between two numbers does not change after adding or subtracting the same quantity to both numbers.
Output	the result of a process or system	**Sequence**	ordered sets of numbers, shapes or other mathematical objects, arranged according to a rule.
Operation	mathematical procedures or processes used to work something out.	**Rule**	The pattern that a sequence follows
		Axis	real or imaginary reference line. (plural – axes)
Square	a number that results from multiplying an integer by itself	**Linear**	number pattern is a sequence of numbers whose difference between all the terms is the same
Inverse	opposite, reverse operations.	**Non-Linear**	do not increase from term to term by a constant amount
Commutative	numbers may be added or multiplied together in any order.	**Term to Term**	a rule that defines the value of each term in a sequence if the previous terms are known.
Expression	an expression is one or a group of terms and may include variables, constants, operators and grouping symbols.	**Position to Term**	a rule that defines the value of each term in a sequence with regard to its position
Variable	a letter or symbol representing a varying quantity,	**Graph**	a visual diagram used to represent statistical information

Edward Peake Church of England Middle School		
Topic: Understand and Use Notation	**Year: 7**	**NC Strand: Algebra**

	for example, n in 10 + n.		or functions and equations.
Coefficient	a number which multiplies a variable.	**Curve**	a curve is not straight
Equation	a mathematical statement containing an equals sign	**Interval**	the space between each value on the scale of a graph.

Diagram/Key Information



Key Information

We will develop a deep understanding of the basic algebra forms. Function machines will be used alongside bar models and letter notation. We will use inverse operations to find the input when given the output of a function machine.

Students need to know the following algebraic notations

ab in place of $a \times b$
$3y$ in place of $y + y + y$ and $3 \times y$
a^2 in place of $a \times a$
ab in place of $a \times b$
$\frac{a}{b}$ in place of $a \div b$

Investigate/Homework tasks

Edward Peake Church of England Middle School		
Topic: Understand and Use Notation	**Year: 7**	**NC Strand: Algebra**

- Homework will be set from the booklet issued by your teacher
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  - Explain the key questions typed in purple text

Key skills/Timeline/Topic Questions

- How can we check if the answer on our calculator is reasonable?
- What happens to the size of the outputs if we change the size of the inputs?
- How can we check that we have worked out our answer for the input correctly?
- Will outputs like a + 3 and 3a always, sometimes or never be the same?
- What does the expression 6a mean?
- Why are the expressions $\frac{a}{2}$ and $\frac{2}{a}$ different?
- Are t + 5 and 5 + t always, sometimes or never equal?
- Are 2p and p^2 always, sometimes or never equal?
- Does it always, sometimes or never make a difference if you change the order of a pair of function machines?
- What is the difference between $\frac{a+4}{2}$ and $\frac{a}{2} + 4$
- How would you use your calculator to find out the square of a number?
- What feature of the difference between the terms tells us if a sequence is linear?
- Which type of rule is better for finding the 100^{th} term of a sequence?
- How can you tell from an equation if the graph is going to be linear?

Edward Peake Church of England Middle School		
Topic: Equality and Equivalence	**Year: 7**	**NC Strand: Algebra**

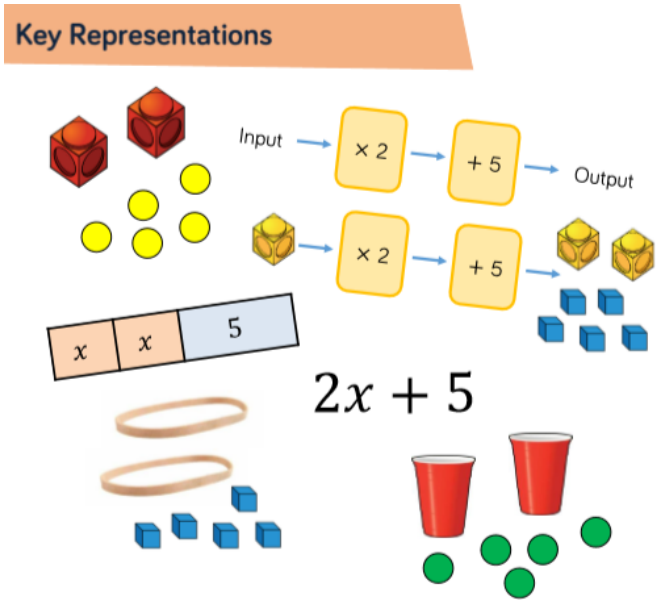
What should I already know?
• How to find pairs of numbers that satisfy an equation with two unknowns • How to use a single function machine • How to use inverse operations to find the input given the output • How to use diagrams and letters to generalise number operations • How to use diagrams and letters with single function machines • How to find the function machine given a simple expression • How to substitute values into single operation expressions • How to find numerical inputs and outputs for a series of two function machines • How to find the function machine given a two-step expression

What will I know by the end of the unit?
• How to write equations correctly • How to explain if an equation is true • How to write and use fact families numerically • How to write and use fact families algebraically • How to solve one-step linear equations involving addition and subtraction by using inverse operations • How to solve one-step linear equations involving multiplication and division by using inverse operations • How to recognise and explain if terms are like terms or unlike terms • How to recognise equivalent expressions and demonstrate they are equivalent • How to collect like terms and use the symbol for equivalence

Vocabulary			
Fact family	a fact family consists of four related number facts.	**Coeficient**	a number which multiplies a variable.
Equation	a mathematical statement containing an equals sign, to show that two expressions are equal.	**Index**	an index (exponent, power or order) is a small number placed to the upper-right of a base number which shows how many copies of the base number are multiplied together.
Solve	work out the answer to a problem.	**Expression**	an expression is one or a group of terms and may include variables, constants, operators and grouping symbols.
Solution	the answer to a problem.	**Equivalent**	expressions that simplify to same expression, e.g. 3(x + y) is equivalent to 3x + 3y.
Inverse	opposite, reverse operations.	**Equal**	having the same amount or value.
Unknown	a variable representing an unknown quantity.	**Simplify an expression**	to remove brackets, unnecessary terms and numbers
Term	one of the numbers in a sequence, e.g. 1, 3, 5, 7, ...	**Collect like terms**	means to simplify terms in expressions in which the variables are the same
Like	are exactly the same except for their coefficients. Can be combined to make a single term.	**Variable**	a letter or symbol representing a varying quantity, for example, n in 10 + n.
		Simplify an expression	to remove brackets, unnecessary terms and numbers

Edward Peake Church of England Middle School		
Topic: Equality and Equivalence	**Year: 7**	**NC Strand: Algebra**

Diagram



Key Information

We will be forming and solving equations using our knowledge of inverse operations. Equations we will meet will require the use of a calculator. This is to ensure students understand how to solve equations rather than using informal methods e.g spotting solutions. We also look at the difference between equivalence and equality by looking at collecting like terms.

Investigate/Homework tasks

- Homework will be set from the booklet issued by your teacher
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Key Questions

Edward Peake Church of England Middle School		
Topic: Equality and Equivalence	**Year: 7**	**NC Strand: Algebra**

- What difference does it make when you swap the right hand side and the left hand side of an equation?
- If you change the order of the terms on one side of an equation, will it still be true?
- Do bar models need to be drawn to scale?
- If you know one addition fact how many subtraction facts do you also know?
- What is the difference between an equation and an expression?
- How is an unknown different from a variable?
- What is the inverse of add on 12?
- Are the equations 3x = 192 and 192 = 3y the same or different?
- How can we check the answers to our equations are correct?
- Why are 3x and $3x^2$ unlike terms?
- What is the coefficient of d in the term -7d?
- Are the expressions 2x and x^2 equivalent. Why or why not?
- Write down as many expressions as you can that are equivalent to 5p
- What's the difference between equality and equivalence?
- Can you simplify unlike terms?

Edward Peake Church of England Middle School		
Topic: Ordering Integers and Decimals	**Year: 7**	**NC Strand: Number**

What should I already know?
• How to read write and represent numbers to ten million in different ways • How to write a number up to ten million putting the comma's in the correct places • How to compare and order whole numbers up to ten million • How to use the correct mathematical vocabulary alongside inequality symbols • How to round numbers up to ten million to the nearest 10, 100, 1000, 10,000, 100,000, 1,000,000 • How to use pictures and number lines to work with negative numbers to find intervals across zero

What will I know by the end of the unit?	
• How to recognise place value of any number up to one billion • How to write integers up to one billion in words and figures • How to work out intervals on a number line • How to position integers on a number line • How to round integers to the nearest power of ten • How to compare two numbers and use the correct symbol • How to order a list of integers • How to find the range for a set of numbers • How to find the median for a set of numbers	• Place value for decimals • How to position decimals on a number line • How to compare an order any number up to one billion • How to round a number to 1 significant figure • How to write 1, 10, 100, 1000, etc as powers of ten • How to write positive integers in the form A X 10^n • Negative powers of ten • How to write decimals in the form A X 10^n

Vocabulary			
Place holder	Halfway	Ascending	Decimal
Place value	Convention	Leading digit	Decimal point
Integer	Round	Range	Round
Digit	Nearest	Greatest	Approximate
Billion	Compare	Least	Significant Figure
Equal division	Equal	Difference	Power
Space	Not equal	Median	Index
Gap	Greater than	Middle	million
Interval	Less than	Average	Standard form
scale	Order	Tenth	Scientific notation
Approximate	Descending	Hundredth	Negative

Investigate/Homework tasks

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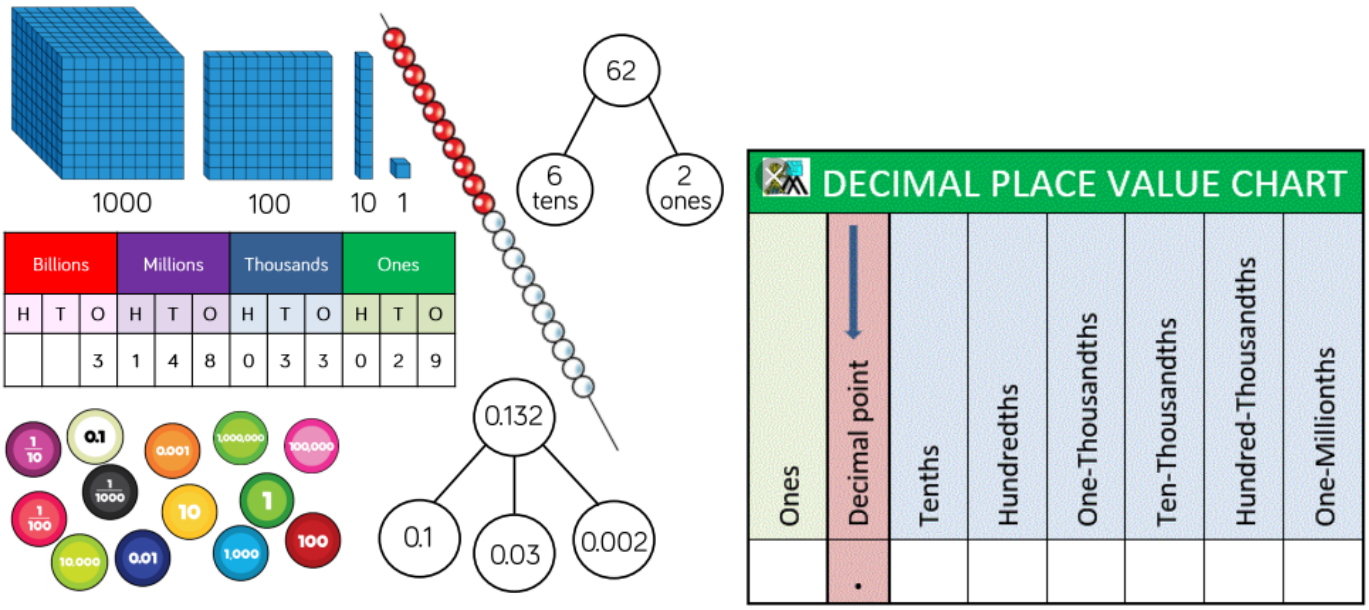
• To challenge yourself: Answer the key questions to deepen your knowledge
  ○ Investigate the key questions typed in red text

Edward Peake Church of England Middle School		
Topic: Ordering Integers and Decimals	**Year: 7**	**NC Strand: Number**

- Explain the key questions typed in purple text

Challenge yourself by answering the questions typed in green text

Diagram



Key skills/Timeline/Topic Questions

Why do we need place holders?
Where do we put spaces and commas inlarge integers?
Why do we count the number of spaces rather than the number of marks on a number line?
Whay can we mark some numbers exactly on a number line and others only approximately?
When talking about the population of the UK would you round to the nearest hundred thousand or million? What about the population of Biggleswade?
Is it true that if a>b and b> c than a> c?
For a set of integers is the longest number always the largest?
How do you calculate the range for a set of numbers?
What is different about the median and the range?
Why do we say 0.37 as nought point three seven not nought point thirty seven?
Why is 0.4 bigger than 0.29, even though twenty nine is bigger than 4?
When you see a list of decimal numbers in the longest number always the largest number?
Explain how to estimate the answer to seventeen million multiplied by two point nine six.
Why do we use standard index form?
What is the difference between positive and negative powers of ten?
Why is ten to the power of zero not equal to zero?

Edward Peake Church of England Middle School		
Topic: Fraction decimal and percentage equivalence	**Year: 7**	**NC Strand: number**

What should I already know?
• How to Identify the value of each digit in numbers given to 3 decimal places and multiply numbers by 10, 100 and 1,000 giving answers up to 3 decimal places • How to write decimals as fractions and fractions to decimals

What will I know by the end of the unit?
• How to represent tenths and hundredths as diagrams • How to represent tenths and hundredths on a number line • How to interchange between fractional and decimal number lines • How to convert fractions to decimals and vice versa (tenths and hundredths) • How to convert fractions to decimals and vice versa (fifths and quarters) • How to convert fractions to decimals and vice versa (eighths and thousandths) • How to use a number square to understand what percentage means • How to convert between simple fractions decimals and percentages • How to use and interpret pie charts • How to represent any fraction as a diagram • How to represent fractions on a number line • How to identify and use simple equivalent fractions • I understand fractions as division • How to convert fluently between fractions, decimals and percentages • How to explore fractions above one, decimals and percentages

Vocabulary			
Place value	Quarter	Three quarters	Part
Digit	Fifth	Half	Equivalence
Place holder	Quarter	Pie chart	Division
Tenths	Equivalent	Fraction	Quotient
Hundredths	Eighth Thousandth	Equal parts	Operator
Interval	Equal	Sector	Improper
Fraction	Percent	Denominator	Rational
Decimal	Percentage	Numerator	Mixed Number
Number Line	Out of Hundred	Whole	Convert

Investigate/Homework tasks
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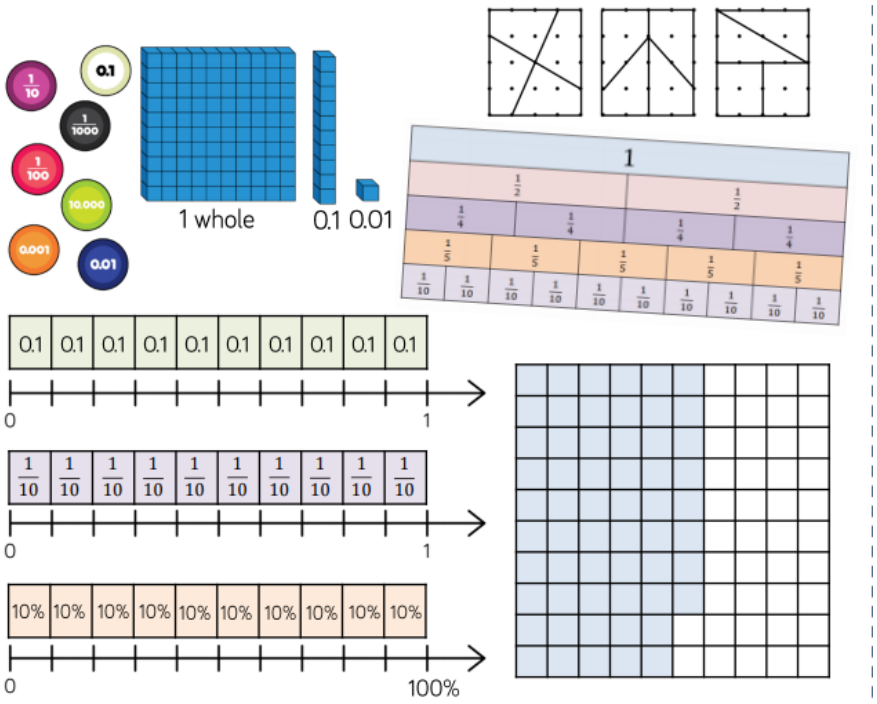
Edward Peake Church of England Middle School		
Topic: Fraction decimal and percentage equivalence	**Year: 7**	**NC Strand: number**

Diagram / Key Information



Key skills/Timeline/Topic Questions

How can you show fractions and decimals on the same number line?
How can we easily convert tenths to hundredths?
Why might it not be so easy to convert hundredths to tenths?
Can you write fifths as tenths and hundredths?
Can you write quarters as tenths? Hundredths? Why?
Why are we unable to write eights in tenths?
Can we write one eight in hundredths? Thousandths? Explain your answer.
Is it possible to 110% effort?
Is it possible to find 110% of an amount?
What's the same about 30% and 3%?
How is a fraction related to a decimal?
How is a percentage related to a fraction?
How is 100% represented as a fraction? As a decimal?
Why is it impossible to compare quantities by looking at two pie charts? What can we compare?
Does a diagram have to be split into equal parts in order to identify the fraction shaded or not shaded?
How can we represent the "whole" on a number line?
What makes a fraction equivalent to another fraction?
Why are equivalent fractions useful in making comparisons?
When are fractions used as quotients?

Edward Peake Church of England Middle School		
Topic: Fraction decimal and percentage equivalence	**Year: 7**	**NC Strand: number**

Why do we use all three representations of fractions, decimals and percentages?

Edward Peake Church of England Middle School		
Topic: Solving Problems Using Additin and Subtraction	**Year: 7**	**NC Strand: Number**

What should I already know?
• How to use column addition and subtraction with multidigit calculations? • How to decide if mental, informal or column methods of addition and subtraction are more appropriate for a calculation • How to reason and apply my understanding of calculations, inverses and commutativity to use known facts when calculating • How to use my knowledge of rounding to estimate answers for calculations and problems • How to use inverse operations to check my answers to addition and subtraction calculations • How to use my knowledge of addition and subtraction to solve multi-step problems • How to solve problems involving number up to three decimal places

What will I know by the end of the unit?	
• How to use the properties of addition and subtraction • How to use mental strategies to solve addition and subtraction problems • How to use formal methods for addition of integers • How to use formal methods for addition of decimals • How to use formal methods for subtraction of integers • How to use formal methods for subtraction of decimals	• How to choose the most appropriate method to solve a problem • How to solve problems in the context of perimeter • How to solve financial maths problems • How to solve problems involving timetables and tables • How to solve problems with frequency trees • How to solve problems with bar charts and line charts • How to add and subtract numbers given in standard form

Vocabulary			
Total	Inverse	Number Bonds	Decimal point
Sum	Bridging	Column Method	Estimate
Difference	Compensation	Exchange	Equivalence
Number line	Difference	Place Value	Partition
Commutative	Count On	Place Holder	Subtraction
Associative	Partition	Carrying	Addition
Equation	Digit	Formal Method	jottings
Calculator	Mental	Length	units
Path	sides	polygon	distance
profit	Debit	loss	statement
balance	Change	credit	bill
Frequency	Frequency tree	Axis	scale
Standard form	exponent	Significant figure	billion
million	minutes	hours	

Investigate/Homework tasks

Edward Peake Church of England Middle School		
Topic: Solving Problems Using Additin and Subtraction	**Year: 7**	**NC Strand: Number**

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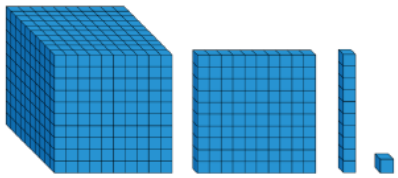
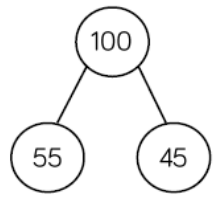
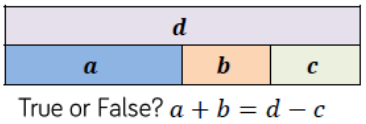
Diagram / Key Information

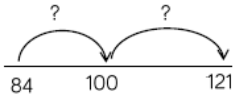
Key Representations

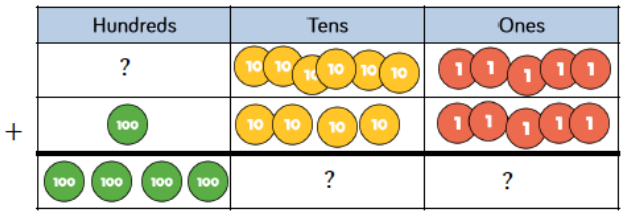






True or False? $a + b = d - c$





Concrete, pictorial and abstract representations are an important part of developing students' conceptual understanding.

Number lines are particularly useful for both addition and subtraction and provide a good model of mental methods.

The column methods are sometimes not understood by students and are therefore prone to error. Linking these formal methods to the use of place value counters and/or base 10 blocks illustrating exchanges is very useful.

Key skills/Timeline/Topic Questions

If we know $x = y + z$, what other addition facts do we know? What subtraction facts do we know?
What's the easiest way to add a list of numbers like this: $6 + 8 + 4 + 7 + 2 + 3$?
How could a number line help us to find the difference between, say, 186 and 354?

Make up an example where number bonds to 10 and 100 are useful to perform mental calculations.
How does adding the same number to both parts of a subtraction affect the difference?
Find three ways to mentally calculate $700 - 438$

Why do you not add/subtract the powers when adding/subtracting numbers written in standard form?

Explain the difference between 10^{-3} and 10^{3}

Does the column method for subtraction work when dealing with time? Why or why not?
Explain how we could use a number line (or time line) to help us with calculations for time.
Is it true that sum of all the row totals in a table equal to the sum of all the column totals? Why or why not?

Why do we start column addition with the column on the right?
When and why do we exchange in column addition?
Is the column method always the best way to solve an addition problem?

What is the difference between the words credit and debit on a bank statement.?

How do you calculate profit?

Why does a calculator display £12.50 as 12.5?

Explain the relationships between the numbers in a frequency tree.

When might we have a frequency tree with more than two branches?

Why isn't subtraction commutative?
How can we check the answer to a subtraction?
When do we need to perform exchanges when doing a written subtraction?

How do you decide which method to use to perform a

Edward Peake Church of England Middle School		
Topic: Solving Problems Using Additin and Subtraction	**Year: 7**	**NC Strand: Number**

How do we line up decimal addition if one of the numbers is an integer?

What does placeholder mean? Why do we use placeholders?

Why is the number of sides on a shape the same as the number of terms in a perimeter addition?

If all the sides of a rectangle are increased by 2 units, how could we know how much the perimeter has increased by?

Edward Peake Church of England Middle School		
Topic: Solving problems multiplication and division	**Year: 7**	**NC Strand: Number**

What should I already know?
• How to multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication How to divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context • How to divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context • How to perform mental calculations, including with mixed operations and large numbers • How to identify common factors, common multiples and prime numbers

What will I know by the end of the unit?	
• How to apply the properties of multiplication and division • How to understand and use multiples • How to understand and use factors • How to multiply and divide integers and decimals by powers of ten • How to multiply by 0.1 and 0.01 • How to convert metric units • How to use formal methods to multiply integers • How to use formal methods to multiply decimals	• How to use formal methods to divide integers • How to use formal methods to divide decimals • How to use order of operations • How to solve problems using area of rectangles and parallelograms • How to solve problems using area of triangles • How to solve problems using area of trapezia • How to solve problems using the mean • How to multiply and divide algebraic expressions

Vocabulary			
Product	Even	Ones	Efficient
Multiply	Venn Diagram	Metric	Integer
Divide	Integer	Convert	Estimate
Inverse	Multiple	Milli	Adjust
Quotient	Common	Centi	Divisor
Commutative	Lowest Common Multiple	Kilo	Dividend
Factor	Place Value	Litre	Remainder
Array	Hundredths	Gram	Decimal
Odd	Tenths	Metre	Priority
Order	Operation	Base	Parallelogram
Perpendicular height	Parallel	Trapezium	Mean
Average	Median	Range	Coefficient
Expression	Simplify	Term	

Investigate/Homework tasks

Edward Peake Church of England Middle School		
Topic: Solving problems multiplication and division	**Year: 7**	**NC Strand: Number**

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Key Information/Diagrams

The aim is to get to the formal method but the children need to understand how it works.

6 x 23 =

$$\begin{array}{r} 23 \\ \times\ 6 \\ \hline 138 \\ \hline 1\ 1 \end{array}$$

Long division

To get 744 children have solved 6 x 124
To get 2480 they have solved 20 x 124

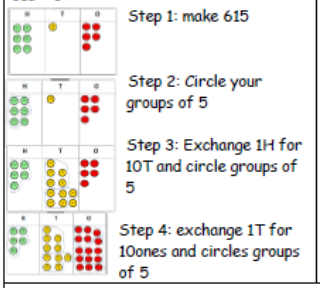
$$\begin{array}{r} 1\ 2\ 4 \\ \times\ \ 2\ 6 \\ \hline 7\ 4\ 4 \\ 2\ 4\ 8\ 0 \\ \hline 3\ 2\ 2\ 4 \\ 1\ 1 \end{array}$$

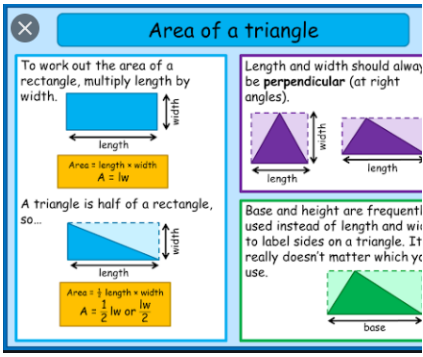
Answer: 3224

$$5\overline{)615}\quad 123$$

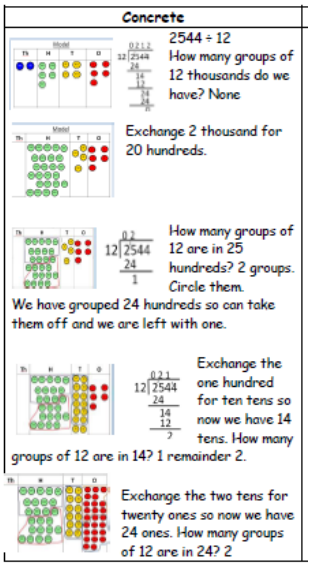
Use of the 'bus stop method' using grouping and counters. Key language for grouping- how many groups of X can we make with X hundreds'- *this can also be done using sharing!*

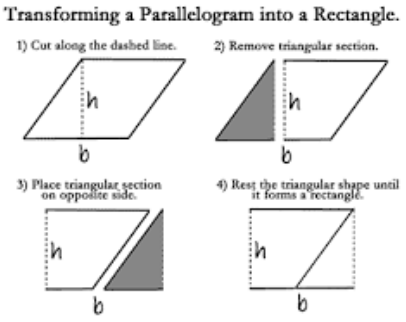
615 ÷ 5

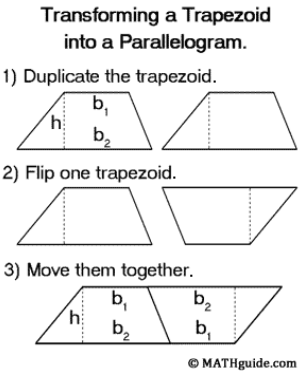




Concrete







Key Questions

If $a = b \times c$ what other multiplication and division facts do we know? Why is doubling and doubling again the same as multiplying by 4? Is $\times 10$ and then $\div 2$ a quick way of multiplying by 5? Find a similar way to divide by 50.	How do you work out the factors of a number? Which numbers have an odd number of factors? Explain why. The larger the number the more factors it has. True or false? Why are factors always integers?	How do multiples relate to times-table facts? Is 0 a multiple of every number? Can multiples be negative? Do multiples have to be a whole number? Explain how 18 can be both a factor and a multiple number.
What's the same and what's different about dividing 30 by 10 and 3 by 10? Why is dividing a number by 10 and then dividing by 10 again the same as dividing the original number by 100? What's different about multiplying an integer by 10, 100 or 1000 and multiplying a non-integer by 10, 100 or 1000?	What decimal is the same as $\frac{1}{10}$? How do you find one-tenth of a number? Explain why $\times 0.1$ is the same as $\div 10$ Give an example of when multiplication makes a number bigger, and one where it makes a number smaller.	What do the words milli-, centi- and kilo- mean? How do you convert km to m and kg to g? What's the same, what's different? What do you think a centilitre is? What about a kilolitre? Do these measurements exist? Why can you not convert metres to milligrams?

Edward Peake Church of England Middle School		
Topic: Solving problems multiplication and division	**Year: 7**	**NC Strand: Number**

Why would it not be sensible to show 27×39 using place value counters? Is a formal method always the best way to solve a multiplication? How would you work out 63×99? Why is $36 \times 24 \neq 30 \times 20 + 6 \times 4$?	How do you estimate the answer to a decimal multiplication? Explain why $6.4 \times 24 = 2.4 \times 64$. Tell me three more multiplications using these digits that have the same answer.	How do you know $341 \div 2$ will not have an integer answer? Explain why 341 is the same as 341.0 or 341.00 What type of equations are solved using division? Tell m three examples.
Why is multiplication done before addition? Why do multiplication and division have equal priority? Explain how this diagram helps you remember which operations come before others. 	What is the same? What's different about finding the area of a rectangle and parallelogram? Draw a rectangle with an area of 20 cm². Draw a parallelogram with an area of 20 cm². Now draw more. What do you notice? "If the area of the two rectangles are equal, then the perimeters are equal." Always, never or sometimes true?	Explain/show why you need to divide by 2 to find the area of triangle. What is meant by the perpendicular height? How do you work out the area of a triangle when the units are different? How can you show any triangle is half of a parallelogram?
What is a trapezium? What are the properties? How many different types of trapezia can you draw/make? How could you find the area of this trapezium? Can you prove that the area of a trapezium is always $\frac{1}{2}(a+b)h$? Why is it more efficient to use the formula for find the area rather than dividing it into other shapes?	Can you show visually what happens when you find the mean of a set of numbers? Do you know any other measures of average? When might you use the mean over the median? When might it be better to use the median rather than the mean? If you know the mean of a set of numbers, how do you find their total?	Why is it possible to simplify $2a \times 3b$ but not $2a + 3b$? The area of a rectangle is $6xy$. What might the lengths of the sides be? Why do we write $a \times 2$ as $2a$ instead of $a2$?

Edward Peake Church of England Middle School		
Topic: Fractions and Percentages	**Year: 7**	**NC Strand: Number**

What should I already know?

- How to use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- How to compare and order fractions, including fractions > 1
- How to add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- How to divide proper fractions by whole numbers
- How to associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction

What will I know by the end of the unit?

- How to find a fraction of a given amount
- How to use a given to find the whole and/or other given fractions
- How to find a percentage of a given amount using mental methods
- How to find a percentage of a given amount using a calculator
- How to solve problems with fractions greater than 1 and percentages greater than 100%

Vocabulary

Fraction	Denominator	Place Value	Decimal
Equivalent	Whole	Percent	Convert
Numerator	Original	Percentage	Equivalent

Investigate/Homework tasks

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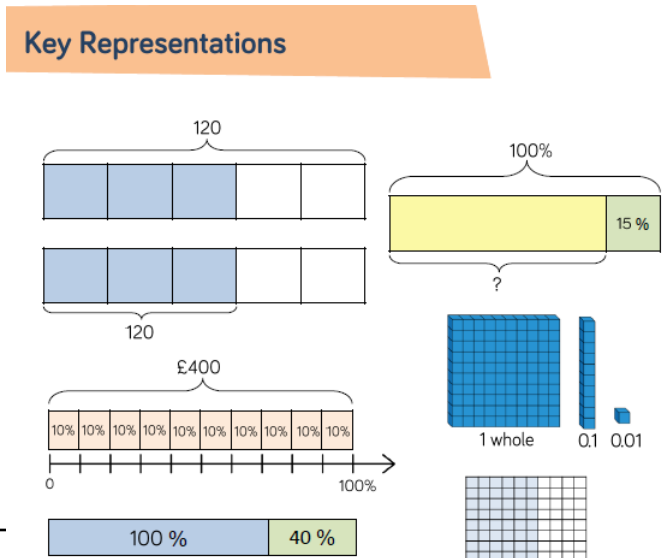
Key Information/Diagrams



Edward Peake Church of England Middle School		
Topic: Fractions and Percentages	**Year: 7**	**NC Strand: Number**

Key Questions		
How do you work out $\frac{3}{5}$ of a number? Draw a diagram to explain why your method works. What's the same and what's different about these two questions? $\frac{2}{3}$ of 60 = ☐ $\frac{2}{3}$ of ☐ = 60 Why is one third of 90 equal to two-thirds of 45?	How can I work out a number if I know a fraction of the number? What's different about these questions? ▪ What number is half of 12? ▪ 12 is half of what number?	Why is it that you divide by 10 to find 10% of a number, but you don't divide by 20 to find 20% of a number? If you know 10% of a number, what other percentages can you easily work out? Find as many ways as you can to work out 60% of 45
When is it easier to use a mental method rather than a calculator? How do you know how to interpret the display on a calculator? What does the % button on your calculator do?	Can 110% of the class be absent on one day? If the price of an item increases by 60%, what percentage is the new price of the old price? Can a price increase/decrease by 180% or 200%?	

Edward Peake Church of England Middle School		
Topic: Operations and Equations with Directed Numbers	**Year: 7**	**NC Strand: Number**

What should I already know?
• How to use negative numbers in context, and calculate intervals across zero • How to solve number and practical problems that involve negative numbers in context, and calculate intervals across zero

What will I know by the end of the unit?	
• How to understand and use interpretations of directed numbers • How to order directed numbers using number lines and symbols • How to perform calculations that cross zero • How to add directed numbers • How to subtract directed numbers • How to multiply directed numbers • How to divide directed numbers	• How to use a calculator for directed numbers • How to evaluate algebraic expressions with directed numbers • How to solve two step equations • How to use order of operations with directed numbers • Understand that positive numbers have more than one square root • How to work with higher powers and roots

Vocabulary			
Positive	Smaller/Bigger than	Zero pair	Expression
Negative	Greater/Less than	Product	Order of operations
Reflections	Increase	Multiply	Solve
Symmetric	Decrease	Inverse	Solution
Sea Level	Difference	Multiplicative	Equation
Ascending	Add	Calculator	Function Machine
Descending	Subtract	Sign Change	Balance
Positive	Partition	Fraction button	Zero pair
Negative	Minus	Substitute	

Investigate/Homework tasks
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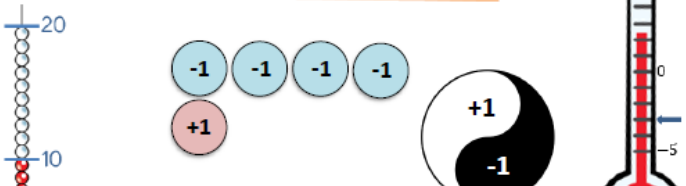
Key Information/Diagrams

Key Representations



When dealing with directed numbers, it is important to use both horizontal and vertical number lines. The vertical will be

Edward Peake Church of England Middle School		
Topic: Operations and Equations with Directed Numbers	**Year: 7**	**NC Strand: Number**

Key Questions

How far is -3 from zero? How far is 3 from 0? How are they different? What does this tell us about positive and negative numbers? (If using bead strings, they can be moved to emphasise the reflection about 0)	Is ordering temperatures from hottest to coldest, putting them in ascending or descending order? Where would $+\frac{1}{4}$ be on the number line? Is it closer to 0 or 1? How does this help us to put $-\frac{1}{4}$ on the number line? Between which two consecutive integers does -1.5 lie?	How could you use the number line to help perform this calculation? What is $4-4$? What is $-4+4$? What do you notice? How is $-3m+5m$ different from $-3+5$? How are they the same?
Why is adding a negative the same as subtracting? Why is $100+-102$ an easy calculation despite the large numbers? How does partitioning help? Give an example to show the statement "Two negatives make a positive" is wrong.	Using the manipulatives, what happens to the total when I take away 2 negatives? What happens when the lowest score is removed? Does the total increase or decrease? What happens when you subtract a negative number from a positive total? How can you represent this visually?	How could we use the number line to answer this question? If $3\times-2=-6$, what is -3×-2? How do you know? Why is $-3\times5a$ equal to $3\times-5a$? What other calculations give the same answer?
Explain how to use the $\pm$ on a calculator. How is it different from the $-$ button? What is the difference between -2.3^2 and $(-2.3)^2$ If there is no sign written in front of a number, is it positive or negative?	How do we substitute values into an expression? What is the correct order of operations? Why is it useful to put negative numbers in brackets when substituting?	How do you know if an equation can be solved in one step or more than one step? Can the solution to an equation be a negative number? How does a bar model help you to decide what step to take first when solving a multi-step equation?
What is the same and what is different about these questions and answers? When is it most useful to use a bar model for a two-step equation? How do you know the order of steps to take to solve an equation?	What does it mean when there is a number directly in front of a bracket e.g. $3(6+4)$? What's the difference between $(-6)^2$ and -6^2? Does a negative number change the order of operations?	What is a square number? What is the inverse of multiplication/squaring a number? What is the difference between $(-5)^2$ and -5^2? Does 5 have a square root?
What does cube mean? How do you raise a number to the fourth power? How do you find roots and powers on your calculator? If a number has two square roots, does it have three cube roots?		

Edward Peake Church of England Middle School		
Topic: Addition and Subtraction of Fractions	**Year: 7**	**NC Strand: Numbers**

What should I already know?

- How to use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- How to compare and order fractions, including fractions > 1
- How to add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

What will I know by the end of the unit?

- How to represent fractions
- How to convert between mixed numbers and fractions
- How to add and subtract unit fractions with the same denominator
- How to add and subtract fractions from integers expressing the answer as a single fraction
- Understand and use equivalent fractions
- How to add and subtract fractions where denominators share a simple common multiple
- How to add and subtract fractions with any denominator
- How to add and subtract improper fractions and mixed numbers
- How to use fractions in algebraic contexts
- How to use equivalence to add and subtract decimals and fractions
- How to add and subtract simple algebraic fractions

Vocabulary

Equal parts	Smaller/Bigger than	Partition	Solve
Denominator	Greater/Less than	Equivalent	Equation
Numerator	Unit Fraction	Lowest common multiple	Linear
Congruent	Whole	Common denominator	Geometric
Divide	Multiple	Equivalent	Inverse
Ascending	Mixed number	Commutative	Expression
Descending	Addition	Improper fraction	Place Value
Positive	Subtraction	Sequence	Tenths
Negative	Integer	Substitute	Hundredths
Decimal	Simplify	Like terms	Collect
In terms of			

Investigate/Homework tasks

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Key Information/Diagrams

Key Representations

Edward Peake Church of England Middle School		
Topic: Addition and Subtraction of Fractions	**Year: 7**	**NC Strand: Numbers**

Key Questions

How do you know each part is equal when they look different? Where would this fraction be on a number line? How else can you represent this fraction?	How many _____ are there in a whole? Is (e.g. $\frac{5}{4}$) greater than one or less than one? How do we know? Why is it called a 'mixed' number? Why is it called an 'improper' fraction?	How many _____ make a whole? What happens when you subtract a unit fraction from the same unit fraction? Would the answers to these questions be different if we performed the operations in a different order?
How many _____ make a whole? If I have three-fifths and I take away two of those fifths, how many fifths do I have now? Is it possible to have a negative fraction? Where would it be on the number line?	How many _____ are there in a whole? How can a number line or diagram be used to represent this calculation? How does partitioning help us to subtract fractions from integers?	How do we find a fraction that is equivalent to a given fraction? Which is the greater/smaller fraction? (e.g. $\frac{3}{4}, \frac{6}{8}$) How many fractions can you find are there that are equivalent to one-half? How many are there altogether?
Why do we need a common denominator to add fractions? Why is $\frac{1}{10}+\frac{7}{10}$ easier to calculate than $\frac{1}{10}+\frac{7}{15}$? Is it possible to subtract a larger fraction from a smaller one e.g. $\frac{1}{4}-\frac{1}{2}$?	What's the same and what's different about the way we approach $\frac{1}{8}+\frac{3}{4}$ and $\frac{1}{6}+\frac{3}{4}$? Why don't we always multiply two numbers to find their lowest common multiple? How would approach adding and subtracting with mixed numbers?	Which method is most efficient for this question and why? Is it possible to have a negative fraction? Where would this be on the number line? What could we do if we need to add a negative fraction to a positive integer?
How do we substitute numbers into an expression? Is it possible to substitute fractions into expressions? What is the inverse operation of _____ ? How can you tell if a sequence is linear or not?	How could a number line help with addition and subtraction of fractions and decimals? If we know $\frac{1}{4}=0.25$, how could this help us find $\frac{1}{8}$? Which fractions would be more difficult to give your answer in decimal form?	What's the same/different about e.g. $\frac{1}{2}a$ and $\frac{a}{2}$? What does 'in terms of m' mean? Is it possible to get a numeric answer? How would I do this if algebra were not involved? Now how would I do this algebraically?

Edward Peake Church of England Middle School		
Topic: Constructing Measuring and Using Geometric Notation	**Year: 7**	**NC Strand: Geometry**

What should I already know?
• How to compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons • How to illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius • How to recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

What will I know by the end of the unit?	
• How to use letter and labelling conventions including those for geometric figures • How to draw and measure line segments including geometric figures • How to understand angles as a measure of turn • How to classify angles • How to measure angles up to 180 degrees • How to draw angles up to 180 degrees • How to draw and measure angles between 180 and 360 degrees • How to identify perpendicular and parallel lines • How to recognise types of triangles	• How to recognise types of quadrilaterals • How to identify polygons with up to ten sides • How to construct triangles using SSS (Side, side, side) • How to construct triangles using SSS, SAS, ASA • How to construct more complex polygons • How to interpret simple pie charts using proportion • How to interpret pie charts using a pie chart • How to draw pie charts

Vocabulary			
Line	Figure	Interior	Equilateral
Notation	Quarter/Half/Three quarter/Full turn	Exterior	Isosceles
Line segment	Degrees	Protractor	Scalene
Polygon	Angle	Construct	Right-angled
Geometric Figure	Rotation	Sum	Square
Segment	Acute	Measures	Rectangle
Length	Obtuse	Parallel	Kite
Height	Right angle	Perpendicular	Rhombus
Width	Reflex	intersect	Parallelogram
Trapezium	Polygon	Edges	Vertices
Equal	triangle	decagon	Pair of compasses
Construct	Side	Point	Vertex
Regular	Diagonals	Compound	Proportion
Frequency	Fraction	Total	Comparison
Sector	Sector		

Investigate/Homework tasks

Edward Peake Church of England Middle School		
Topic: Constructing Measuring and Using Geometric Notation	**Year: 7**	**NC Strand: Geometry**

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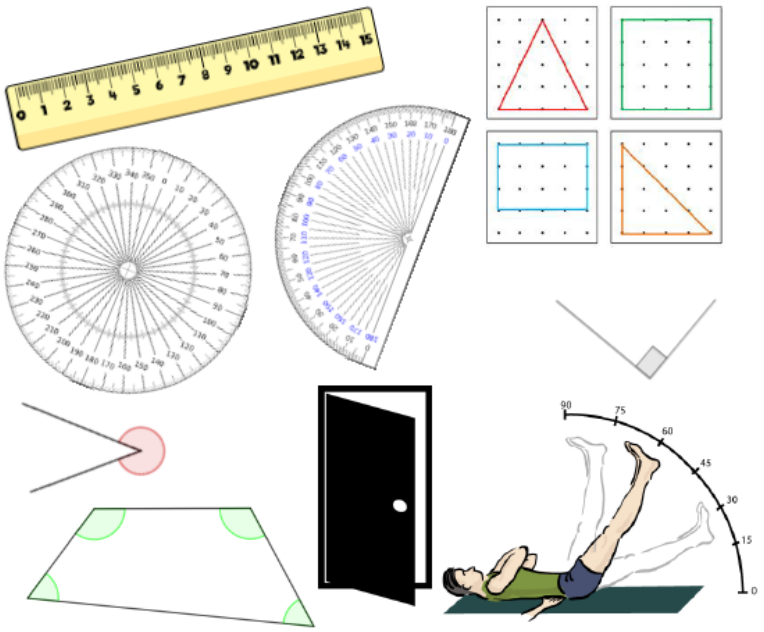

Here are a few ideas of equipment and representations that you might use during Construction and Measuring.

Opening and closing a door or a book allows students to visualise angles as a turn. They can also physically turn themselves and use their arms and legs to demonstrate angles and turns as in the lower right diagram.

Key Questions

How many points do you need to define a straight line? How many points do you need to define a polygon?	What is the difference between a line and a line segment? What would you measure in millimetres/centimetres etc.?	How can we measure the size of a turn? How can we describe the direction of a turn? Does direction matter for a turn of 180°?
How do we illustrate that an angle is 90°? How do we know which angle we are measuring? Will turning through two acute angles result in turning through an obtuse angle? Will turning through two obtuse angles result in turning through a reflex angle?	How do we know which scale should be used to measure the angle? How do we know where to put the protractor when measuring an angle?	How do you choose which scale to use on a protrac Is it possible to draw an angle of 180°? Why are there two scales on a protractor?
How many degrees are there in a full turn? How can we use a protractor that doesn't go up to 360° t draw and measure angles over 180°?	When are two or more lines parallel? When are two lines perpendicular? Can curved lines be parallel?	What is the difference between a scalene and an isosceles triangle? What would you need to know about a triangle to be sure that it was equilateral? Which types of triangle can also be right-angled? Is an equilateral triangle also an isosceles triangle?
What property does every quadrilateral share? Is a quadrilateral a polygon? Which quadrilaterals always have an interior right-angle? Which quadrilaterals sometimes have an interior right-angle? Explain why a square is a rectangle and a parallelogram.	When is a polygon regular? What name do we give to a regular three sided polygon? What name do we give to a regular four sided polygon?	Is it possible to accurately construct a triangle given the side lengths using just a pencil and ruler? Why is more accurate to use a pair of compasses?

Edward Peake Church of England Middle School		
Topic: Constructing Measuring and Using Geometric Notation	**Year: 7**	**NC Strand: Geometry**

Is it possible to construct a unique triangle given all three angles? Why is it sometimes possible to draw two distinct triangles when given an angle and the length of two sides?	Is it possible to construct an irregular polygon with equal angles? Is it possible to construct an irregular polygon with equal side lengths?	What do pie charts show us? If two parts of the pie chart are the same size, what does that tell us? If one part of two different pie charts are the same size, do they represent the same frequency?
If two pie charts are identical, do they represent identical frequencies? What if the angle measured is between two marks on your protractor?	What do you do when the total frequency is neither a multiple nor a factor of 360? How do you calculate the angle of a sector of a pie chart?	

Edward Peake Church of England Middle School		
Topic: Developing Geometric Reasoning	**Year: 7**	**NC Strand: Geometry**

What should I already know?
• How to compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons • How to recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

What will I know by the end of the unit?	
• How to use the sum of angles at a point to solve problems • How to solve the sum of angles on a straight line to solve problems • How to use the equality of vertically opposite angles to solve problems • Know and apply the sum of angles in a triangle • Know and apply the sum of angles in a quadrilateral	• How to solve angle problems using properties of triangles and quadrilaterals • How to solve complex angle problems • How to find and solve the angle sum of any polygon • How to investigate angles in parallel lines • How to use parallel lines angle rules • How to use known facts to obtain simple proofs

Vocabulary			
Sum	Isosceles	Rhombus	Equal
Angle	Equilateral	Point	Opposite
Degree	Scalene	Straight Line	Transversal
Line Segment	Right- angled	Polygon	
Notation	Sum	Interior	
Adjacent	Quadrilateral	Regular	
Vertically opposite	Convex	Parallel	
Line	Concave	Perpendicular	
Intersect	Parallelogram	Conjecture	

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Key Information/Diagrams

Key Representations

The blue diagram shows a reverse motion linkage that students should be familiar with from primary school.

Edward Peake Church of England Middle School		
Topic: Developing Geometric Reasoning	**Year: 7**	**NC Strand: Geometry**

Key Questions		
What is the sum of angles at a point? How many right-angles fit around a point? How does 180° compare to the sum of angles at a point	What is the sum of angles at a point on a straight line? How many right-angles would fit on a straight line? John measures three angles on a straight line. They are 81°, 47° and 51°. Has John measured the angles correctly? Explain your answer	When are vertically opposite angles formed? Given an angle formed at the intersection of two straight lines, is it always possible to find all angles at that point?
What is the sum of the interior angles of a triangle? How many angles do you need to know to be able to find all of the interior angles of a triangle? If one angle in an isosceles triangle is 60°, is it an equilateral triangle? Can a triangle have two right-angles?	What is the sum of interior angles in a quadrilateral? How can you demonstrate that the sum of the interior angles of a quadrilateral is 360°? If a quadrilateral has four right-angles, is it a square?	How did you decide which angle fact to use and apply? Could you have applied a different angle fact? Which angle facts do you know? Which angle facts do you think you will need to apply to this question?
How did you decide which angle facts to apply? Could you have considered the same angle facts in a different order? Could you have applied a different angle fact?	Explain why the interior angle of any polygon is a multiple of 180°. How can you calculate the angle sum of any polygon? Does your method work for concave polygons?	How do you denote that two or more lines are parallel? What do you notice about the sum of angles ___ and ___ ? What do you notice about angles ___ and ___ ?
How do you identify corresponding/alternate/co-interior angles? Why are co-interior angles different to corresponding and alternate angles?	What is the difference between a proof and a demonstration? Is it possible to prove something in more than one way? Can you prove that there are 360° in a full turn?	

Edward Peake Church of England Middle School		
Topic: Number Sense	**Year: 7**	**NC Strand: Number**

What should I already know?
• How to perform mental calculations, including with mixed operations and large numbers

What will I know by the end of the unit?
• How to use mental addition and subtraction strategies for integers • How to use mental multiplication and division strategies for integers • How to use mental arithmetic strategies for decimals • How to use mental arithmetic strategies for fractions • How to use factors to simplify calculations • How to use estimation as a method to check mental calculations • How to use known number facts to derive other facts • How to use known algebraic facts to derive other facts • Which method to use: mental strategy , formal written method or a calculator

Vocabulary			
Compensation	Factors	Denominator	Compensate
Number Line	Place Value	Equivalent	Product
Addition	Estimate	Calculation	Quotient
Subtraction	Tenths	Multiple	Equation
Associative	Hundredths	Rounding	Expression
Commutative	Thousandths	Significant Figure	Equality
Partition	Whole	Overestimate	Equal
Multiply	Equal Parts	Underestimate	Mental
Divide	Numerator	Addend	Calculator
Formal	Efficient	Interpret	

Investigate/Homework tasks

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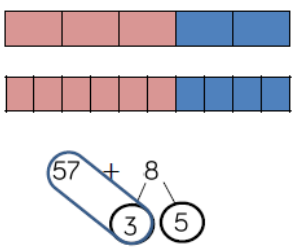
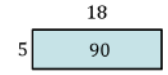
Key Information/Diagrams

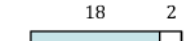
Key Representations





$10 \times 5 = 50$
$8 \times 5 = 40$
$50 + 40 = 90$

$18 \times 10 = 180$
$180 \div 2 = 90$



$20 \times 5 = 100$

18×5 can be calculated in many different ways. It could be partitioned into 10×5 and 8×5 or 18 could be halved and 5 could be doubled to change the calculation to 9×10

Edward Peake Church of England Middle School		
Topic: Number Sense	**Year: 7**	**NC Strand: Number**

Key Questions		
How can you check answers to subtraction problems using addition? Can you explain why addition is commutative using concrete manipulatives? Does the same apply to subtraction?	What does partitioning mean? Why do we do some multiplications by portioning and adding, but others by partitioning and subtracting?	How does estimation help us check if answers are reasonable? Does multiplication always make a number bigger? Why is multiplying by 0.1 the same as dividing by 10? Can you just "add a zero" to multiply by 10?
Is $\frac{1}{2}$ of an amount always bigger than $\frac{1}{4}$ of an amount? Is it possible to find $\frac{5}{3}$ of a number? What is the relationship between the denominator, numerator and finding a fraction of an amount?	What numbers are easiest to multiply by? What factors should you look for to make a calculation easier? Why does using a different form of the number still give you the same answer?	Why is estimation useful? Is estimating the same as rounding? Is estimating the same as approximating?
What's remains the same about the question, what's different? How does multiplying one number in a calculation affect the answer? What about both numbers? How can I change both numbers in a division but keep the answer the same?	Explain the difference between an equation and an expression. If I double both sides in an equation, is the value of the unknown the same? What does the = sign mean?	Is your mental method more efficient than a written method? Is it quicker or slower than using a written method? Can you interpret your calculator display in terms of the context of the question? Can time calculations be done on a calculator e.g. how long is it from 1835 to 1920?

Edward Peake Church of England Middle School		
Topic: Sets and Probability	**Year: 7**	**NC Strand: Data**

What should I already know?
• How to solve problem in context • How to sort data using tables and diagrams • Understand and use decimal and fraction number lines • Know decimal and fraction number bonds to 1

What will I know by the end of the unit?
• How to identify and represent sets • How to interpret and create Venn diagrams • How to understand and use the intersections of sets • How to understand and use the union of sets • How to understand and use the compliment of a set • Know and use the vocabulary of probability • How to generate sample spaces for single events • How to calculate the probability for a single event • How to understand and use the probability scale • Know that the sum of probabilities for all possible outcomes is 1

Vocabulary			
Universal set	Intersect	Even	Outcomes
Inclusive	Complement	Unlikely	Simplify
Event	And	Certain	Equivalent
Member	Element	Random	Equally Likely
Set	Or	Bias	Scale
Venn diagram	Both	Event	Fair
Intersection	Not	Sample Space	Equivalence
Mutually Exclusive	Impossible	Possibilities	Whole
Union	Likely	Event	Sum

Investigate/Homework tasks
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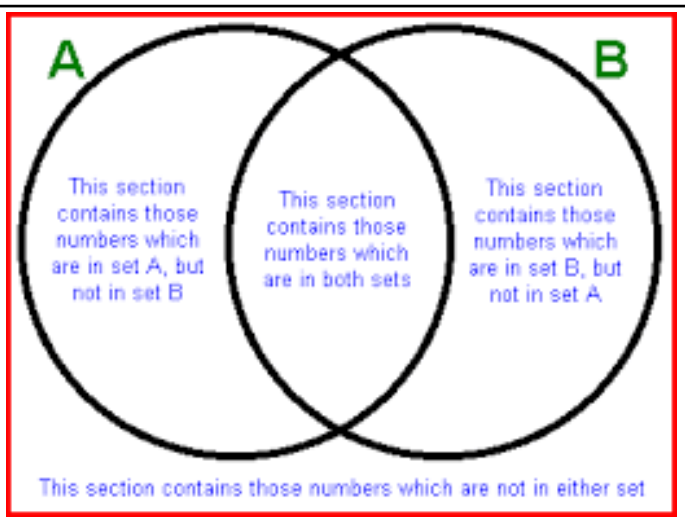
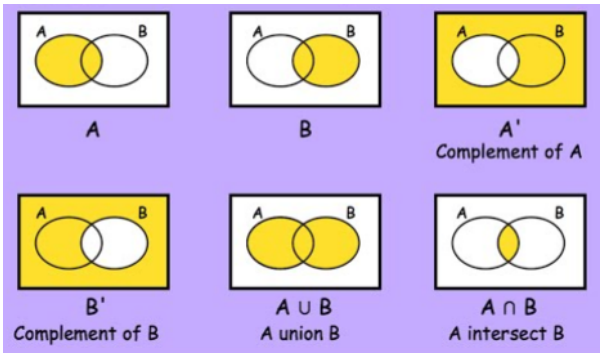
Key Information/Diagrams

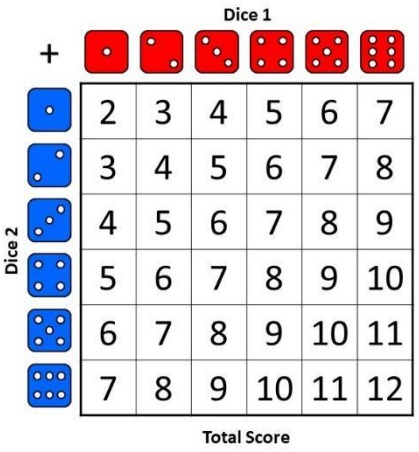
Edward Peake Church of England Middle School		
Topic: Sets and Probability	**Year: 7**	**NC Strand: Data**



Venn Diagrams



Sample Space Diagrams



P(8) =

P(9) =

P(even) =

P(0) =

P(more than 7) =

P(3, 5 or 10) =

Key Questions

What makes a group of objects a set? Do sets just have to be numerical? Can you have a set with an infinite number of elements?	How many circles or ellipses are needed in a Venn diagram? Do we always need a box around the circles/ellipses? Why or why not? Do the circles/ellipses always need to overlap? Why or why not?	What's the same and what's different about the following Venn diagrams? Why do you think we use different Venn diagrams for different problems? Do all sets intersect? What does the overlapping region represent?
What's the same and what's different between the union of sets and the intersection of sets? What does the union of two sets look like if they have no intersection? What's the same and what's different about A ∪ B in these situations?	Do all sets have a complement? What is the relationship between the complement of a set, the set itself and the universal set? Can a set whose elements are not numbers have a complement?	What is the difference between 'almost certain' and 'certain'? Give me examples of events that are 'certain' to happen and those that are 'almost certain'. Give an example of an experiment with two outcomes that are equally likely. Give an example of an experiment with two outcomes that are not equally likely.
How do you know you have a complete sample space? How does a sample space help you to work out whether something is equally likely to happen or not? If a sample space has just two possible outcomes, does this mean they are equally likely? If a sample space has 12 outcomes, does this mean they are equally likely?	Is $\frac{25}{100}$ a larger probability than $\frac{1}{4}$? Explain your answer. What does 'random' mean? Is the probability of rolling a 6 on a dice always $\frac{1}{6}$? Why or why not?	Can a probability be 120%? Why or why not? Why can't a probability be less than 0? Why do the sum of probabilities for all possible outcomes add up to 1? Why not 2? or 100? Why are 100 and 100% different?
Why does the probability scale end at 1? What is the probability of an impossible event? If the probability of two events are marked on a probability scale, how can you tell which is the more likely?		

Edward Peake Church of England Middle School		
Topic: Prime numbers and proof	**Year: 7**	**NC Strand: Number**

What should I already know?

- How to identify common factors, common multiples and prime numbers

What will I know by the end of the unit?

- How to find and use multiples
- How to identify factors of numbers and expressions
- How to recognise and identify prime numbers
- How to recognise and identify square and triangle numbers
- How to find factors of a set of numbers including the highest common factor (HCF)
- How to find multiples of a set of numbers including the lowest common multiple (LCM)
- How to write a number as a product of it's prime factors
- How to use a venn diagram to calculate the HCF and LCM
- How to make and test conjectures
- How to use a counter example to disprove a conjecture

Vocabulary

Multiples	Factorise	Investigate	Lowest Common multiple (LCM)
Positive	Divisor	Square number	Prime factor
Integer	Prime number	Expression	Express
Zero	Odd	Common Factor	Union/Intersection
Factor	Even	Factorising	Conjecture
Divisible	Digit	Highest Common Factor (HCF)	Explain
Remainder	Triangular Number	Common multiple	True/False
Term	Relationship	Product	Proof
Demonstration	Always/Never/Sometimes	Systematic	Assumption
Counter example			

Investigate/Homework tasks

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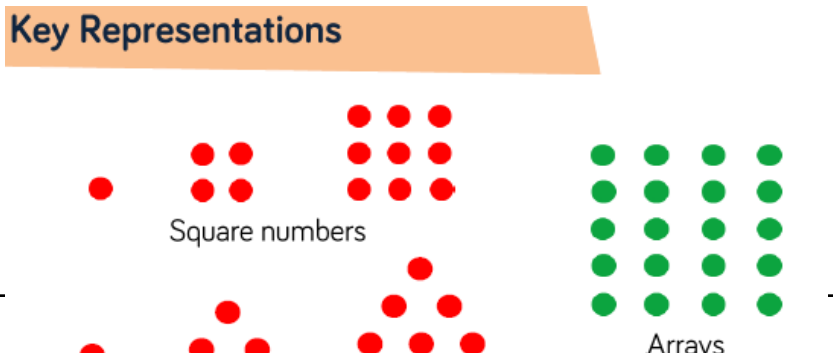

Edward Peake Church of England Middle School		
Topic: Prime numbers and proof	**Year: 7**	**NC Strand: Number**

Key Questions

How many multiples of 11 are there?

Can you have multiples of $\frac{1}{3}$?

Does zero have any multiples? Explain your answer.

Explain the difference between a factor of a number and a multiple of a number.
Can a number be both a factor and a multiple?
Can zero be a factor of a number?
Can negative numbers be factors of positive numbers?

When you add together two prime numbers, do they always give an even number? Explain your answer.

Which large numbers can you tell are not prime just by looking at their digits?

Can a number be both square and triangular?
Why do square numbers always have an odd number of factors?
What's the difference between n^2 and $n + n$?
Can triangular and square numbers be odd or even?

How many examples do you need to prove that a conjecture is always true?
Convince me that your conjecture is always true. Give me a mathematical reason.
What's meant by proof?
Why is proof different from demonstration?

What number is a common factor of all numbers?
How do we know when we have found the highest common factor?
What do you notice about the HCF of two numbers when one is a multiple of the other?

Why will the product of two numbers be a common multiple of the numbers?
When is the LCM of a set of numbers not the same as their product?
Can the HCF and LCM of a pair of numbers be the same?

Is there more than one way to factorise 12?
Is there more than one way to express 12 as a product of prime factors? Does the order of the factors matter?
What happens when you find the prime factorisation of a prime number?

$60 = 2 \times 2 \times 3 \times 5$ $168 = 2 \times 2 \times 2 \times 3 \times 7$
Why don't we write 2, 2, 2, 2, 3, and 3 in the intersect on the Venn diagram?
Why is $2 \times 2 \times 3$ the HCF of the two numbers?
Why is $2 \times 2 \times 2 \times 3 \times 5 \times 7$ the smallest of the common multiples?
How can we find a larger common multiple?

How many counterexamples do we need to disprove a conjecture?

Is it important to be systematic when looking for a counterexample? Why? What strategies could you use?