Beckfoot

Subject: Maths	Term: Half Term 1 - June	Year Group: 9

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Number – LCM/HCF

1	HCF	Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48 Factors of 30: 1, 2, 3, 5, 6, 10, 15, 30	The HCF is 6
2	LCM	Multiples of 3: 3, ..., 18, 21, 24, ..., 39, 42 Multiples of 7: 7, 14, 21, 28, 35, 42	The LCM is 21

Algebra – Working with symbols

1	Expand and Simplify	Expand and simplify: $2(4a + 2b) - 2(a + 3b)$ $8a + 4b - 2a - 6b$ $6a - 2b$
2	Expand double brackets	Multiply each term in the second bracket by each term in the first. $(x + 7)(x + 2) = x^2 + 9x + 14$
3	Factorise	The **reverse** of **expanding**. Factorising is writing an expression as a product of terms by '**taking out' a common factor**. $6x - 15 = 3(2x - 5)$, where 3 is the common factor.

Key Vocabulary

1	Integer	A **whole number** that can be positive, negative or zero.
2	Factor	A number that **divides exactly** into another number without a remainder.
3	Multiple	The result of multiplying a number by an integer.
4	Expand	To expand a bracket, **multiply** each term **in the bracket** by the expression **outside** the bracket.
5	Factorise	The **reverse** of **expanding**. Factorising is writing an expression as a product of terms by '**taking out' a common factor**.

Ratio, Proportion and Rates of Change - Ratio

1	Ratio	Simplify 60 : 40 : 100 This could have been done in one step by dividing by 20. ÷ 10 6 : 4 : 10 ÷ 2 3 : 2 : 5 Write 2 : 5 in the form 1 : n 2 : 5 ÷ 2 ÷ 2 1 : 2.5 Share £45 in the ratio 2 : 7 45 ÷ 9 = 5 £10 : £35 2 : 7 =10 =35 Joy and Martin share money in the ratio 2 : 5. Martin gets £18 more than Joy. How much do they each get? 2 : 5 18 ÷ 3 = 6 £12 : £30 =12 =30

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Subject: Maths	Term: Half Term 2 - September	Year Group: 9

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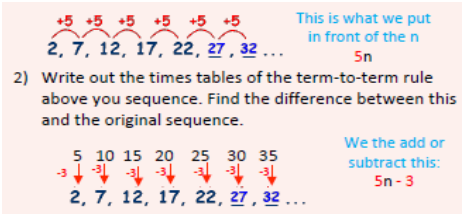
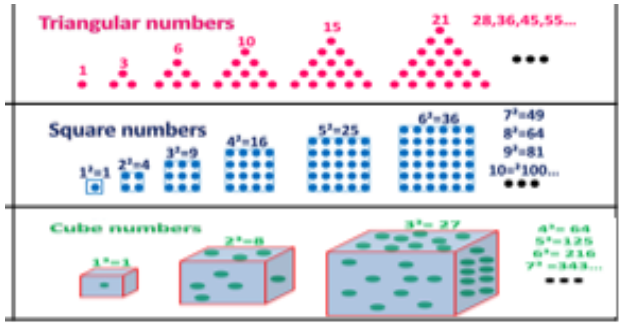
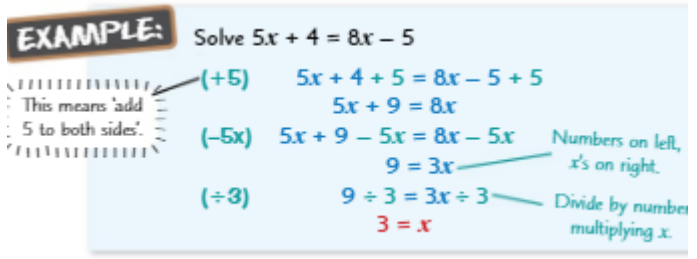
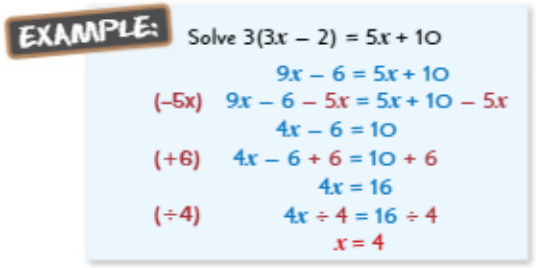
Algebra – Sequences

1	Nth term	
2	Special Sequences	

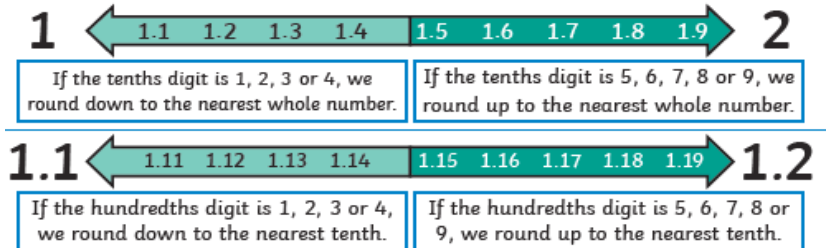
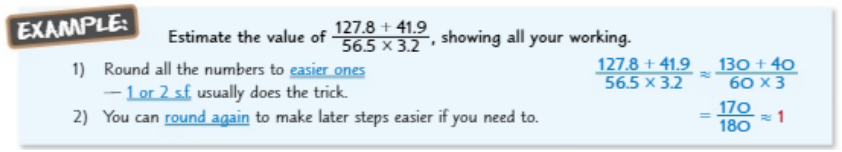
Algebra – Equations

1	
	

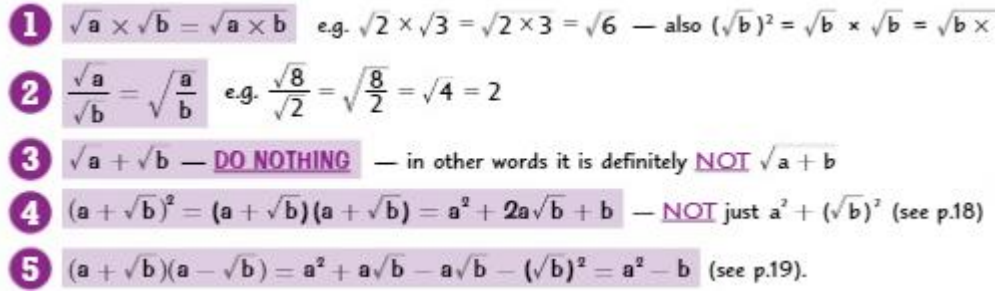
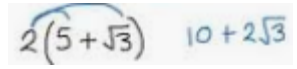
Key Vocabulary

1	Geometric Sequence	In a **Geometric Sequence** each term is found by **multiplying** the previous term by a **constant**.
2	Estimate	To find a value that is close enough to the right answer, usually with some thought or calculation involved.
3	Surd	When we can't simplify a number to remove a square root (or cube root etc) then it is a **surd**. Example: √2 (square root of 2) can't be simplified further so it is a **surd**.

Number – Rounding and estimating

1	Rounding	
2	Estimating	

Number – surds

1	Simplifying Surds	
2	Expanding with surds	

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Subject: Maths	Term: Half Term 3 - November	Year Group: 9H

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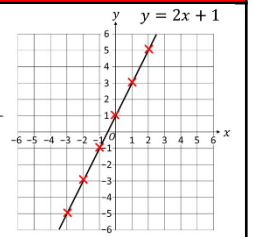
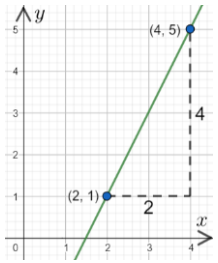
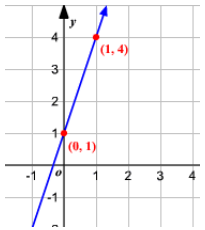
Probability

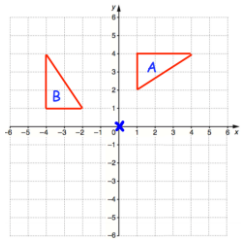
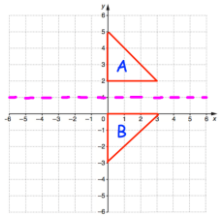
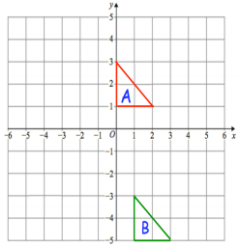
1	Calculating Probability	$\frac{\text{number of } successful \text{ outcomes}}{\text{number of } possible \text{ outcomes}}$
2	Relative Frequency • $\frac{Frequency}{Total}$	

Color	Frequency	Relative Frequency
Purple	7	7/20= 35%
Blue	3	3/20= 15%
Pink	5	5/20=25%
Orange	5	5/20=25%
Total	20	20/20 = 100%

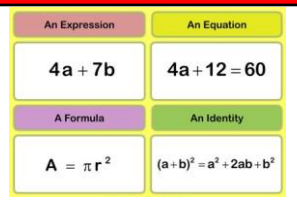
Algebra – Linear Graphs

1	Plotting a linear graph	$y = 2x + 1$ 1) Complete a Table of Values. x: −3, −2, −1, 0, 1, 2, 3 y: -5, -3, -1, 1, 3, 5, 7 
2	Equation of a line	y = mx + c m is gradient and c is the y intercept
3	Finding the Gradient • $\frac{Change\ in\ y}{Change\ in\ x}$ • $\frac{4}{2} = 2$	
4	Finding the equation of a line • Gradient is 3 • Y intercept is 1 • Equation of the line: **y = 3x + 1**	

Geometry and Measure - Transformations

1	Rotation: need the degrees turned, direction (clockwise or anti-clockwise) and the **centre of rotation**.	
2	Reflection: need the line that the shape has been reflected in. This shape has been reflected in *y = 1*.	
3	Translation: need the direction and how far the shape has travelled. Can be given as a column vector. Example: $\begin{pmatrix}1\\-6\end{pmatrix}$ This means 1 right and 6 down.	
4	Enlargement: the shape will get bigger or smaller. Multiply each side by the scale factor.	Scale factor 3 means '3 times larger' = multiply it by 3. Scale factor ½ means half the size, divide by 2.

Algebra - Formulae

1	Expression, Equation, Identity, Formulae	
2	Substitution: replacing letters with numbers	a = 3, b = 2 *and* c = 5. Find: 1. $2a$ = 2 × 3 = 6 2. $3a - 2b$ = 3 × 3 − 2 × 2=5
3	Rearranging formulae: Use inverse operations on both sides of the formula (balancing method) until you find the expression for the letter.	Make x the subject of $y = \frac{2x-1}{z}$ Multiply both sides by z $yz = 2x - 1$ Add 1 to both sides $yz + 1 = 2x$ Divide by 2 on both sides $\frac{yz+1}{2} = x$ We now have x as the subject.

Key Vocabulary

1	Rotational symmetry	A shape that still looks the same after some rotation. Eg. a square has a rotational symmetry of order 4.
2	Square root	The **number you multiply by itself** to get another number.
3	Cube root	The **number you multiply by itself and itself again** to get another number.
4	Perpendicular line	A **line** meeting another at a right angle, or 90°
5	Index notation	Indices are a way of representing numbers and letters that have been multiplied by themselves a number of times.

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Subject: Maths	Term: Half Term 4 - January	Year Group: 9H

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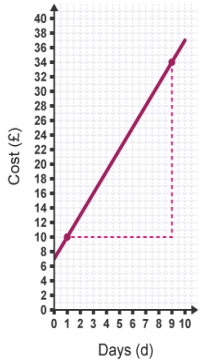
Number – Percentages

1	Percentage Change	$\frac{Changed\ by}{Original\ amount}\ x\ 100$
2	Increase or Decrease by a Percentage	Non-calculator: **Find the percentage** and **add** or **subtract** it from the **original** amount. Calculator: Find the **percentage multiplier** and multiply.
3	Reverse Percentages	Find the **correct percentage given in the question**, then work backwards to **find 100%** Look out for words like **'before'** or **'original'**

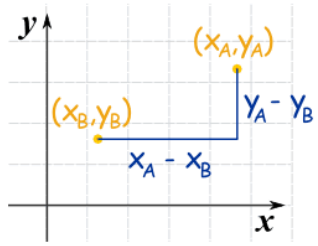
Algebra – Real Life Graphs

1	The **gradient, y-intercept** and **area under the graph** might have a contextual meaning. Example – Graph shows cost of hiring a ladder for various number of days. The **gradient** shows the cost per day. The **y-intercept** shows the additional cost/deposit/fixed charge.	

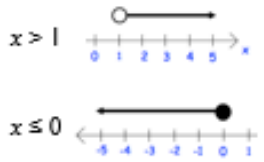
Algebra – Simultaneous Equations

1	Solve by Substitution	Usually used for quadratic equations – Rearrange and Substitute
2	Solve by Elimination	Usually used for linear equations – same signs subtract, different signs add.
3	Solve Graphically	The solution is found at the points of intersection

Geometry and Measures - Pythagoras

1	Finding the hypotenuse (longest side) $a^2 + b^2 = c^2$	$a^2 + b^2 = c^2$ $3^2 + 4^2 = 25$ $\sqrt{25} = 5$
2	Finding a shorter side	$a^2 = c^2 - b^2$
3	Find the distance between two points	 $\sqrt{(x_A - x_B)^2 + (y_A - y_B)^2}$

Algebra – Inequalities

1	Understanding inequality signs	
2	Representing inequalities on a number line	
3	Quadratic Inequalities	You should get **two pairs of solutions** Graphically, you should have **two points of intersection**

Key Vocabulary

1	Multiplier	The decimal by which another number is multiplied
2	Factorise	The reverse of expanding brackets
3	Simultaneous	A set of two or more equations
4	Hypotenuse	The longest side of a right angle triangle

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Subject: Maths	Term: Half Term 5 - March	Year Group: 9H

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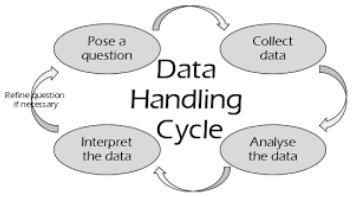
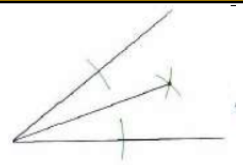
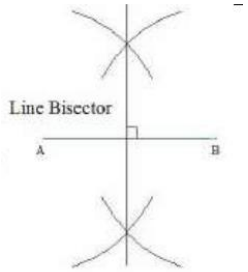
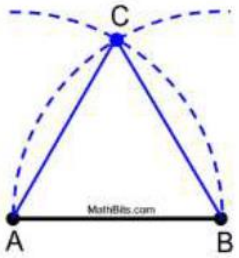
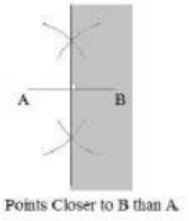
Statistics – Collecting Data

1	Types of Data	**Qualitative** Data – **non-numerical** data **Quantitative** Data – **numerical** data
2	Grouped Data	Data that has been **put in to Categories** Foot length, l, (cm) $10 \leqslant l < 12$ $12 \leqslant l < 17$
3	Data Handling Cycle	

Number – Fractions and Decimals

1	Mixed Number	A number formed of both an **integer part** and a **fraction part**.
2	Reciprocal	The reciprocal of a number is **1 divided by the number**. The reciprocal of x is $\frac{1}{x}$
3	Recurring Decimals - $0.\dot{3}$ means 0.333333	A **recurring decimal** exists when decimal numbers repeat forever

Geometry – Constructions and Loci

1	Angle Bisector - Cuts the angle in half.	
2	Perpendicular Bisector - Cuts a line in half and at right angles.	
3	Constructing an Equilateral Triangle (also makes a 60° angle)	
4	Loci and Regions - A locus is a path of points that follow a rule.	

Statistics – Statistical Measures

1	Median for grouped data – add up the frequency column, add one to the total and divide by 2, this will tell you where the median value will be found	Half-Way through the Frequency is (18 + 1) /2 = 9.5 Cappuccinos / f / Cumulative f 0-3: 2 / 2 4-7: 3 / 5 8-11: 8 / 13 12-15: 3 / 16 16-19: 2 / 18 TOTAL 18 The 9.5th position occurs during the 8-11 Interval. In this Interval we pass through 9.5 on the way to reaching 13. The Median Class is 8-11
2	Mean for grouped data – find the midpoint of the data multiply it by the frequency.	Cappuccinos / Freq / Interval Midpoint / Freq x Midpt 0-3: 2 / 1.5 / 2 x 1.5 = 3 4-7: 3 / 5.5 / 3 x 5.5 = 16.5 8-11: 8 / 9.5 / 8 x 9.5 = 76 12-15: 3 / 13.5 / 3 x 13.5 = 40.5 16-19: 2 / 17.5 / 2 x 17.5 = 35 TOTALS 18 / 171 MEAN Average = Total of (Freq x Midpt) / Total Frequency = 171 / 18 = 10 cappuccinos per hour
4	IQR = UQ – LQ (Interquartile range = Upper quartile – Lower Quartle)	UQ = 75% LQ = 25% $IQR = Q_3 - Q_1$ $23, 25, 28, 28, 32, 33, 35$ $IQR = 33 - 25$

Key Vocabulary

1	Perpendicular	Two lines intersect at a right angle
3	Locus	A **locus** is a set of points satisfying a certain condition
4	Stratified Sampling	The researcher divides the population into separate groups, called strata
5	Quartiles	A **quartile** is **defined** as a group of values and/or means that divide a data set into quarters, or groups of four

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Subject: Maths	Term: Half Term 6 - April	Year Group: 9H

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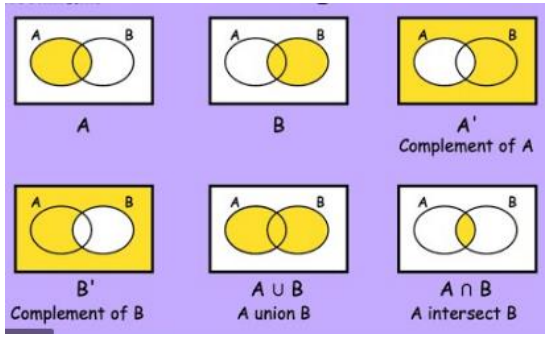
Algebra - Quadratics

1	Quadratic	A quadratic expression is of the form $ax^2 + bx + c$ where a, b and c are numbers
2	Factorising Quadratics	When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that add to give **b** and multiply to give **c**. $x^2 + 7x + 10 = (x + 5)(x + 2)$
3	Difference of Two Squares	An expression of the form $a2 - b2$ can be factorised to give $(a + b)(a - b)$ $x^2 - 25 = (x + 5)(x - 5)$ $16x^2 - 81 = (4x + 9)(4x - 9)$
4	Solving Quadratics by Factorising	**Factorise** the quadratic in the usual way. **Solve = 0** Solve $x^2 + 3x - 10 = 0$ Factorise: $(x + 5)(x - 2) = 0$ $x = -5$ *or* $x = 2$

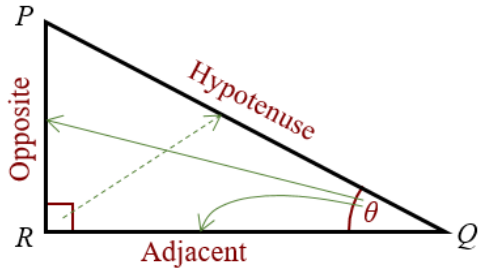
Statistics – Representing Data

1	Venn Diagrams



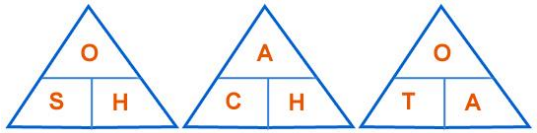
Geometry and Measures – Trigonometry

1	Identifying the sides	Longest side = Hypotenuse

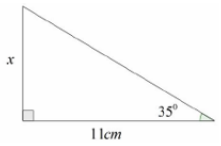


2	Trigonometric Formulae	Use **SOHCAHTOA**

$$\sin\theta = \frac{O}{H} \qquad \cos\theta = \frac{A}{H} \qquad \tan\theta = \frac{O}{A}$$

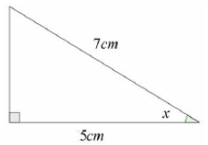


3	Worked Example	Finding a side / Finding an angle



Use 'Opposite' and 'Adjacent', so use 'tan'

$$\tan 35 = \frac{x}{11}$$
$$x = 11\tan 35 = 7.70cm$$



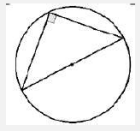
Use 'Adjacent' and 'Hypotenuse', so use 'cos'

$$\cos x = \frac{5}{7}$$
$$x = cos^{-1}\left(\frac{5}{7}\right) = 44.4°$$

Geometry and Measures – Circle Theorems

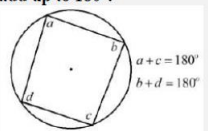
Circle Theorem 1

Angles in a semi-circle have a right angle at the circumference.



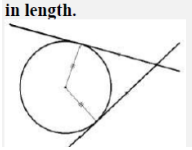
Circle Theorem 2

Opposite angles in a cyclic quadrilateral add up to 180°.



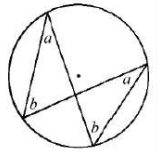
Circle Theorem 3

Tangents from an external point at equal in length.



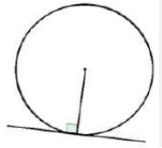
Circle Theorem 4

Angles in the same segment are equal.



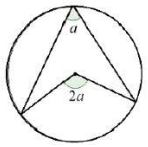
Circle Theorem 5

A tangent is perpendicular to the radius at the point of contact.



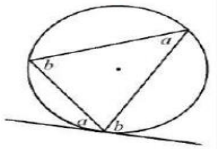
Circle Theorem 6

The angle at the centre is twice the angle at the circumference.

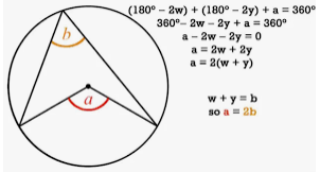


Circle Theorem 7

Alternate Segment Theorem



Prove circle theorems



Key Vocabulary

1	Mutually Exclusive	Two or more events are said to be **mutually exclusive** if the occurrence of any one of them **means** the others will not occur
2	Relative Frequency	How often something happens divided by all outcomes