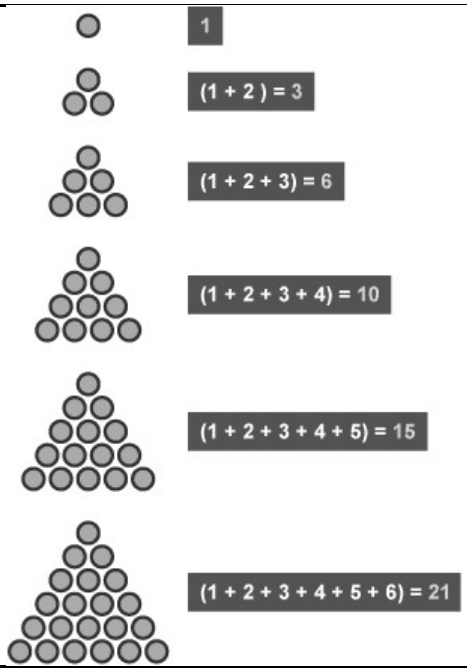
Knowledge Organiser Y7 Maths Numbers and the number system

Key Vocabulary	Definition/Tips	Example
Integer	A **whole number** that can be positive, negative or zero.	$-3, 0, 92$
Decimal	A number with a **decimal point** in it. Can be positive or negative.	$3.7, 0.94, -24.07$
Negative Number	A number that is **less than zero**. Can be decimals.	$-8, -2.5$
BIDMAS	An acronym for the **order** you should do calculations in. BIDMAS stands for **'Brackets, Indices, Division, Multiplication, Addition and Subtraction'**. Indices are also known as 'powers' or 'orders'. With strings of division and multiplication, or strings of addition and subtraction, and no brackets, work from left to right.	$6 + 3 \times 5 = 21, not\ 45$ $5^2 = 25$, where the 2 is the index/power. $12 \div 4 \div 2 = 1.5, not\ 6$
Prime Numbers	**Prime numbers are** special numbers, greater than 1, that have exactly two factors, themselves and 1.	2, 3, 5, 7, 11, 13, 17, 19… 2 x 1 = 2, 3 x 1 = 3 etc
Factors	**Factors** are numbers that divide exactly into another number.	For example, the factors of 8 are: **1, 2, 4, 8** Factors can be shown in pairs. Each pair multiplies to make 8. 1 x 8 = 8 2 x 4 = 8
Multiples	**Multiples are really just extended times tables.**	The multiples of 2 are all the numbers in the 2 times table, such as 2, 4, 6, 8, 10 and so on.
LCM	The **lowest/least common multiple** (abbreviated to LCM) is the lowest number that is a multiple of two or more subject-numbers.	For example, the **common multiples** of 4 and 5 are 20, 40, 60, 80 and so on. These are the numbers that are multiples of **both** 4 and 5. The LCM is therefore 20, as this is the lowest of all the common multiples.

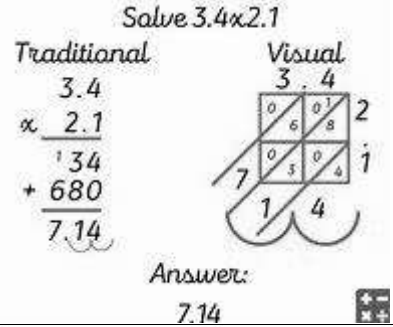
HCF	A **common factor** is a factor that is shared by two or more numbers. For example, a common factor of 8 and 10 is 2, as 2 is a factor of 8, and 2 is also a factor of 10. The highest common factor (HCF) is found by finding all common factors of two numbers and selecting the largest one.	For example, 8 and 12 have common factors of 1, 2 and 4. The highest common factor is 4.
Square numbers	A square number is a number multiplied by itself. This can also be called 'a number squared'. The symbol for squared is ².	$2^2 = 2 \times 2 = 4$ $3^2 = 3 \times 3 = 9$ $4^2 = 4 \times 4 = 16$
Cube Numbers	A cube number is a number multiplied by itself twice. This can also be called 'a number cubed'. The symbol for cubed is ³.	$2^3 = 2 \times 2 \times 2 = 8$ $3^3 = 3 \times 3 \times 3 = 27$ $4^3 = 4 \times 4 \times 4 = 64$
Triangular numbers	Triangle numbers are numbers which form to make triangles.	

Knowledge Organiser Y7 Maths Counting and comparing

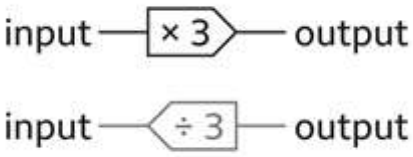
Key Vocabulary	Definition/Tips	Example
Integer	A **whole number** that can be positive, negative or zero.	$-3, 0, 92$
Decimal	A number with a **decimal point** in it. Can be positive or negative.	$3.7, 0.94, -24.07$
Negative Number	A number that is **less than zero**. Can be decimals.	$-8, -2.5$
Place Value	The **value** of where a **digit** is within a number.	In 726, the value of the 2 is 20, as it is in the 'tens' column.
Inequalities	An inequality says that two values are not equal. $a \neq b$ means that a is not equal to b.	$7 \neq 3$ $x \neq 0$
Inequality symbols	$x > 2$ means x is greater than 2 $x < 3$ means x is less than 3 $x \geq 1$ means x is greater than or equal to 1 $x \leq 6$ means x is less than or equal to 6	State the integers that satisfy $-2 < x \leq 4$. -1, 0, 1, 2, 3, 4
Fraction	A mathematical expression representing the **division** of one integer by another. Fractions are written as **two numbers separated by a horizontal line**.	2/7 is a 'proper' fraction. 9/4 is an 'improper' or 'top-heavy' fraction.
Numerator	The **top** number of a fraction	In the fraction 3/5, 3 is the numerator.
Denominator	The **bottom** number of a fraction.	In the fraction 3/5, 5 is the denominator.
Unit fraction	A fraction where the **numerator is one** and the denominator is a positive integer.	1/2,1/3,1/4 etc. are examples of unit fractions.
Mixed Number	A number formed of both an **integer part** and a **fraction part**.	3 3/5 is an example of a mixed number.
Simplifying Fractions	**Divide the numerator and denominator by the highest common factor.**	20/45 = 4/9
Equivalent Fractions	Fractions, which represent the **same value**.	2/5 = 4/10 = 20/50 = 60/150 etc.
Comparing Fractions	To compare fractions, they each need to be rewritten so that they have a **common denominator**.	Put in to ascending order : 3/4, 2/3, 5/6, 1/2 Equivalent: 9/12, 8/12, 10/12, 6/12

	Ascending means **smallest to biggest.** **Descending** means **biggest to smallest.**	Correct order: 1/2, 2/3, 3/4, 5/6
Adding or Subtracting Fractions	Find the **LCM of the denominators** to find a common denominator. Use equivalent fractions to change each fraction to the **common denominator.** Then just **add or subtract the numerators** and keep the **denominator the same.**	2/3/+/4/5 Multiples of 3: 3, 6, 9, 12, 15.. Multiples of 5: 5, 10, 15.. LCM of 3 and 5 = 15 2/3=1015 4/5=12/15 10/15+12/15=22/15=1 7/15
Multiplying Fractions	**Multiply** the **numerators** together and **multiply** the **denominators** together.	3/8 × 2/9 = 6/72 = 1/12
Dividing Fractions	'Keep it, Flip it, Change it – KFC' Keep the first fraction the same Flip the second fraction upside down Change the divide to a multiply Multiply by the reciprocal of the second fraction.	3/4 ÷ 5/6 = 3/4 × 6/5 = 18/20 = 9/10

Knowledge Organiser Y7 Maths Calculating

Key Vocabulary	Definition/Tips	Example
Integer	A **whole number** that can be positive, negative or zero.	$-3, 0, 92$
Decimal	A number with a **decimal point** in it. Can be positive or negative.	$3.7, 0.94, -24.07$
Negative Number	A number that is **less than zero**. Can be decimals.	$-8, -2.5$
Addition	To find the **total**, or **sum**, of two or more numbers. 'add', 'plus', 'sum'	$3 + 2 + 7 = 12$
Subtraction	To find the **difference** between two numbers. To find out how many are left when some are taken away. 'minus', 'take away', 'subtract'	$10 - 3 = 7$
Multiplication	Can be thought of as **repeated addition**. 'multiply', 'times', 'product'	$3 \times 6 = 6 + 6 + 6 = 18$
Division	Splitting into equal parts or groups. The process of calculating the **number of times one number is contained within another one**. 'divide', 'share'	$20 \div 4 = 5$ $\frac{20}{4} = 5$
Remainder	The amount '**left over**' after dividing one integer by another.	The remainder of $20 \div 6$ is 2, because 6 divides into 20 exactly 3 times, with 2 left over.
Multiplying decimals	**Multiplying decimals** works the same way as **multiplying whole numbers**.	
Dividing decimals	**Dividing decimals** works the same way as **dividing whole numbers**. Ensure you align the decimal points.	$5\overline{)68.5}$ $5\overline{)68.5}$ $5\overline{)68.5}$

Knowledge Organiser Y7 Maths: Unit 4 Algebraic proficiency: tinkering

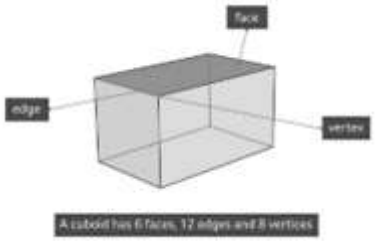
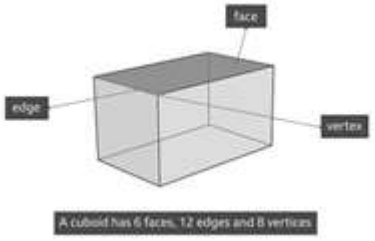
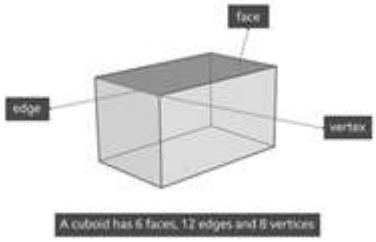
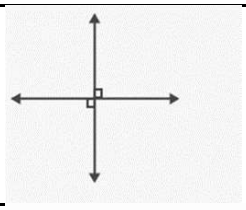
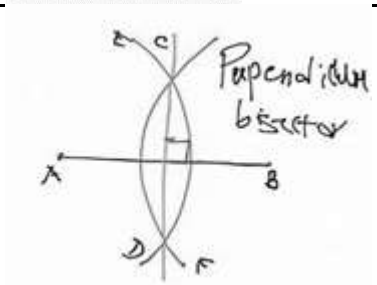
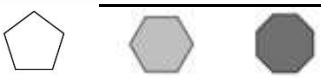
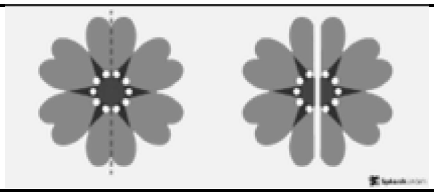
Key vocabulary	Definition/Tips	Example
1. Expression	A mathematical statement written using **symbols**, **numbers,** or **letters**.	$3x + 2$ or $5y^2$
2. Equation	A statement showing that **two expressions are equal**	$2y - 17 = 15$
3. Identity	An equation that is **true for all values** of the variables An identity uses the symbol: ≡	$2x \equiv x + x$
4. Formula	Shows the **relationship** between **two or more variables**	Area of a rectangle = length x width or A= L x W
5. Collecting terms	An algebraic expression may be simplified by collecting like terms. To reduce the number of terms in the expression, like terms are added or subtracted.	$4x - 2x + 8 + 3x - 1$ $4x + 3x - 2x + 8 - 1$
6. Function Machines	A function relates an input to an output. One or more operations are applied to an input to give an output. There is one output for a given input. An input value becomes an output value when the operations of a function machine are worked through from **left** to **right**. An input value can be found from the output when the inverse operations are worked through from **right** to **left**.	
7. Substitution	**Replace letters with numbers**. Be careful of $5x^2$. You need to square first, then multiply by 5.	$a = 3, b = 2$ and $c = 5$. Find: 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
9. Expanding brackets	To expand a **single bracket**, each term inside the bracket is multiplied by the expression outside the bracket.	Expand 3(a + 3) = 3xa + 3x3 (simplify) = 3a + 9

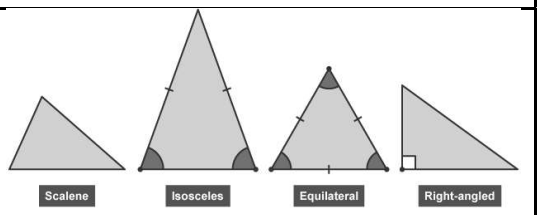
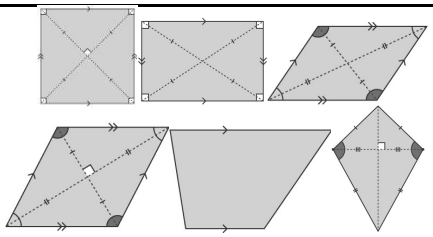
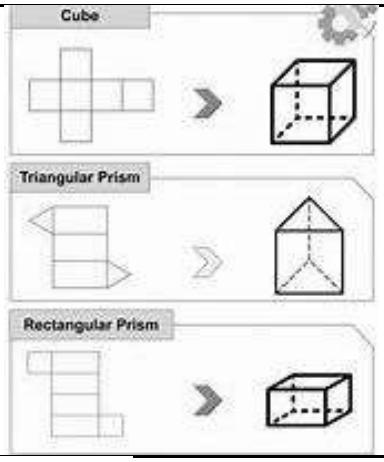
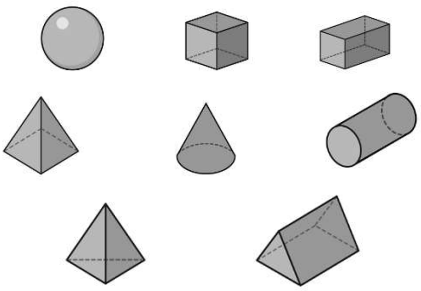
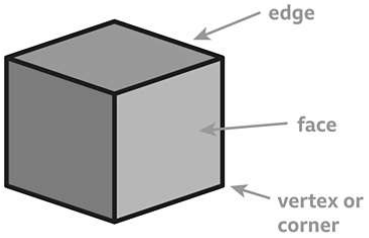
Knowledge Organiser: HT2 Y7 Unit 5-6 Fractions, Decimals and Percentages

Key Vocabulary	Definition/Tips	Example
Fraction	A mathematical expression representing the **division** of one integer by another. Fractions are written as **two numbers separated by a horizontal line**.	$\frac{2}{7}$ is a 'proper' fraction. $\frac{9}{4}$ is an 'improper' or 'top-heavy' fraction.
Numerator	The **top** number of a fraction.	In the fraction $\frac{3}{5}$, 3 is the numerator.
Denominator	The **bottom** number of a fraction.	In the fraction $\frac{3}{5}$, 5 is the denominator.
Unit Fraction	A fraction where the **numerator is one** and the denominator is a positive integer.	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ etc. are examples of unit fractions.
Mixed Number	A number formed of both an **integer part** and a **fraction part**.	$3\frac{2}{5}$ is an example of a mixed number.
Simplifying Fractions	**Divide the numerator and denominator by the highest common factor**.	$\frac{20}{45} = \frac{4}{9}$
Equivalent Fractions	Fractions which represent the **same value**.	$\frac{2}{5} = \frac{4}{10} = \frac{20}{50} = \frac{60}{150}$ etc.
Comparing Fractions	To compare fractions, they each need to be rewritten so that they have a **common denominator**. **Ascending** means **smallest to biggest**. **Descending** means **biggest to smallest**.	Put in to ascending order : $\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$. Equivalent: $\frac{9}{12}, \frac{8}{12}, \frac{10}{12}, \frac{6}{12}$ Correct order: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$
Adding or Subtracting Fractions	Find the **LCM of the denominators** to find a common denominator. Use equivalent fractions to change each fraction to the **common denominator**. Then just **add or subtract the numerators** and keep the **denominator the same**.	$\frac{2}{3} + \frac{4}{5}$ Multiples of 3: 3, 6, 9, 12, **15**.. Multiples of 5: 5, 10, **15**.. LCM of 3 and 5 = 15 $\frac{2}{3} = \frac{10}{15}$ $\frac{4}{5} = \frac{12}{15}$ $\frac{10}{15} + \frac{12}{15} = \frac{22}{15} = 1\frac{7}{15}$

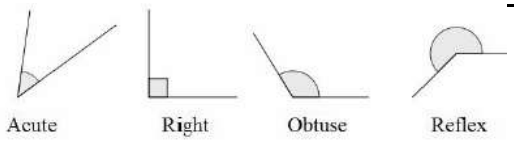
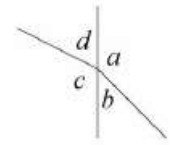
Multiplying Fractions	**Multiply** the **numerators** together and **multiply** the **denominators** together.	$\frac{3}{8} \times \frac{2}{9} = \frac{6}{72} = \frac{1}{12}$
Dividing Fractions	**'Keep it, Flip it, Change it – KFC'** Keep the first fraction the same Flip the second fraction upside down Change the divide to a multiply Multiply by the reciprocal of the second fraction.	$\frac{3}{4} \div \frac{5}{6} = \frac{3}{4} \times \frac{6}{5} = \frac{18}{20} = \frac{9}{10}$
Percentage	**Number of parts per 100.**	31% means $\frac{31}{100}$
Finding 10%	To find **10%**, **divide by 10**	10% of £36 = 36÷10=£3.60
Finding 1%	To find **1%**, **divide by 100**	1% of £8 = 8÷100 = £0.08
Percentage Change	$\frac{\boldsymbol{Difference}}{\boldsymbol{Original}} \times \mathbf{100\%}$	A games console is bought for £200 and sold for £250. % change = $\frac{50}{200} \times 100 = 25\%$
Percentages to Decimals	**Divide by 100**	$8\% = 8 \div 100 = 0.08$
Decimals to Percentages	**Multiply by 100**	$0.4 = 0.4 \times 100\% = 40\%$
Fractions to Percentages	Percentage is just a fraction out of 100. **Make the denominator 100 using equivalent fractions**. When the denominator doesn't go in to 100, use a calculator and **multiply the fraction by 100**.	$\frac{3}{25} = \frac{12}{100} = 12\%$ $\frac{9}{17} \times 100 = 52.9\%$
Percentages to Fractions	Percentage is just a fraction out of 100. **Write the percentage over 100** and simplify.	$14\% = \frac{14}{100} = \frac{7}{50}$

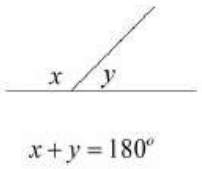
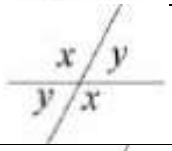
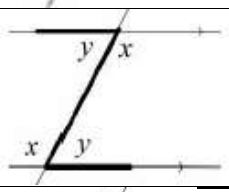
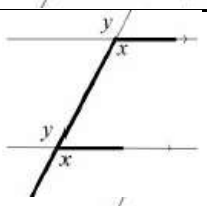
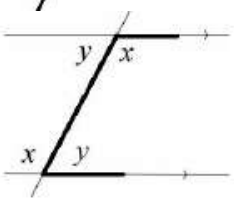
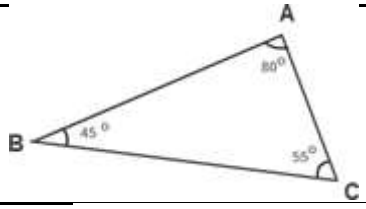
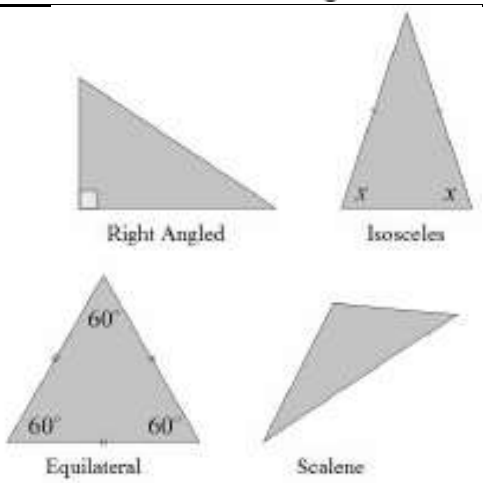
Knowledge Organiser Y7 Maths: Unit 7 Visualising and constructing

Key vocabulary	Definition/Tips	Example
Faces	A **face** is a flat surface.	
Edges	An **edge** is where two faces meet.	
Vertex/Vertices	A **vertex** is a corner where edges meet. The plural of vertex is **vertices**.	
Perpendicular	at an angle of 90° (right angle) to a given line, plane, or surface or to the ground.	
Construction	Construction is the act of drawing geometric shapes using only a compass and straightedge. No measuring of lengths or angles is allowed.	
Polygon (regular)	Polygons are 2D shapes that have straight sides. Regular polygons have sides and angles that are all the **same size**.	
Symmetry	If an object is said to have **symmetry** if it **can be divided into two identical halves**	

Key Vocabulary	Definition/Tips	Example
Triangle	A triangle is **a 2D shape with three sides.** There are four different triangles with different properties. A scalene triangle has 3 sides of different lengths and 3 unequal angles. An isosceles triangle has 2 sides of equal length.	
Quadrilateral	A quadrilateral is a 2D shape with four sides. Shapes to consider: Square, Rectangle, Parallelogram, Rhombus Trapezium and Kite.	
Net	The net of a 3D shape is **what it looks like if it is opened out flat.** A net can be folded up to make a 3D shape.	
3D Shapes	3D shapes have three dimensions: length, width and depth. Examples are: Sphere, Cube, Cuboid, Square based pyramid, cone, cylinder, Tetrahedron and Triangular prism.	
Faces, Edges and Vertices	**Faces** - A face is a flat surface on a 3D shape. For example a cube has 6 faces. **Edges** - An edge is where two faces meet. For example a cube has 12 edges. **Vertices** - A vertex is a corner where edges meet (the plural is vertices). For example a cube has 8 vertices.	

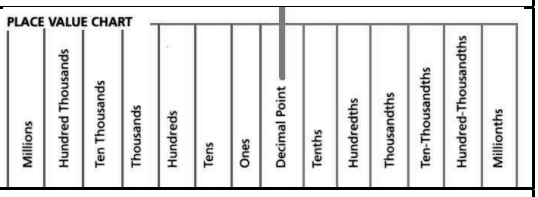
Ratio	Ratio compares the size of **one part** to **another part**. Written using the ':' symbol.	3 : 1 
Proportion	Proportion compares the size of **one part** to the size of the **whole**. Usually written as a fraction.	In a class with 13 boys and 9 girls, the proportion of boys is $\frac{13}{22}$ and the proportion of girls is $\frac{9}{22}$
Simplifying Ratios	**Divide** all parts of the ratio by a **common factor**.	5 : 10 = 1 : 2 (divide both by 5) 14 : 21 = 2 : 3 (divide both by 7)
Ratios in the form $1 : n$ or $n : 1$	**Divide** both parts of the ratio by one of the numbers to make **one part equal 1**.	5 : 7 = 1 : $\frac{7}{5}$ in the form 1 : n 5 : 7 = $\frac{5}{7}$: 1 in the form n : 1
Sharing in a Ratio	**1. Add** the total parts of the ratio. **2. Divide** the amount to be shared by this value to find the value of one part. **3. Multiply** this value by each part of the ratio. Use only if you **know the total**.	Share £60 in the ratio 3 : 2 : 1. 3 + 2 + 1 = 6 60 ÷ 6 = 10 3 x 10 = 30, 2 x 10 = 20, 1 x 10 = 10 £30 : £20 : £10
Unitary Method	Finding the **value of a single unit** and then finding the necessary value by **multiplying** the single unit value.	3 cakes require 450g of sugar to make. Find how much sugar is needed to make 5 cakes. 3 cakes = 450g So 1 cake = 150g (÷ by 3) So 5 cakes = 750 g (x by 5)
Linear Sequence	A number pattern with a **common difference**.	2, 5, 8, 11… is a linear sequence
Term	**Each value** in a sequence is called a term.	In the sequence 2, 5, 8, 11…, 8 is the third term of the sequence.
Term-to-term rule	A rule which allows you to **find the next term** in a sequence if you **know the previous term**.	First term is 2. Term-to-term rule is 'add 3' Sequence is: 2, 5, 8, 11…
nth term	A rule which allows you to **calculate the term** that is in the **nth position** of the sequence. Also known as the 'position-to-term' rule. **n** refers to the **position** of a term in a sequence.	nth term is $3n - 1$ The 100th term is $3 \times 100 - 1 = 299$
Fibonacci type sequences	A sequence where the next number is found by **adding up the previous two terms**	The Fibonacci sequence is: $1,1,2,3,5,8,13,21,34 \ldots$ An example of a Fibonacci-type sequence is: $4, 7, 11, 18, 29 \ldots$

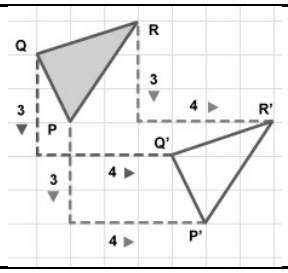
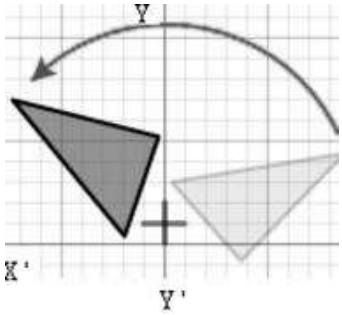
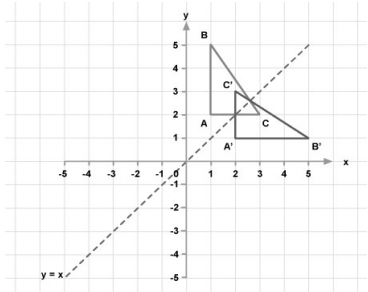
Key Vocabulary	Definition/Tips	Example
Metric System	A system of measures based on: - the metre for length - the kilogram for mass - the second for time **Length: mm, cm, m, km** **Mass: mg, g, kg** **Volume: ml, cl, l**	$1kilometres = 1000\ metres$ $1\ metre = 100\ centimetres$ $1\ centimetre = 10\ millimetres$ $1\ kilogram = 1000\ grams$
Imperial System	A system of weights and measures originally developed in England, usually based on human quantities. **Length: inch, foot, yard, miles** **Mass: lb, ounce, stone** **Volume: pint, gallon**	$1\text{lb} = 16\ \text{ounces}$ $1\ \text{foot} = 12\ \text{inches}$ $1\ \text{gallon} = 8\ \text{pints}$
Metric and Imperial Units	Use the **unitary method** to convert between metric and imperial units.	$5\ \text{miles} \approx 8\ \text{kilometres}$ $1\ \text{gallon} \approx 4.5\ \text{litres}$ $2.2\ \text{pounds} \approx 1\ \text{kilogram}$ $1\ \text{inch} = 2.5\ \text{centimetres}$
Types of Angles	**Acute angles** are less than 90°. **Right angles** are exactly 90°. **Obtuse angles** are greater than 90° but less than 180°. **Reflex angles** are greater than 180° but less than 360°.	
Angles at a Point	**Angles around a point add up to 360°**.	 $a+b+c+d=360^{o}$

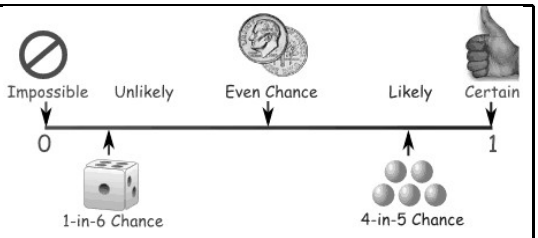
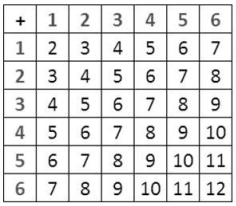
Angles on a Straight Line	**Angles around a point on a straight line add up to 180°.**	
Opposite Angles	**Vertically opposite angles are equal.**	
Alternate Angles	**Alternate angles are equal.** They look like Z angles.	
Corresponding Angles	**Corresponding angles are equal.** They look like F angles.	
Co-Interior Angles	**Co-Interior angles add up to 180°.** They look like C angles.	
Angles in a Triangle	**Angles in a triangle add up to 180°.**	
Types of Triangles	**Right Angle** Triangles have a **90°** angle in. **Isosceles** Triangles have **2 equal sides** and **2 equal base angles**. **Equilateral** Triangles have **3 equal sides** and **3 equal angles (60°)**. **Scalene** Triangles have **different sides** and **different angles**.	
Expression	A mathematical statement written using **symbols**, **numbers,** or **letters**.	$3x + 2$ or $5y^2$
Equation	A statement showing that **two expressions are equal**	$2y - 17 = 15$

Identity	An equation that is **true for all values** of the variables An identity uses the symbol: ≡	$2x \equiv x + x$
Formula	Shows the **relationship** between **two or more variables**	Area of a rectangle = length x width or A= L x W
Collecting terms	An algebraic expression may be simplified by collecting like terms. To reduce the number of terms in the expression, like terms are added or subtracted.	$4x - 2x + 8 + 3x - 1$ $4x + 3x - 2x + 8 - 1$
Substitution	**Replace letters with numbers**. Be careful of $5x^2$. You need to square first, then multiply by 5.	$a = 3, b = 2$ *and* $c = 5$. Find: 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
Expanding brackets	To expand a **single bracket**, each term inside the bracket is multiplied by the expression outside the bracket.	Expand 3(a + 3) = 3xa + 3x3 (simplify) = 3a + 9
Solve	To find the **answer**/value of something **Use inverse operations** on both sides of the equation (balancing method) until you find the value for the letter.	Solve $2x - 3 = 7$ Add 3 on both sides $2x = 10$ Divide by 2 on both sides $x = 5$
Inverse	**Opposite**	The inverse of addition is subtraction. The inverse of multiplication is division.
Writing Formulae	**Substitute letters for words** in the question.	Bob charges £3 per window and a £5 call out charge. $C = 3N + 5$ Where N= number of windows and C=cost

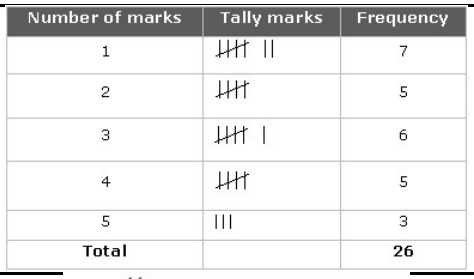
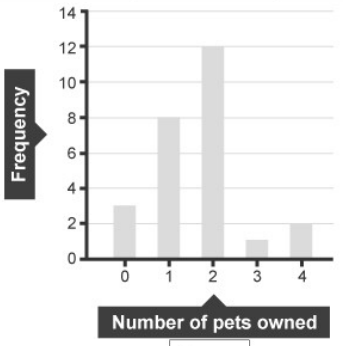
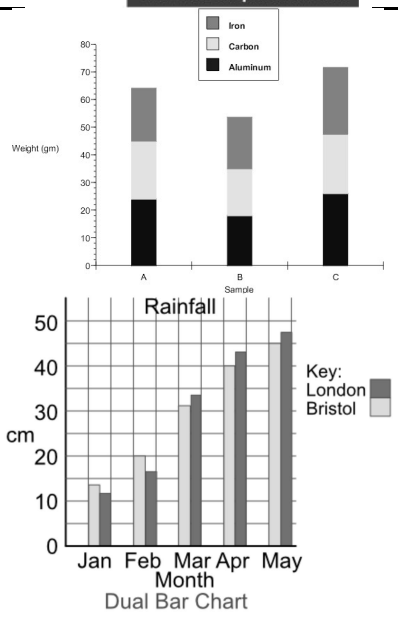
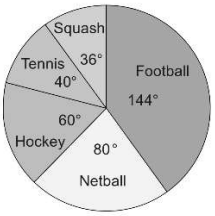
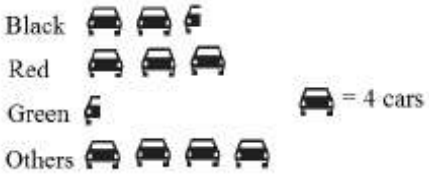
Key Vocabulary	Definition/Tips	Example

Place Value	The **value** of where a **digit** is within a number.	In 726, the value of the 2 is 20, as it is in the 'tens' column.
Place Value Columns	The names of the columns that **determine the value of each digit**. The 'ones' column is also known as the 'units' column.	
Rounding	To make a number simpler but keep its value close to what it was. If the **digit to the right** of the rounding digit is **less than 5, round down**. If the **digit to the right** of the rounding digit is **5 or more, round up**.	74 rounded to the nearest ten is 70, because 74 is closer to 70 than 80. 152,879 rounded to the nearest thousand is 153,000.
Decimal Place	The **position** of a digit to the **right of a decimal point**.	In the number 0.372, the 7 is in the second decimal place. 0.372 rounded to two decimal places is 0.37, because the 2 tells us to round down. Careful with money - don't write £27.4, instead write £27.40
Significant Figure	The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number. The **first significant figure** of a number **cannot be zero**. In a number with a decimal, trailing zeros are not significant.	In the number 0.00821, the first significant figure is the 8. In the number 2.740, the 0 is not a significant figure. 0.00821 rounded to 2 significant figures is 0.0082. 19357 rounded to 3 significant figures is 19400. We need to include the two zeros at the end to keep the digits in the same place value columns.
Truncation	A method of approximating a decimal number by **dropping all decimal places** past a certain point **without rounding.**	3.14159265… can be truncated to 3.1415 (note that if it had been rounded, it would become 3.1416)
Error Interval	A **range of values** that a number could have taken before being rounded or truncated. An error interval is written using inequalities, with a **lower bound** and an **upper bound**.	0.6 has been rounded to 1 decimal place. The error interval is: $0.55 \leq x < 0.65$ The lower bound is 0.55 The upper bound is 0.65

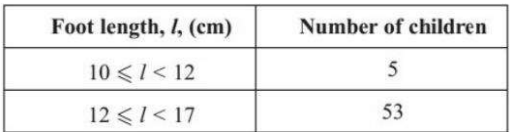
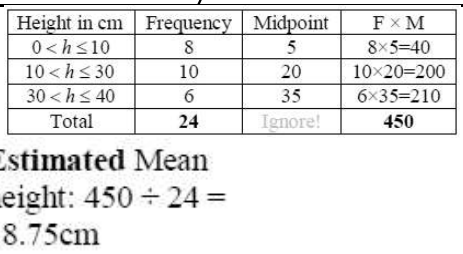
	Note that the lower bound inequality can be 'equal to', but the upper bound cannot be 'equal to'.	
Estimate	To find something **close to the correct answer**.	An estimate for the height of a man is 1.8 metres.
Approximation	When using approximations to estimate the solution to a calculation, **round each number in the calculation to 1 significant figure**. ≈ means 'approximately equal to'	$\frac{348+692}{0.526} \approx \frac{300+700}{0.5} = 2000$ 'Note that dividing by 0.5 is the same as multiplying by 2'
Translation	**Translate** means to **move a shape**. The shape does not change **size** or **orientation**.	
Column vector	In a column vector, the **top** number moves **left (-) or right (+)** and the **bottom** number moves **up (+) or down (-)**	$\begin{pmatrix}2\\3\end{pmatrix}$ means '2 right, 3 up' $\begin{pmatrix}-1\\-5\end{pmatrix}$ means '1 left, 5 down'
Rotation	The size does not change, but the **shape is turned around a point**. Use tracing paper.	Rotate Shape A 90° anti-clockwise about (0,1) 
Reflection	The size does not change, but the shape is '**flipped**' like in a **mirror**. Line x =? is a **vertical line**. Line y =? is a **horizontal line**. Line $y = x$ is a **diagonal line**.	Reflect shape C in the line $y = x$ 

Probability	The **likelihood/chance** of something happening. **I**s expressed as a number **between 0 (impossible) and 1 (certain).** Can be expressed as a fraction, decimal, percentage or in words (likely, unlikely, even chance etc.)	
Probability Notation	**P(A)** refers to the **probability that event A will occur.**	P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards.
Theoretical Probability	$\frac{Number\ of\ Favourable\ Outcomes}{Total\ Number\ of\ Possible\ Outcomes}$	Probability of rolling a 4 on a fair 6-sided die = $\frac{1}{6}$.
Relative Frequency	$\frac{Number\ of\ Successful\ Trials}{Total\ Number\ of\ Trials}$	A coin is flipped 50 times and lands on Tails 29 times. The relative frequency of getting Tails = $\frac{29}{50}$.
Expected Outcomes	To find the number of expected outcomes, **multiply** the **probability** by the **number of trials.**	The probability that a football team wins is 0.2 How many games would you expect them to win out of 40? $0.2 \times 40 = 8\ games$
Exhaustive	Outcomes are **exhaustive** if they **cover the entire range of possible outcomes.** The **probabilities** of an **exhaustive** set of outcomes **adds up to 1.**	When rolling a six-sided die, the outcomes 1, 2, 3, 4, 5 and 6 are exhaustive, because they cover all the possible outcomes.
Mutually Exclusive	Events are mutually exclusive if they **cannot happen at the same time.** The **probabilities** of an exhaustive set of **mutually exclusive** events **adds up to 1.**	Examples of mutually exclusive events: - Turning left and right - Heads and Tails on a coin Examples of non mutually exclusive events: - King and Hearts from a deck of cards, because you can pick the King of Hearts
Sample Space	The **set of all possible outcomes** of an experiment.	
Independent Events	The outcome of a **previous event does not influence/affect the outcome of a second event.**	An example of independent events could be replacing a counter in a bag after picking it.
Dependent Events	The outcome of a **previous event does influence/affect the outcome of a second event.**	An example of dependent events could be not replacing a counter in a bag after picking it. 'Without replacement'

Knowledge Organiser Y7 Unit 18 and 19

Key Vocabulary	Definition/Tips	Example
1. Frequency Table	A record of **how often each value** in a set of data **occurs**.	
2. Bar Chart	Represents data as vertical blocks. $x-axis$ shows the **type** of data $y-axis$ shows the **frequency** for each type of data Each bar should be the **same width** There should be **gaps** between each bar Remember to **label** each axis.	
3. Types of Bar Chart	**Compound/Composite** Bar Charts show data stacked on top of each other. **Comparative/Dual** Bar Charts show data side by side.	
4. Pie Chart	Used for showing **how data breaks down into** its constituent **parts**. When drawing a pie chart, **divide 360° by the total frequency**. This will tell you how many degrees to use for the frequency of each category. Remember to **label** the category that each sector in the pie chart represents.	 If there are 40 people in a survey, then each person will be worth 360÷40=9° of the pie chart.
5. Pictogram	Uses **pictures** or symbols to **show the value** of the data. A pictogram must have a **key**.	

Number of marks	Tally marks	Frequency
1	𝍸 ||	7
2	𝍸	5
3	𝍸 |	6
4	𝍸	5
5	|||	3
Total		26

1. Types of Data	**Qualitative** Data – **non-numerical** data **Quantitative** Data – **numerical** data **Continuous** Data – data that can take **any numerical value** within a given range. **Discrete** Data – data that can take **only specific values** within a given range.	Qualitative Data – eye colour, gender etc. Continuous Data – weight, voltage etc. Discrete Data – number of children, shoe size etc.
2. Grouped Data	Data that has been **bundled in to categories**. Seen in grouped frequency tables, histograms, cumulative frequency etc.	 **Foot length, *l*, (cm)** / **Number of children** $10 \leqslant l < 12$ / 5 $12 \leqslant l < 17$ / 53
3. Primary /Secondary Data	**Primary** Data – **collected yourself** for a specific purpose. **Secondary** Data – **collected by someone else** for another purpose.	Primary Data – data collected by a student for their own research project. Secondary Data – Census data used to analyse link between education and earnings.
4. Mean	**Add** up the values and **divide** by how many values there are.	The mean of 3, 4, 7, 6, 0, 4, 6 is $\frac{3+4+7+6+0+4+6}{7} = 5$
5. Mean from a Table	1. Find the midpoints (if necessary) 2. Multiply Frequency by values or midpoints 3. Add up these values 4. Divide this total by the Total Frequency If **grouped** data is used, the answer will be an **estimate**.	 Height in cm / Frequency / Midpoint / F × M $0 < h \leq 10$ / 8 / 5 / 8×5=40 $10 < h \leq 30$ / 10 / 20 / 10×20=200 $30 < h \leq 40$ / 6 / 35 / 6×35=210 Total / **24** / Ignore! / **450** **Estimated** Mean height: $450 \div 24 =$ 18.75cm
6. Median Value	The **middle** value. Put the data in order and find the middle one. If there are **two middle values**, find the number half way between them by **adding them together and dividing by 2**.	Find the median of: 4, 5, 2, 3, 6, 7, 6 Ordered: 2, 3, 4, **5**, 6, 6, 7 Median = 5
7. Median from a Table	Use the formula $\frac{(n+1)}{2}$ to find the position of the median. n is the total frequency.	If the total frequency is 15, the median will be the $\left(\frac{15+1}{2}\right) =$ $8th$ position
8. Mode /Modal Value	**Most** frequent/common. Can have more than one mode (called bi-modal or multi-modal) or no mode (if all values appear once)	Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4 Mode = 4
9. Range	**Highest value subtract the Smallest value** Range is a 'measure of spread'. The smaller the range the more <u>consistent</u> the data.	Find the range: 3, 31, 26, 102, 37, 97. Range = 102-3 = 99