Edward Peake Church of England Middle School		
Topic: Place Value	**Year: 6**	**NC Strand: Number**

What should I already know?
● How to read, write, order and compare numbers to 10,000 ● How to read Roman numerals to a 1000 ● How to round any number to the nearest 10, 100 and 1000 up to 10,000 ● How to read and write numbers to 100,000 ● How to compare and order numbers to 100,000 ● How to round numbers to the nearest 10, 100, 1000 and 10,000 up to 100,000 ● How to read write and represent numbers up to 1,000,000 ● How to count forwards and backwards in 10s, 100s, 1000s, 10,000s, and 100,000s ● How to compare and order numbers up to 1,000,000 using the correct vocabulary and symbols ● How to round numbers to the nearest 10, 100, 1000, 10000, 100,000 up to 1,000,000

What will I know by the end of the unit?
● 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

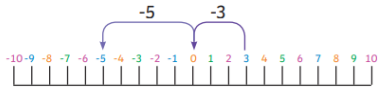
Vocabulary			
ten million	10,000,000 (10 x10 x10x10x10x10x10)	**less than**	not as many as.
millions	1,000,000 (10x10x10x10x10)	**order**	arrangement according to size, amount or value.
Ten thousand	10,000 (10x10x10x10)	**round (rounded)**	to change a number to a more convenient value.
thousands	1,000 (10x10x10)	**negative number**	any number less than zero
hundreds	100(10x10)	**partition**	a strategy that splits (partitions) numbers into smaller addends,
tens	10	**digit**	symbol used to show a number.
ones	1	**interval**	between two points or values.
zero	0	**sequence**	ordered sets of numbers, shapes or other mathematical objects, arranged according to a rule.
place value	the value of a digit depending on its place in a number.	**linear sequence**	A sequence that that increases or decreases from term to term by a constant amount
greater than	is more than		

Edward Peake Church of England Middle School		
Topic: Place Value	**Year: 6**	**NC Strand: Number**

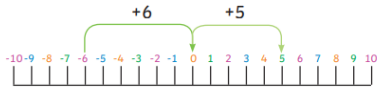
Diagram / Key Information

Negative Numbers

3 - 8 = -5



-6 + 11 = 5



Round Any Number

Rounding to the nearest 1000

2000 ← 2499	2500 → 3000
round down	round up

Rounding to the nearest 100 000

200 000 ← 249 999	250 000 → 300 000
round down	round up

Rounding to the nearest 10 000

20 000 ← 24 999	25 000 → 30 000
round down	round up

Rounding to the nearest 1 000 000

2 000 000 ← 2 499 999	2 500 000 → 3 000 000
round down	round up

Numbers to Ten Million

3 926 471

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	9	2	6	4	7	1

three million, nine hundred and twenty-six thousand, four hundred and seventy-one

3 926 471	
3 926 000	471

Investigate/Homework tasks

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- To challenge yourself:
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  - Explain the key questions typed in purple text

Key skills/Timeline/Topic Questions

Edward Peake Church of England Middle School		
Topic: Place Value	**Year: 6**	**NC Strand: Number**

• Why is the zero in a number important when representing large numbers • Why do we round up when the following digit is 5 or above? • Which place value column do we look at when rounding to the nearest hundred thousand? • What is the purpose of rounding?	• Are all negative numbers whole numbers? • Why does positive one added to negative one equal 0. Can you use a number line to explain this? • Draw me a picture to show 5 subtract 8 • Show 5 more than negative two on a number line

Edward Peake Church of England Middle School		
Topic: Addition, Subtraction, Multiplication and D	**Year: 6**	**NC Strand:**

What should I already know?	
• How to add/subtract whole numbers with more than four digits using the column method • 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 find multiples of whole numbers • How to list the factor pairs of whole numbers • How to find the common factors of two numbers	• How to recall prime numbers up to 19 • How to find out (establish) if a number less than 100 is a prime number • How to explain if a number is a square number by finding it's factors • How to find the cube numbers of an integer • How to multiply a whole number by 10, 100 and 1000 • How to divide a whole number by 10, 100 and 1000 using a place value chart • How to multiply by a multiple of 10, 100 and 1000

What will I know by the end of the unit?	
• 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 multiply a four digit number by a two digit number • How to use short division to divide a 4 digit number by a 2 digit number • How to use my knowledge of factors to answer division questions • How to divide a 3 digit number by a 2 digit number • How to divide 4 digit numbers by 2 digit numbers using long division • How to divide using long division where answers have remainders	• How to divide a 4 digit number by a 2 digit number and know when rounding is appropriate to use for interpreting the remainder • How to find the common factors of two numbers and present this in a venn diagram • How to find common multiples of two numbers using numbers outside of my known times table facts • How to break a number down into it's prime factors • How to explore relationships and solve problems involving prime and square numbers • How to use order of operations to complete calculations • How to use estimation and mental methods to carry out calculations efficiently • How to reason and apply my understanding of calculations, inverses and commutativity to use known facts when calculating

Vocabulary			
increase	get larger in size, number or quantity	**multiply**	a mathematical operation where a number is added to itself a number of times
altogether	to join two or more numbers or quantities to get one number	**product**	the result when two numbers are multiplied
add		**divide**	to divide or division is sharing or grouping a number into equal parts.
		share	
more	Involves addition	**prime factor**	a factor that is prime
Sum /total	the result of addition.	**factor**	a number that divides exactly into another number
		common factor	factors of two numbers that are the same
subtract	to take one quantity away from another.	**prime number**	a number with only 2 factors: 1 and itself
		composite number	a number with more than two factors
Less/fewer	the difference between two quantities or values involves subtraction.	**multiple**	a number in another number's times table
		common multiple	multiples of two numbers that are the same

Edward Peake Church of England Middle School		
Topic: Addition, Subtraction, Multiplication and D	**Year: 6**	**NC Strand:**

decrease		**square numbers**	the result when a number has been multiplied by itself
difference		**cube numbers**	the result when a number has been multiplied by itself 3 times
solution	the answer to a problem.	**prime number**	a number with only 2 factors: 1 and itself
		round	to change a number to a more convenient value.

Diagram/ Key information

When children start to multiply 3d x 3d and 4d x 2d etc, they should be confident with the abstract:

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

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

Answer: 3224

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

Step 1: make 615

Step 2: Circle your groups of 5

Step 3: Exchange 1H for 10T and circle groups of 5

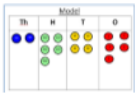
Step 4: exchange 1T for 10ones and circles groups of 5

This can easily be represented pictorially, till the children no longer to do it.
It can also be done to decimal places if you have a remainder!

$$5\overline{)615}\ \begin{array}{l} 123 \\ {\scriptstyle 1\ 1} \end{array}$$

Edward Peake Church of England Middle School		
Topic: Addition, Subtraction, Multiplication and D	**Year: 6**	**NC Strand:**

Long division

Concrete	Pictorial	Abstract
 2544 ÷ 12 How many groups of 12 thousands do we have? None  Exchange 2 thousand for 20 hundreds.  How many groups of 12 are in 25 hundreds? 2 groups. Circle them. We have grouped 24 hundreds so can take them off and we are left with one.  Exchange the one hundred for ten tens so now we have 14 tens. How many groups of 12 are in 14? 1 remainder 2.  Exchange the two tens for twenty ones so now we have 24 ones. How many groups of 12 are in 24? 2	Children to represent the counters, pictorially and record the subtractions beneath.	Step one- exchange 2 thousand for 20 hundreds so we now have 25 hundreds. Step two- How many groups of 12 can I make with 25 hundreds? The 24 shows the hundreds we have grouped. The one is how many hundreds we have left. Exchange the one hundred for 10 tens. How many groups of 12 can I make with 14 tens? The 14 shows how many tens I have, the 12 is how many I grouped and the 2 is how many tens I have left. Exchange the 2 tens for 20 ones. The 24 is how many ones I have grouped and the 0 is what I have left.

Investigate/Homework tasks

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  - Explain the key questions typed in purple text

Key skills/Timeline/Topic Questions

- Using Column addition/Subtraction
  - What happens when there is more than 9 in a place value column?
  - Can you exchange between columns?
  - When you are given part of a solution to column addition or subtraction how can you find the missing digits?
  - Is the column method always the best method? Can you explain giving examples
- Long Division
  - What does the arrow represent?
  - How can multiples help us divide?
- Why do we subtract the totals from the starting number?
- Why is the context of the question important when deciding how to round the remainders after division?
- What is a factor?

Edward Peake Church of England Middle School		
Topic: Addition, Subtraction, Multiplication and D	**Year: 6**	**NC Strand:**

• When multiplying what is it important to remember when, multiplying by tens? • Make up a multiplication question and solve it using long multiplication? What do you have to remember when you are multiplying by numbers in different columns? • What strategy can you use to find the lowest common multiple of different numbers?	• How do you know you have found all the factors of a given number? • How does a venn diagram show a common factor? Where are the common factors? • What is a prime number? • What is a composite number? • Are all prime numbers odd? • Is 1 a prime number?

Edward Peake Church of England Middle School		
Topic: Fractions	**Year: 6**	**NC Strand: Proportion**

What should I already know?

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

What will I know by the end of the unit?

- How to use Highest Common Factors to simplify fractions
- How to count forwards and backwards in fractions
- How to compare and order fractions with the same denominator or denominators that are multiples of the same number
- How to order and compare fractions by finding a common denominator
- How to order and compare fractions by finding a common numerator
- How to add and subtract fractions when one denominator will stay the same
- How to add and subtract fractions when I have to find the LCM of the denominators
- How to add fractions with any denominator and mixed numbers
- How to subtract mixed numbers
- How to solve problems that involve adding and subtracting fractions and mixed numbers
- How to multiply fractions and mixed numbers by integers
- How to multiply a fraction by a fraction
- How to divide a fraction by an integer when the numerator is a multiple of the integer
- How to divide a fraction by an integer
- How to use the four operations and order of operations when calculating with fractions
- How to calculate a fraction of an amount
- How to find a whole amount when given the value of a fraction of the whole

Vocabulary

Highest common factor	Denominator	Proper	Equal parts
Equivalent fractions	Numerator	Whole number	Whole
Simplifying	Difference	Mixed number	Parts
Fraction wall	Lowest common multiple	Repeated addition	BIDMAS
Compare	Converting	Integer	
Order	Unit fraction	Common denominator	

Investigate/Homework tasks

Edward Peake Church of England Middle School		
Topic: Fractions	**Year: 6**	**NC Strand: Proportion**

- Homework will be set from the SATS practice book 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:
  - Find out more about the meaning of the vocabulary list using http://www.amathsdictionaryforkids.com/
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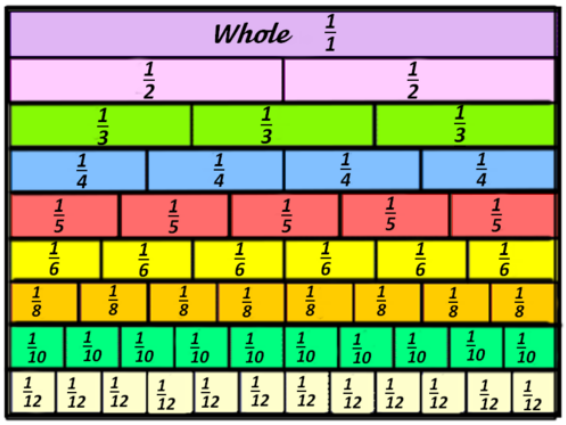
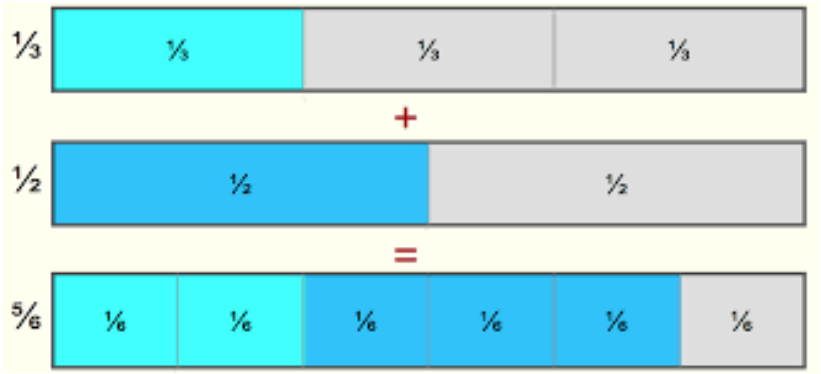
Diagram/Key Information





Key skills/Timeline/Topic Questions

Write down a fraction what is the highest common denominator of the numerator and the denominator?
Isa simplified fraction always equivalent to the original fraction? Why?
If the HCF of the numerator and denominator is 1, can it be simplified?
How can you use a number line to find the difference between two fractions?
If the denominators are different when we are adding or subtracting fractions, what do we need to do? Why?
How can we find the LCM of three numbers? Do we multiply them together? Is 120 the LCM of 4, 5 and 6?
How many eighths can we exchange for one whole?
How is multiplying fractions similar to adding fractions?
How does partitioning a mixed number into wholes and fractions help us multiply them by an integer?
Do you prefer partitioning a mixed number or converting it to an improper fraction to multiply it by an integer? Why?
Does it matter if the integer if first or second in the multiplication sentence?
Does multiplying two numbers always give you a larger product? Explain why?
Can you draw a diagram to represent multiplying two proper fraction?
Why does finding an equivalent fraction help us to divide fractions by integers?

Edward Peake Church of England Middle School		
Topic: Position and Direction	**Year: 6**	**NC Strand: Geometry**

What should I already know?

- How to draw shapes in the first quadrant from given coordinates
- Identify, describe and represent the position of a shape following a reflection or translation,
- Identify, describe and represent the position of a shape following a reflection or translation
- using the appropriate language,
- know that the shape has not changed.

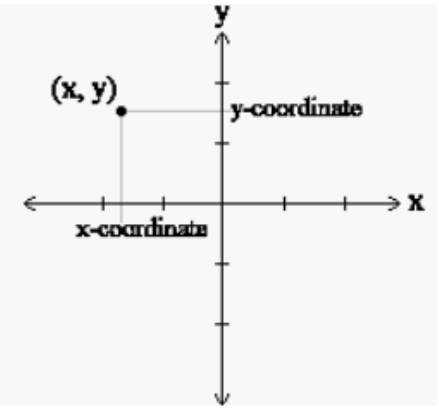
What will I know by the end of the unit?

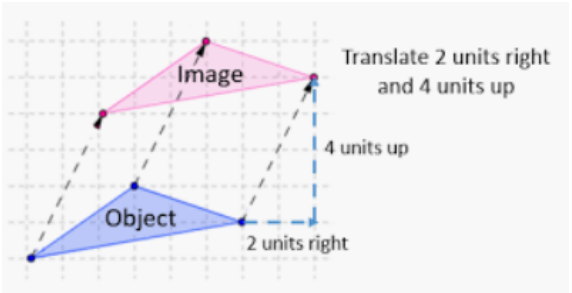
- How to draw shapes in the first quadrant from given coordinates
- How to write coordinates for shapes without plotting the points
- How to read and plot coordinates in all four quadrants
- How to draw shapes in all four quadrants from given coordinates
- How to find the length of a line from the coordinates of it's two endpoints
- How to use instructions to translate shapes in all four quadrants
- How to describe translations in all four quadrants
- How to reflect shapes in the x-axis and the y-axis

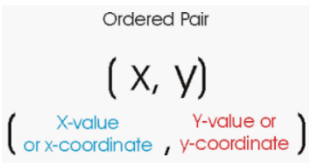
Vocabulary

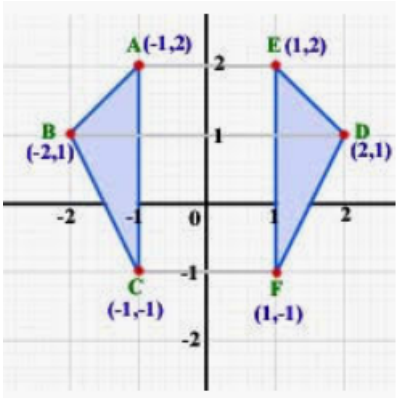
Coordinate	Quadrant	Translated	axes
Vertices	Four quadrants	Reflection	origin
Plot	Axis	Reflected	Corresponding
positive	Negative	x-axis	Image
x-coordinate	Endpoint	y-axis	Object
y-coordinate	Translation		

Diagram/Key Information









Edward Peake Church of England Middle School		
Topic: Position and Direction	**Year: 6**	**NC Strand: Geometry**

Investigate/Homework tasks
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Key skills/Timeline/Topic Questions

When plotting coordinate pairs, which axis do we look at first?
Can you describe the coordinates of a square plotted in the first quadrant?
If (0,0) is the centre of the axis (the origin), which way do you move along the x-axis to find the negative coordinates?
If (0,0) is the centre of the axis (the origin), which way do you move along the y-axis to find the negative coordinates?
What does translation mean?
Which point are you going to look at when describing the translation?
Does each vertex of a shape translate in the same way?
How is reflecting different to translating?
Can you reflect one vertex at a time? Does this make it easier to reflect the shape?
Which axis are you going to use as the mirror line?

Edward Peake Church of England Middle School		
Topic: Decimals	**Year: 6**	**NC Strand: Number**

What should I already know?

- How to read and write decimal numbers as fractions [for example, 0.71 = 71/100
- How to use thousandths and relate them to tenths, hundredths and decimal
- equivalents
- How to round decimals with two decimal places to the nearest whole number and to one
- decimal place
- How to read, write, order and compare numbers with up to three decimal places
- How to solve problems involving number up to three decimal places

What will I know by the end of the unit?

- How to describe the value in words and digits in numbers with up to three decimal places
- How to multiply numbers with three decimal places by 10, 100 and 1,000
- How to divide numbers with three decimal places by 10, 100 and 1,000
- How to multiply decimals by an integer
- How to divide decimals by an integer
- How to use division to solve problems (where the answer has up to two decimal places)
- How to write a decimal as a fraction using place value knowledge
- How to write a fraction as a decimal. Using equivalence to write fractions with a denominator of 10, 100 and 1,000
- How to use knowledge of division to write a fraction as a decimal

Vocabulary

decimal	Exchanging	equivalent	Thirds
Decimal places	Tenths	Dividing	Quarters
Value	Hundredths	Sharing	Eighths
Digit	Thousandths	Grouping	Fifths
Place value	Zero	Multiplying	Denominator
Words	Place holder	Fractions	Numerator
Column	Decimal point	simplify	convert

Investigate/Homework tasks

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Edward Peake Church of England Middle School		
Topic: Decimals	**Year: 6**	**NC Strand: Number**

Diagram/Key Information

Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

Multiplying and Dividing by 10, 100 and 1000

10 000	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Multiplying

X 10	digits move LEFT **1** space
X 100	digits move LEFT **2** spaces
X 1000	digits move LEFT **3** spaces

Dividing

÷ 10	digits move RIGHT **1** space
÷ 100	digits move RIGHT **2** spaces
÷ 1000	digits move RIGHT **3** spaces

Key skills/Timeline/Topic Questions

How many hundredths are the same as 5 tenths?
Why is 0 important when multiplying by 10, 100 and 1,000?
What happens to the counters/digits when you divide by 10, 100 or 1,000?
Why is zero important when dividing by 10, 100 and 1,000?
What is happening to the value of the digit each time it moves one column to the right?
What are the relationships between tenths, hundredths and thousandths?
Which is bigger, 0.1, 0.01 or 0.001? Why?
How many 0.1s do you need to exchange for a whole one?
How else could we partition the number 3.69? (For example, 2 ones, 16 tenths and 9 hundredths.)
Can you have a unit fraction that is larger than 0.5? Why?
How many hundredths are equivalent to one tenth?
How could you convert a fraction to a decimal?
Do we divide the numerator by the denominator or divide the denominator by the numerator? Explain why.

Edward Peake Church of England Middle School		
Topic: Decimals	**Year: 6**	**NC Strand: Number**

Edward Peake Church of England Middle School		
Topic: Percentages	**Year: 6**	**NC Strand: Number**

What should I already know?
● How to recognise the per cent symbol (%) and ● That per cent relates to 'number of parts per hundred', and ● How to write a percentage as a fraction with denominator 100, and as a decimal ● How to solve problems which require knowing percentage and decimal equivalents of ½ and ¼

What will I know by the end of the unit?
● How to convert fractions to equivalent fractions where the denominator is 100 in order to find the percentage equivalent ● How to use equivalent fractions and decimals to find the equivalent percentage ● How to convert between fractions, decimals and percentages to order and compare them ● How to use fractional equivalences to find percentages of amounts. ● How to use different methods of finding certain percentages e.g. Finding 20% by dividing by 10 and multiplying by 2 or by dividing by 5 ● How to find the missing whole or a missing percentage when the other values are given (Using bar models)

Vocabulary			
Per cent	equivalent	tenths	compare
fraction	denominator	hundredths	Equal parts
convert	decimal	Order	dividing
whole			

Investigate/Homework tasks
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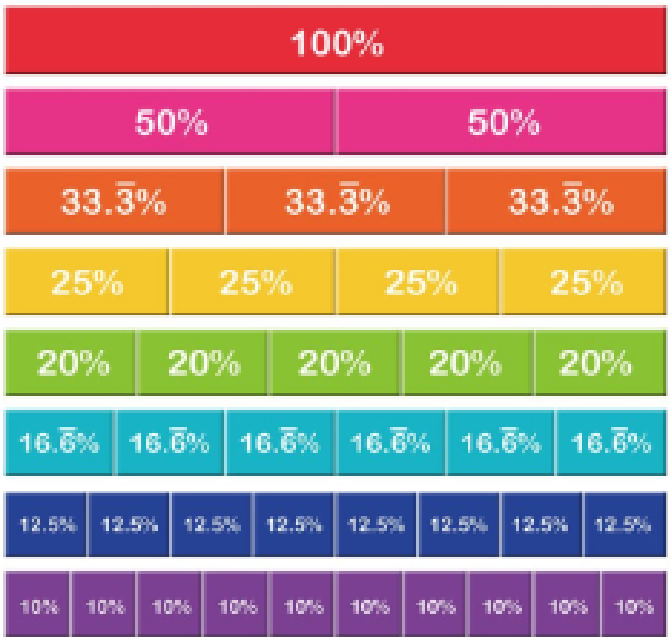
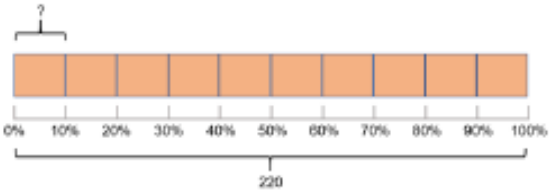
Edward Peake Church of England Middle School		
Topic: Percentages	**Year: 6**	**NC Strand: Number**

Diagram/ Key Information



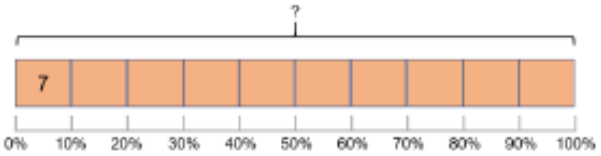
Mo uses a bar model to find 30% of 220



10% of 220 = 22 , so 30% of 220 = 3 × 22 = 66

If 7 is 10% of a number, what is the number?

Use the bar model to help you.



Key Questions

- What does the word 'percent' mean?
- How can you convert tenths to hundredths?
- Why is it easy to convert fiftieths to hundredths?
- What other fractions are easy to convert to percentages?

- How does converting a decimal to a fraction help us to convert it to a percentage?
- How do you convert a percentage to a decimal?
- Can you use a hundred square to represent your conversions?

- Why do we divide a quantity by 2 in order to find 50%?
- How do you calculate 10%of a number mentally?
- What's the same and what's different about 10% of 300and 10%of 30?

- Is dividing by 10 and multiplying by 5 the most efficient way to find 50%? Explain why.
- Is dividing by 10 and multiplying by 9 the most efficient way to find 90%? Explain why.
- How many ways can you think of to calculate 60% of a number?

- If we know a percentage, can we work out the whole?

Edward Peake Church of England Middle School		
Topic: Percentages	**Year: 6**	**NC Strand: Number**

- If we know the whole and the amount, can we find what percentage has been calculated?

Edward Peake Church of England Middle School		
Topic: Algebra	**Year: 6**	**NC Strand: Algebra**

What should I already know?

- How to use diagrams to represent problems
- How to use bar models to show fact families for addition/subtraction and multiplication/division
- Know that addition and multiplication are commutative

What will I know by the end of the unit?

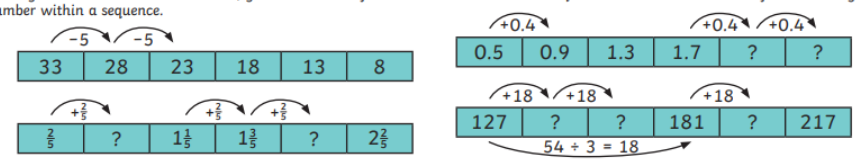
- How to use simple formulae.
- How to generate and describe linear number sequences.
- How to express missing number problems algebraically.
- How to find pairs of numbers that satisfy an equation with two unknowns.
- How to enumerate possibilities of combinations of two variables.

Diagram

Linear Number Sequences

A linear number sequence is a sequence where each value increases or decreases by the same amount each time. Each number in a linear number sequence is called a **term**. The constant change between each number is called the term to term rule. To identify the **term to term rule**, find the difference between two adjacent terms.

When you know the term to term rule, you can use it to find the next number in the sequence. It can also be used to find a missing number within a sequence.



Forming Expressions

An expression is a group of numbers, letters and operation symbols.

Add 14 to a	$a + 14$
Subtract 20 from b	$b - 20$
Multiply c by 4	$4c$
12 more than d	$d + 12$
Multiply e by 3 and subtract 5	$3e - 5$
Add 12 to f and then multiply by 2	$2(f + 12)$

Forming Equations

$a + 14 = 20$
$b - 20 = 15$
$4c = 28$
$d + 12 = 30$
$3e - 5 = 10$
$2(f + 12) = 44$

An equation is a number statement with an equal sign (=). Expressions on either side of the equal sign are of equal value.

Equations with Pairs of Unknowns

In an equation with two unknown numbers, there may be **several** possible values for the unknowns that will balance the equation.

$ab = 18$

a	b
1	18
2	9
3	6
6	3
9	2
18	1

$2a + b = 10$

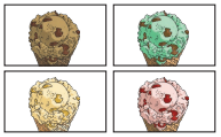
a	b
2	6
3	4
4	2
5	0

Enumerating Possibilities

Enumerating means making a complete list of answers to a problem.

- Use a system for finding the possibilities.
- Organise your findings in an ordered list or table.
- Have a way of deciding when all possibilities have been found.

There are four ice cream flavours.



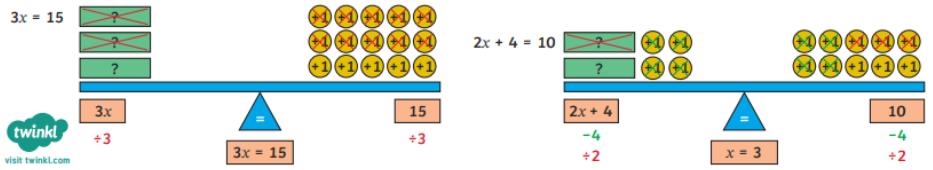
Two scoops of two different flavours give six possible combinations.

- chocolate and strawberry
- chocolate and vanilla
- chocolate and mint
- strawberry and vanilla
- strawberry and mint
- vanilla and mint

Solving One-Step and Two-Step Equations

In algebra, missing numbers in equations are represented by letters. Any letter can be used but often the letter x is used. An algebraic x is written to look different to a normal letter 'x' to avoid confusion.

The multiplication sign is not used in algebra to avoid confusing it with the algebraic x used to show a missing number. Inverse operations are used to isolate the letter on one side of the equation.



Edward Peake Church of England Middle School		
Topic: Algebra	**Year: 6**	**NC Strand: Algebra**

Key skills/Timeline/Topic Questions

What do you think "one-step function" means?
What examples of functions do you know?
Do some functions have more than one name?
What do you think input and output mean?
What is the output if ....?
What is the input if ....?
How many sets of inputs and outputs do you need to be able to work out the function? Explain how you know.

How can you write $+5$ followed by -2 as a one-step function?
If I change the order of the functions, is the output the same?
What is the output if ....?
What is the input if ....?
If you add 3 to a number and then add 5 to the result, how much have you added on altogether?

What expressions can be formed from this function machine?

What would the function machine look like for this rule/expression?

How can you write $x \times 3 + 6$ differently?

Are $2a + 6$ and $6 + 2a$ the same? Explain your answer

Why do you have to do the same to each side of the equation?

Why subtract 1? What does this do to the left hand side of the equation?

Does the order the equation is written in matter?

What's the same and what's different about solving the equations $2x + 1 = 17$ and $2x - 1 = 17$?

Can a and b be the same value?

Is it possible for a or b to be zero?

How many possible integer answers are there? Convince me you have them all.

What do you notice about the values of c and d?

Which letter represents the star?
Which letter represents the heart?
Would it still be correct if it was written as $a + b + c$?

What does it mean when a number is next to a letter?

Is $a + b + b$ the same as $a + 2b$?

What tells you something is a formula?

Which of the rectangles is the odd one out? Why?

Could you write the formula for a rectangle in a different way?

What other formulae do you know?

What does the cube represent?
What do the counters represent?

Design your own 'think of a number' problems.

What's the difference between an expression and an equation?

What's the difference between a formula and an equation?

Can you make some of your own equations using cups and counters for a friend to solve?

Why do you think the equation is set up on a balance? What does the balance represent? How does this help you solve the equation?

What is the same and what is different about each bar model?

What does $2a$ mean? (2 multiplied by an unknown number)
What is the greatest/smallest number 'a' can be?

What strategy did you use to find the value of 'b'?

Can you draw a bar model to represent the following equations:
$3f + g = 20$
$7a + 3b = 40$
What could the letters represent?

Investigate/Homework tasks

- Homework will be set by your teacher using google classroom
- 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
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Edward Peake Church of England Middle School		
Topic: Algebra	**Year: 6**	**NC Strand: Algebra**

Vocabulary			
Term to term rule	Expression	One- step equation	Pairs of Unknowns
Variable	Equation	Two-step equation	Enumerate
Unknown	Formula	Substitution	

Edward Peake Church of England Middle School		
Topic: Converting Units	**Year: 6**	**NC Strand: Measurement**

What should I already know?

- How 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)
- How to understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- How to solve problems involving converting between units of time
- How to use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

What will I know by the end of the unit?

- How to use and understand Metric measures
- How to convert metric measures
- How to calculate with metric measures
- How to convert miles and kilometres
- How to use and understand imperial measures

Key Information/Diagrams

Time

Minute 1 minute = 60 seconds

Hour 1 hour = 60 minutes

Day 1 day = 24 hours

Week 1 week = 7 days

Year 1 year = 12 months = 52 weeks = 365 days

Miles to Kilometres

You might measure the length of a road or the distance between two cities in miles or kilometres.

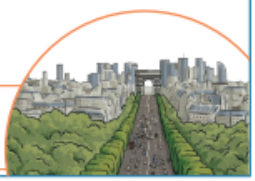
÷ 5 → × 8

miles (m) ⇄ kilometres (km)

× 5 ← ÷ 8

5 miles = 8 kilometres

≈ means approximately equal to



Converting Mass

1 tonne = 1000kg

1000g = 1kg

$\frac{1}{10}$kg = 0.1kg = 100g

$\frac{1}{4}$kg = 0.25kg = 250g

$\frac{1}{2}$kg = 0.5kg = 500g

$\frac{3}{4}$kg = 0.75 = 750g

÷ 1000 → grams (g) → ÷ 1000 → kilograms (kg) → ÷ 1000 → tonnes (t)

× 1000 ← × 1000 ← × 1000

Converting Capacity

1000ml = 1l

$\frac{1}{10}$l = 0.1l = 100ml

$\frac{1}{4}$l = 0.25l = 250ml

$\frac{1}{2}$l = 0.5l = 500ml

$\frac{3}{4}$l = 0.75l = 750ml

$\frac{1}{100}$l = 0.01l = 10ml

÷ 1000 → millilitre (ml) → litres (l) → × 1000

Imperial Measures

Things that could be measured using imperial units:

- Someone's height in feet and inches
- The mass of a bag of sugar in ounces
- The mass of a sack of potatoes in pounds
- A person's mass in stones
- A carton of milk in pints
- The amount of water in a bath in gallons

1 foot = 12 inches

1 pound = 16 ounces

1 stone = 14 pounds

1 gallon = 8 pints

Converting Length

1000m = 1km

100cm = 1m

10mm = 1cm

$\frac{1}{2}$m = 0.5m = 50cm

$\frac{1}{4}$m = 0.25m = 25cm

$\frac{3}{4}$m = 0.75m = 75cm

$\frac{1}{10}$m = 0.01m = 10cm

÷ 10 → millimetres (mm) → ÷ 100 → centimetres (cm) → ÷ 1000 → metres (m) → kilometres (km)

× 10 ← × 100 ← × 1000

Metric to Imperial Conversions

metric (new)	imperial (old)
2.5 centimetres	1 inch
1 kilogram	2.2 pounds
4.5 litres	1 gallon

÷ 2.5 → centimetres → inches → × 2.5

÷ 4.5 → litres → gallons → × 4.5

÷ 2.2 → kilograms → pounds → × 2.2

Edward Peake Church of England Middle School		
Topic: Converting Units	**Year: 6**	**NC Strand: Measurement**

Key Questions	
Which units measure length? Mass? Capacity? When would you use km instead of m? When would you use mm instead of cm? Which is the most appropriate unit to use to measure the object? Explain your answer. Why do you think _____ is not an appropriate estimate? How could you work out what each mark is worth on the scales? What do you think would be the most efficient method for converting the units of time? What's the same and what's different between 1.5 km and 1.500 km? Are the zeroes needed? Why or why not? What do you notice about the amounts in the table? Can you spot a pattern? What's the same and what's different about km and kg? What operation are you going to use and why? How could you use a bar model to help you understand the question? How many ___ are there in a ___? How can we convert between ___ and ___?	Give an example of a length you would measure in miles or km. If we know 5 miles ≈ 8 km, how can we work out 15 miles converted to km? Can you think of a situation where you may need to convert between miles and kilometres? Put these in order of size: 1 cm, 1 mm, 1 inch, 1 foot, 1 metre. How do you know? When do we use imperial measures instead of metric measures? Why are metric measures easier to convert than imperial measures?

Vocabulary			
Mass	Litre	Kilometre	Pound
Gram	Millilitre	Metre	Stone
Kilogram	Centilitre	Foot	Pint
Capacity	Millimetre	Inch	Gallon
Volume	Centimetre	Ounce	

Investigate/Homework tasks

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Edward Peake Church of England Middle School		
Topic: Perimeter, Area and Volume	**Year: 6**	**NC Strand: Measurement**

What should I already know?

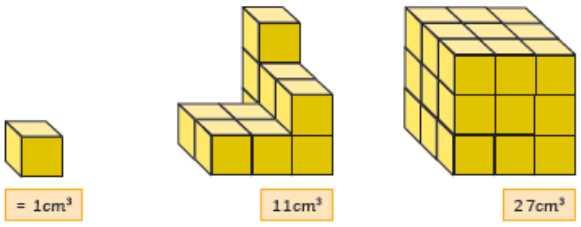
- How to measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- How to calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes
- How to estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]

What will I know by the end of the unit?

- How to explain that shapes with the same areas can have different perimeters and vice versa.
- How to explain when it is possible to use formulae for area of shapes.
- How to explain when it is possible to use formulae for volume of shapes.
- How to calculate the area of parallelograms.
- How to calculate the area of triangles.
- How to calculate, estimate and compare volume of cubes and cuboids.

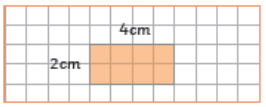
Key Information/Diagrams

Volume - Counting Cubes



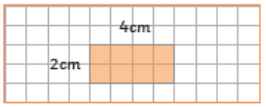
Perimeter and Area

Shapes with the same area can have different perimeters.



area = 8cm² perimeter = 12cm | area = 8cm² perimeter = 18cm

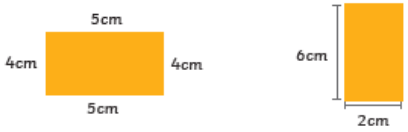
Shapes with the same perimeter can have different areas.



area = 8cm² perimeter = 12cm | area = 5cm² perimeter = 12cm

Perimeter of Rectangles

perimeter = length + width + length + width or (length + width) × 2

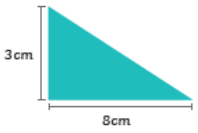


5cm + 4cm + 5cm + 4cm
area = 18cm²

(6 + 2) × 2
area = 16cm²

Area of Triangles

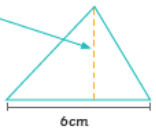
base × perpendicular height ÷ 2 = area of a triangle

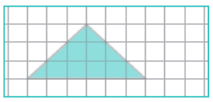


8cm × 3cm ÷ 2
area = 12cm²

perpendicular height = 5cm

6cm × 5cm ÷ 2
area = 15cm²





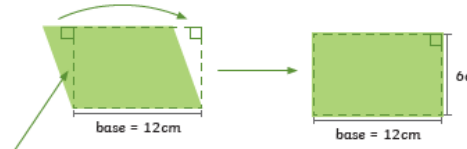
Counting squares:
6 whole squares = 6cm²
6 half squares = 3cm²
6cm² + 3cm² = 9cm²
area = 9cm²

Using formula:
6cm × 3cm
÷ 2 = 9cm²

Area of Parallelograms

base × perpendicular height = area of a parallelogram

A parallelogram can be transformed into a rectangle.

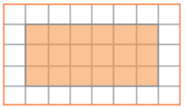


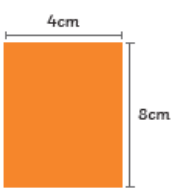
perpendicular height = 6cm

12cm × 6cm = 72cm²

Area of Rectangles

length × width = area of a rectangle



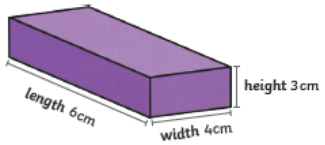


Counting squares:
area = 18cm²
Use formula:
6cm × 3cm
area = 18cm²

8cm × 4cm area = 32cm²

Volume of Cuboids

length × width × height = volume of a cuboid



Multiply dimensions in **any** order:
3cm × 6cm × 4cm
volume = 72cm³

Edward Peake Church of England Middle School		
Topic: Perimeter, Area and Volume	**Year: 6**	**NC Strand: Measurement**

Key Questions

What do we need to know in order to work out the area of a shape?

Why is it useful to know your times-tables when calculating area?

Can you have a square with an area of 48 cm^2? Why?

How can factors help us draw rectangles with a specific area?

What is the difference between the area and perimeter of a shape?

How do we work out the area and perimeter of shapes? Can you show this as a formula?

Can you have 2 rectangles with an area of 24 cm^2 but different perimeters?

How many whole squares can you see?

How many part squares can you see?

What could we do with the parts?

What does estimate mean?

Why is your answer to this question an **estimate** of the area?

Revisit the idea that a square is a rectangle when generalising how to calculate the area of a triangle.

Can you identify the length, width and height of the cuboid?

If the length of a cuboid is 5 cm and the volume is 100 cm^3, what could the width and height of the cuboid be?

What knowledge can I use to help me calculate the missing lengths?

What is the same/different about the rectangle and triangle?

What is the relationship between the area of a rectangle and the area of a right-angled triangle?

What is the formula for working out the area of a rectangle or square?

How can you use this formula to work out the area of a right-angled triangle?

What does the word perpendicular mean?

What do we mean by perpendicular height?

What formula can you use to calculate the area of a triangle?

If there is more than one triangle making up a shape, how can we use the formula to find the area of the whole shape?

How do we know which length tells us the perpendicular height of the triangle?

Describe a parallelogram.

What do you notice about the area of a rectangle and a parallelogram?

What formula can you use to work out the area of a parallelogram?

What's the same and what's different between area and volume?

Can you explain how you worked out the volume? What did you visualise?

What units of measure could we use for volume? (Explore cm^3, m^3, mm^3 etc.)

Vocabulary

Perimeter	Cubic units	Length	Parallelogram
Area	Cuboid	Rectangle	Perpendicular Height
Volume	Width	Rectilinear	

Investigate/Homework tasks

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Edward Peake Church of England Middle School		
Topic: Ratio	**Year: 6**	**NC Strand: Number**

What should I already know?

- How to solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

What will I know by the end of the unit?

- How to use ratio language
- How to compare ratio and fractions
- How to use the ratio symbol
- How to solve problems involving ratio
- How to use scale factors
- How to calculate using scale factors
- How to solve ratio and proportion problems

Key Information/Diagrams

The Ratio Symbol

The ratio of footballs to rugby balls: 1:4

The ratio of rugby balls to footballs: 4:1

The ratio of circles to triangles: 2:3

The ratio of triangles to circles: 3:2

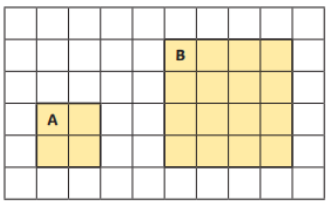
The ratio of apples to bananas: 1:2

The ratio of bananas to oranges: 2:3

The ratio of apples to bananas to oranges: 1:2:3

The ratio of oranges to bananas to apples: 3:2:1

Scale Factors

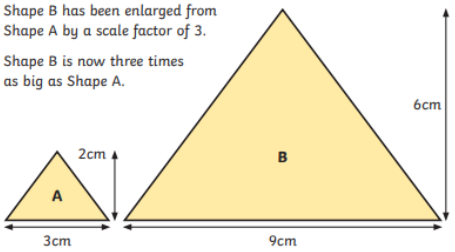


Shape A has been enlarged by a scale factor of 2 to make Shape B.

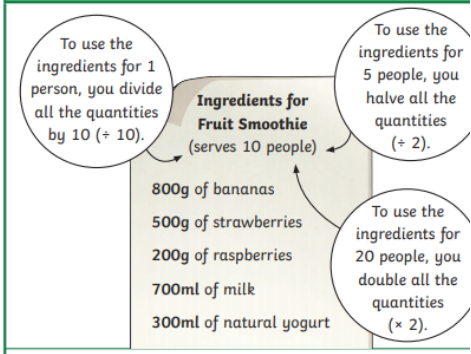
Shape B is now two times as big as Shape A.

Shape B has been enlarged from Shape A by a scale factor of 3.

Shape B is now three times as big as Shape A.

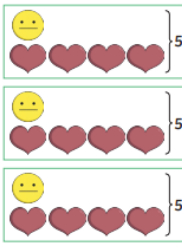


Ratio and Proportion Problem-Solving



In a bag of 15 sweets, there is 1 smiley face sweet for every 4 love heart sweets.

Therefore, there will be 3 smiley face sweets and 12 love heart sweets in the bag.



Ratio and Fractions

For every 1 rugby ball, there are 2 footballs.

Ratio of rugby balls to footballs: 1:2

$\frac{1}{3}$ of the balls are rugby balls.

For every 1 triangle, there are 3 squares.

Ratio of triangles to squares: 1:3

$\frac{1}{4}$ of the shapes are triangles.

Ratio Language

For every 1 circle, there are 2 triangles.

For every 2 bananas, there are 3 apples.

For every 1 football, there are 3 rugby balls.

Edward Peake Church of England Middle School		
Topic: Ratio	**Year: 6**	**NC Strand: Number**

Vocabulary			
Ratio	Part	Enlargement	Width
Proportion	Whole	Similar Shape	Perimeter
For every … there are…	Scale Factor	Length	

Investigate/Homework tasks

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Key Questions

How would your sentences change if there were 2 more blue flowers?

How would your sentences change if there were 10 more pink flowers?

Can you write a "For every..." sentence for the number of boys and girls in your class?

How many counters are there altogether?

How does this help you work out the fraction?

What does the denominator of the fraction tell you?

How can a bar model help you to show the mints and chocolates?

What does the : symbol mean in the context of ratio?

Why is the order of the numbers important when we write ratios?

How do we write a ratio that compares three quantities?

How do we say the ratio "3 : 7"?

What does enlargement mean?

What does scale factor mean?

Why do we have to double/triple all the sides of each shape?

Have the angles changed size?

What does similar mean?

What do you notice about the length/width of each shape?

How would drawing the rectangles help you?

How much larger/smaller is shape A compared to shape B?

What does a scale factor of 2 mean? Can you have a scale factor of 2.5?

How does this problem relate to ratio?

Can we represent this ratio using a bar model?

What does each part represent? What is the whole?

What is the same about the ratios?

What is different about them?

Edward Peake Church of England Middle School		
Topic: Ratio	**Year: 6**	**NC Strand: Number**

How can we represent this ratio using a bar model? What does each part represent? What will each part be worth? How many parts are there altogether? What is each part worth? If we know what one part is worth, can we calculate the other parts?	

Edward Peake Church of England Middle School		
Topic: Properties of Shape	**Year: 6**	**NC Strand: Geometry**

What should I already know?

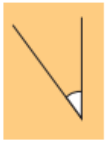
- Hoe to identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- How to draw given angles, and measure them in degrees (o)
- How to identify:
  - angles at a point and one whole turn (total 360o)
  - angles at a point on a straight line and half a turn (total 180o)
  - other multiples of 90o
- How to use the properties of rectangles to deduce related facts and find missing lengths and angles
- How to distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

What will I know by the end of the unit?

- How to measure with a protractor
- Understand angles
- How to calculate missing angles
- The properties of vertically opposite angles
- How to solve problems using the sum of angles in a triangle
- How to solve problems using the sum of angles in a triangle–special cases
- How to solve angle problems in special quadrilaterals
- How to solve angle problems in regular polygon
- How to draw shapes accurately
- How to draw nets of 3-D shapes

Key Information/Diagrams

Angle Types

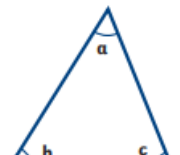


Acute Angles
Any angle that measures less than 90° is called an **acute** angle.

Obtuse Angles
Any angle that measures greater than 90° and less than 180° is called an **obtuse** angle.

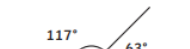
Reflex Angles
Any angle that measures greater than 180° is called a **reflex** angle.

Angles in a Triangle

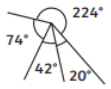


a + b + c = 180°

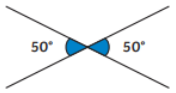
Calculating Angles

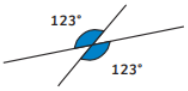


Angles on a straight line always total 180°.

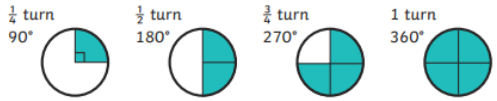


Angles around a point always total 360°.





Opposite angles that share a vertex are equal.

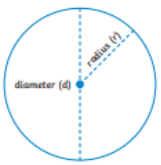


Multiples of 90° can be used as descriptions of a turn.

Parts of Circles

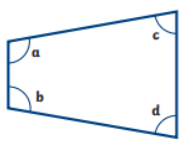
A circle is a 2D shape. The perimeter of a circle is called the **circumference** (c). The distance across the circle, passing through the centre, is called the **diameter** (d).

The distance from the centre of the circle to the circumference is called the **radius** (r).



$r \times 2 = d$ $\quad \frac{d}{2} = r$

Angles in a Quadrilateral



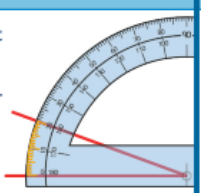
a + b + c + d = 360°

Using a Protractor

Place the cross or circle at the point of the angle you are measuring.

Read from the zero on the outer scale of your protractor.

Count the degree lines carefully.



Properties of 3D Shapes

3D shapes have three dimensions – **length**, **width** and **depth**.

A **polyhedron** is a 3D shape with flat faces. Spheres, cylinders and cones are not polyhedrons as they have curved surfaces.

Cube 6 square faces 12 edges 8 vertices	**Tetrahedron** 4 triangular faces 6 edges 4 vertices	**Sphere** 1 curved surface 0 edges 0 vertices
Cuboid 6 faces 12 edges 8 vertices	**Octahedron** 8 faces 12 edges 6 vertices	**Triangular prism** 5 faces 9 edges 6 vertices
Square-based pyramid 5 faces 8 edges	**Cone** 1 circular face 1 curved surface 1 curved edge	**Cylinder** 2 circular faces 1 curved surface 2 curved edges

Angles in Regular Polygons

As the number of sides of a polygon increases by one, the total of the interior angles increases by 180°. When n = number of sides, this formula can be used to find the size of each angle in a **regular polygon**:

Sum of Interior Angles = (n − 2) × 180° $\quad$ **Each Angle = $\frac{(n-2) \times 180°}{n}$**

Pentagon
n = 5

Hexagon
n = 6

Edward Peake Church of England Middle School		
Topic: Properties of Shape	**Year: 6**	**NC Strand: Geometry**

Vocabulary			
Angle	Vertical	Three-Dimensional	Apex
Right angle	Parallel	Flat face	Radius
Acute	Perpendicular	Curved surface	Side
Obtuse	Polygon	Edge	Diameter
Reflex	Regular	Curved Edge	Circumference
Protractor	Irregular	Vertex	Perimeter
Horizontal	Two-dimensional	Vertices	

Investigate/Homework tasks

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  - Find out more about the meaning of the vocabulary list using http://www.amathsdictionaryforkids.com/
- To challenge yourself: Answer the key questions to deepen your knowledge

Key Questions

Can we name and describe the 4 different types of angles? (right angle, obtuse, acute, reflex)

What unit do we use to measure angles?

Does it matter which side of the protractor I use?

What mistakes could we make when measuring with a protractor?

How would I measure a reflex angle?

Look at a compass, what angles can we identify using the compass?

If there are 90 degrees in one right angle, how many are there in two? What about three?

How many degrees are there in a quarter/half turn?

Between which two compass points can you see a right angle/half turn/three quarter turn?

What do we know about a and b? How do we know this?

Which angle fact might you need to use when answering this question?

Which angles are already given? How can we use this to calculate unknown angles?

What sentences can we write about vertically opposite angles in relation to other angles?

How can we find the missing angle?

Is there more than one way to find this angle?

What's the same and what's different about the four types of triangle?

What do the three interior angles add up to? Would this work for all triangles?

Does the type of triangle change anything?

Does the size of the triangle matter?

How can we identify sides which are the same length on a triangle?

How can we use the use the hatch marks to identify the equal angles?

If you know one angle in an isosceles triangle, what else do you know?

Can you have an isosceles right-angled triangle?

Is it sensible to estimate the angles before calculating them? Are the triangles drawn accurately?

Can you identify the type of triangle? How will this help you calculate the missing angle?

Which angle can you work out first? Why? What else can you work out?

Edward Peake Church of England Middle School		
Topic: Properties of Shape	**Year: 6**	**NC Strand: Geometry**

What is a regular polygon? What is an irregular polygon? What is the sum of interior angles of a triangle? How can we use this to work out the interior angles of polygons? Can we spot a pattern in the table? What predictions can we make?	Is a rectangle a parallelogram? Is a parallelogram a rectangle? What do you notice about the opposite angles in a parallelogram? Is a square a rhombus? Is a rhombus a square? What do you notice about the opposite angles in a rhombus? What is the difference between a trapezium and an isosceles trapezium? If you know 3 of the interior angles, how could you work out the fourth angle? What do you know about the shapes which will help you draw them? How can we ensure our measurements are accurate? How would you draw a triangle on a plain piece of paper using a protractor?

Edward Peake Church of England Middle School		
Topic: Statistics	**Year: 6**	**NC Strand: Statistics**

What should I already know?

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

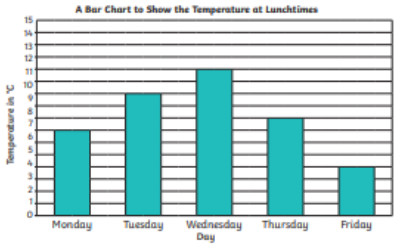
What will I know by the end of the unit?

- How to read and interpret line graphs
- How to draw line graphs
- How to use line graphs to solve problem
- Read and interpret pie charts
- How to interpret Pie charts with percentages
- How to draw pie charts
- How to calculate the mean and use the mean as an average for a set of data

Key Information/Diagrams

Bar Chart

A bar chart has a horizontal axis and a vertical axis. Bars show the data value of each category. There must be a gap between each bar. The scale of the bar chart is chosen based on the data range.



Mean Average

The mean is the average of a set of data.

To find the mean or average, add up all of the values to find the total. Divide the total by the number of values that you added together. This will give you the mean.

12	15	10	8	15

12 + 15 + 10 + 8 + 15 = 60

60 ÷ 5 = 12

The mean of this data is 12.

Frequency Table

Eye Colour	Tally	Frequency
brown	𝍸 I	6
blue	𝍸 III	8
green	III	3
grey	IIII	4
hazel	𝍸	5

Tally marks are used to help count things. Each vertical line represents one unit. The fifth tally mark goes down across the first four to make it easier to count.

The frequency column is completed after all the data has been collected.

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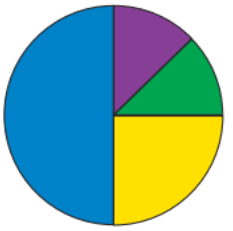
Pie Charts

Pie charts represent discrete data.

A circle is divided into segments, where ea segment represents a data category. The size each segment matches its proportion of the to amount.

A pie chart to show children's favourite sports



24 children were asked in total.

Swimming = $\frac{1}{2}$ so $\frac{1}{2}$ of 24 = 12 children

Netball = $\frac{1}{4}$ so $\frac{1}{4}$ of 24 = 6 children

Football = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children

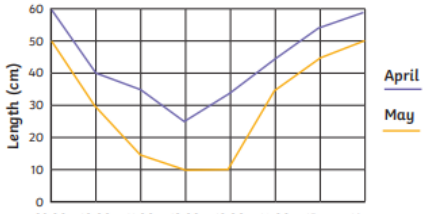
Gymnastics = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children

Line Graph

Line graphs are used to show changes to a measurement over time.

Data shown in a line graph is continuous. Sets of points are joined together to make the line.

A line graph to show the length of shadows over time



Interpreting Data

Information can be show in tables, charts or graphs.

Interpreting data simply means understanding or working out what is being shown by a table, graph or chart and being able to answer questions about that information.

Edward Peake Church of England Middle School		
Topic: Statistics	**Year: 6**	**NC Strand: Statistics**

Vocabulary			
Bar Chart	Pie Chart	Line graph	Comparison
Pictogram	Discrete Data	sum	Interpret
Frequency Table	Continuous data	difference	Mean Average
Tally Chart			

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- To challenge yourself: Answer the key questions to deepen your knowledge

Key Questions

Where might you see a line graph used in real life?

What is the relationship between the diameter and the radius? If you know one of these, how can you calculate the other?

If you know 5 % of a number, how can you work out the whole number?

If you know what 5 % is, what else do you know?

How many degrees are there around a point? How will this help us construct a pie chart?

If the total frequency is ____ , how will we work out the number of degrees representing each sector?

If 180° represents 15 pupils. How many people took part in the survey? Explain why.

Do you think calculating the mean age of the family is a good indicator of their actual age? Why? *(Explore why this isn't helpful).*

When will the mean be useful in real life?