Beckfoot

Subject: Maths	Term: Half Term 1 - June	Year Group: 10H

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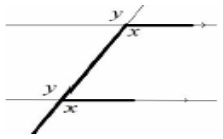
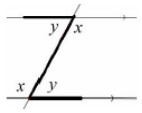
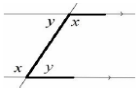
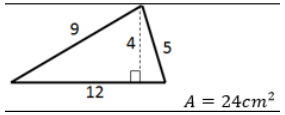
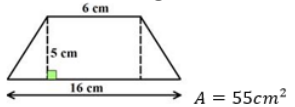
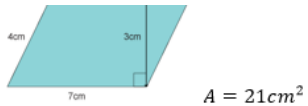
Number – Fractions and Decimals

1	Recurring Decimal	A decimal number that has **digits that repeat forever**. The part that repeats is usually shown by placing a dot above the digit that repeats, or dots over the first and last digit of the repeating pattern. Eg. $\frac{1}{3} = 0.333\ldots = 0.\dot{3}$

Algebra – Working with Symbols

1	Bracket Expansion	To expand a bracket, **multiply** each term **in the bracket** by the expression **outside** the bracket. $3(m+7) = 3x + 21$
2	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.
3	Difference of 2 Squares	An expression of the form $\boldsymbol{a^2 - b^2}$ can be factorised to give $(\boldsymbol{a+b})(\boldsymbol{a-b})$

Geometry and Measure – Angles and Area

1	Corresponding Angles 	**Corresponding angles are equal**. They look like F angles, but never say this in the exam.
2	Alternate Angles 	**Alternate angles are equal**. They look like Z angles, but never say this in the exam.
3	Co-Interior Angles 	**Co - Interior angles add up to 180°.**
4	Area of Triangle **Base x Height ÷ 2**	
5	Area of Trapezium $\frac{(\boldsymbol{a+b})}{\boldsymbol{2}} \times \boldsymbol{h}$	Top add the Bottom x half the height 
6	Area of a parallelogram **Base x Perpendicular Height**	

Key Vocabulary

1	Integer	A **whole number** that can be positive, negative or zero.
2	Fraction	A number that represents a part of a whole. It consists of a numerator and a denominator. The numerator represents the number of equal parts of a whole, while the denominator is the total number of parts that make up said whole.
3	Reciprocal	To get the reciprocal of a number, we divide 1 by the number. Eg. the reciprocal of 2 is ½
4	Expression	Numbers, symbols and operators (such as + and ×) grouped together that show the value of something with no equals sign.
5	Perimeter	Distance around the outside of a shape.
6	Compound Area	An area made up of more than one shape.

7	Area of a Circle	$\boldsymbol{A = \pi r^2}$ which means 'pi x radius squared'.
8	Circumference of a Circle	$\boldsymbol{C = \pi d}$ which means 'pi x diameter'

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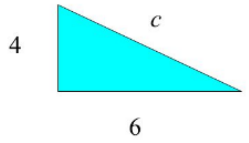
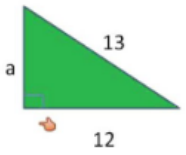
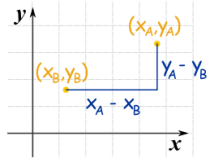
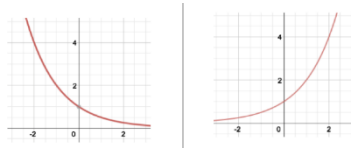
Geometry & Measure - Pythagoras

1	Finding the hypotenuse	Find c. $a^2 + b^2 = c^2$ $4^2 + 6^2 = c^2$ $c^2 = 52$ $c = \sqrt{52}$ $c = 7.21$ 
2	Finding the shorter side	Find the Value of a:  $c^2 = a^2 + b^2$ $a^2 = c^2 - b^2$ $a = \sqrt{c^2 - b^2}$ $a = \sqrt{13^2 - 12^2}$ $a = \sqrt{169 - 144}$ $a = \sqrt{25}$ $a = 5$
3	Find the distance between two points	 $\sqrt{(x_A - x_B)^2 + (y_A - y_B)^2}$

Number - Percentages

1	Percentage multipliers	The multiplier for increasing by 12% is 1.12 The multiplier for decreasing by 12% is 0.88 (100% - 12%)
3	Percentage change	$\frac{(new\ value - original\ value)}{original\ value}$ x 100%
2	Reverse Percentage	A jumper was priced at £48.60 after a 10% reduction. Find its original price. 100% - 10% = 90% 90% = £48.60 1% = £0.54 100% = £54
3	Compound Interest	A bank pays 5% compound interest a year. Bob invests £3000. How much will he have after 7 years? $3000 \times 1.05^7 = £4221.30$
4	Exponential Graph	The equation is of the form $y = a^x$, where a is a number called the **base**. If $a > 1$ the graph **increases**. If $0 < a < 1$, the graph **decreases**. The graph has an **asymptote** which is the **x-axis**. 

Key Vocabulary

1	Hypotenuse	The longest side on a right angled triangle
2	Unit Ratio	Used to compare ratios, one of the parts is 1. The only time it is permissible to have a decimal in a ratio.
3	Unitary method	Find the value of 1 item, before multiplying to find the value of more. Used to work out which products give the better value for money
4	Simple Interest	Interest calculated as a **percentage of the original** amount.
5	Compound Interest	Interest paid on the **original amount and the accumulated interest**.
6	Exponential growth	When we **multiply** a number **repeatedly** by the **same number** ($\neq 1$), resulting in the number **increasing by the same proportion** each time. e.g. $1, 2, 4, 8, 16, 32, 64, 128$ ...
7	Exponential decay	When we **multiply** a number **repeatedly** by the **same number** ($0 < x < 1$), resulting in the number **decreasing by the same proportion** each time. eg. $1000, 200, 40, 8$ ....

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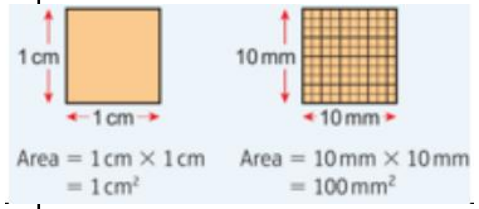
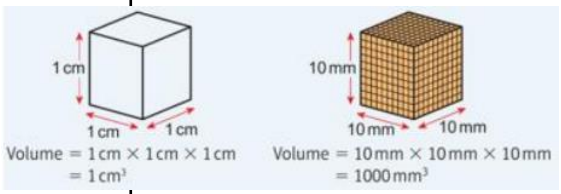
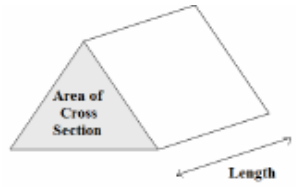
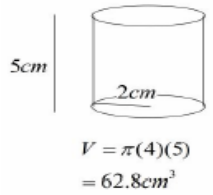
Geometry & Measure – Area & Volume

1	Area units	1 cm² = 100 mm² 1m² = 10000 cm² 
2	Volume units	1 cm³ = 1000 mm³ 1 m³ = 1000000 cm³ 
3	Volume of a Prism = Area of cross section x length	
4	Volume of a Cylinder $V = \pi r^2 h$	
5	Surface Area of Cylinder	$2\pi r^2 + 2\pi rh$

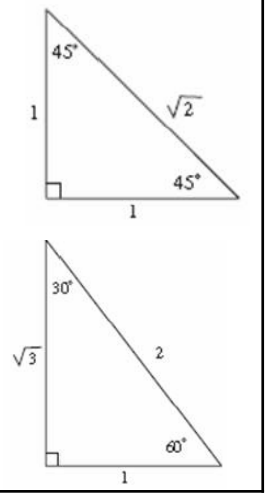
Geometry & Measure – Trigonometry 1

1

Sine	$\sin\theta = \frac{O}{H}$	$\theta = \sin^{-1}\frac{O}{H}$	
Cosine	$\cos\theta = \frac{A}{H}$	$\theta = \cos^{-1}\frac{A}{H}$	
Tangent	$\tan\theta = \frac{O}{A}$	$\theta = \tan^{-1}\frac{O}{A}$	

2 Exact Values for Angles in Trigonometry

Θ	0°	30°	45°	60°	90°
Sin Θ	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
Cos Θ	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
Tan Θ	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	



Key Vocabulary

1	Prism	A 3D shape that has a constant cross-section through its length, eg cylinder, triangular prism

Algebra – Equations & Formulae

1	Expression	A mathematical statement written using **symbols**, **numbers** or **letters**, 3x + 2 or 5y²
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 ≡ x+x
4	Formula	Shows the **relationship** between **two or more variables** Area of a rectangle = length x width or A= LxW
5	Solving inequalities	Inequalities are solved using the same steps as equations. If you multiply or divide an inequality by a negative number, then the inequality sign is reversed. Eg. -5x > 10 x < -2

Ratio, Proportion and rates of change – Ratio

1	Divide in a given ratio	eg Divide £350 in the ratio 3:4 between Amy and Bob. 3+4 = 7 (There are 7 parts.) 350 ÷ 7 = 50 (Each part is worth 50) 3 x 50 = £150 for Amy 4 x 50 = £200 for Bob

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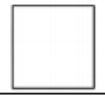
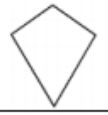
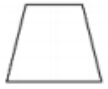
Geometry & Measure – Polygons

1

SPECIAL QUADRILATERALS (4 sided polygon) - Properties

1	**Square**		4 equal sides 4 right angles 2 pairs of parallel sides Diagonals cross at right angles	4 lines of symmetry Rotational symmetry order 4
2	**Rectangle**		2 pairs of equal sides 4 right angles 2 pairs of parallel sides	2 lines of symmetry Rotational symmetry order 2
3	**Rhombus**		4 equal sides 2 pairs of equal angles 2 pairs of parallel sides Diagonals cross at right angles	2 lines of symmetry Rotational symmetry order 2
4	**Parallelogram**		2 pairs of equal sides 2 pairs of equal angles 2 pairs of parallel sides	0 lines of symmetry Rotational symmetry order 2
5	**Kite**		2 pairs of equal sides 1 pairs of equal angles 2 pairs of parallel sides Diagonals cross at right angles	1 lines of symmetry Rotational symmetry order 1
6	**Trapezium**		1 pair of parallel sides	
7	**Isosceles Trapezium**		1 pair of parallel sides 1 pair of equal sides 2 pairs of equal angles	1 lines of symmetry Rotational symmetry order 1

2	Sum of interior angles	For an n-sided polygon Sum of interior angles = $180 \times (n-2)$
3	Sum of exterior angles	For all polygons: Sum of exterior angles = 360
4	Regular polygons	$Exterior\ angle = 360 \div number\ of\ sides$ $number\ of\ sides = 360 \div Exterior\ Angle$ $Interior\ angle = 180 - Exterior\ angle$

Ratio, Proportion and rates of change – Proportion

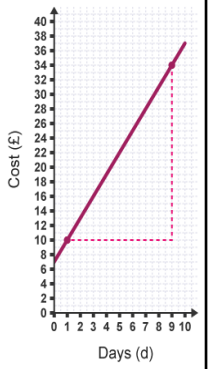
1	Direct proportion	"y is proportional to x" $y \propto x$ $y = kx$
2	Indirect proportion	"y is inversely proportional to x" $y \propto \frac{1}{x}$ $y = \frac{k}{x}$
3	Directly Proportional graph	The graph of two quantities in direct proportion will go through the origin and have a positive gradient 

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.



Key Vocabulary

1	Regular polygon	All sides the same length All angles the same size
2	Direct proportion	Two quantities increase at the same rate
3	Indirect proportion	One variable increases at a constant rate as the second variable decreases
4	Constant of proportionality	Represented by k. Its value stays the same
5	Rate of change	The gradient of a tangent to the curve can be used to calculate the rate of change at any given point
6	Conversion graph	A line graph to convert one unit to another.

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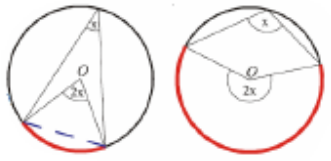
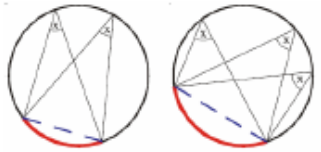
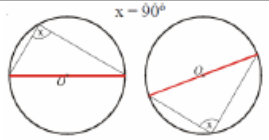
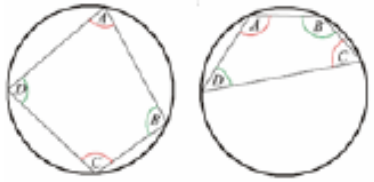
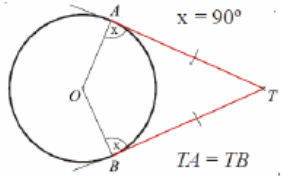
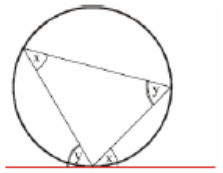
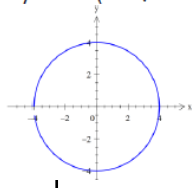
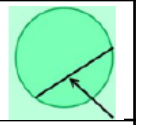
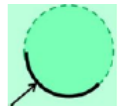
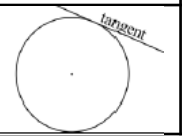
Geometry & Measure – Properties of Circles

1	The angle at the centre is twice the angle at the circumference	
2	Angles at the circumference in the same segment are equal	
3	Angle in a semicircle are 90°	
4	Opposite angles of a cyclic quadrilateral add to 180° $A + C = 180°$ $B + D = 180°$	
5	The angle between a tangent and radius is 90° Two tangents from the same point to a circle are equal lengths.	
6	Alternate segment 	
7	Equation of a circle $x^2 + y^2 = r^2$ Circle with centre (0,0) and radius r	$x^2 + y^2 = 16$ ($r = \sqrt{16} = 4$) 

Geometry & Measure – Reflections, Rotations & Translations

1	Rotation - A "turning" movement of an image about a fixed point	Describe by - a) "Rotation" b) Angle of rotation c) Centre of rotation d) Direction of rotation
2	Reflection - A "flipping" movement across a mirror line	Describe by - a) "Reflection" b) The equation of the line of reflection
3	Translation - A "sliding" movement of an image	Describe by - a) "Translation" b) The column vector $\begin{pmatrix} x \\ y \end{pmatrix}$ x is the horizontal movement y is the vertical movement

Key Vocabulary

1	Chord	A line which touches the circumference at each end	
2	Arc	A section from the circumference of a circle	
3	Segment	The region of a circle bounded by a chord and the arc subtended by the chord	
4	Sector	The region of a circle bounded by two radii and an arc	
5	Tangent	A line outside a circle which only touches the circumference at one point	

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Subject: Maths	Term: Half Term 4 – January	Year Group: 10H

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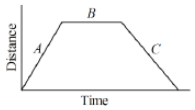
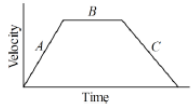
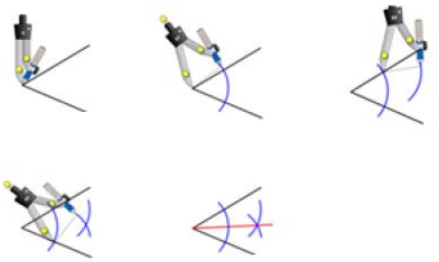
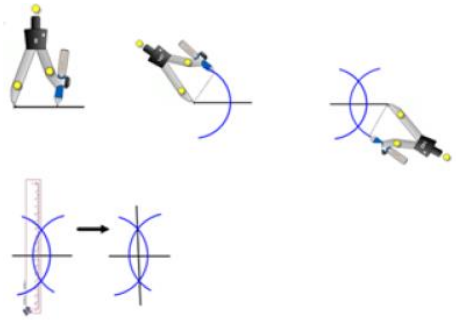
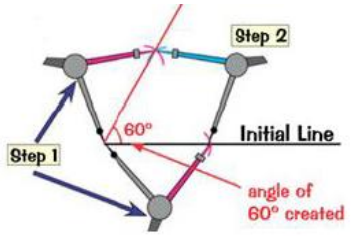
Ratio, Proportion and rates of change – Compound Measures

1	**Density**	$density = \frac{mass}{volume}$	
		The mass of a substance contained in a certain volume	
		Usually measured in g/cm³ or kg/m³	
	Pressure	$pressure = \frac{force}{area}$	
		The force applied over an area	
		Usually measured in N/m²	
	Speed	$speed = \frac{distance}{time}$	
		The distance travelled in an amount of time	
		Usually measured in m/s (metres per second) or km/h (kilometres per hour) or mph (miles per hour)	
2	Distance-Time Graphs	 A = steady speed, B = no movement, C = steady speed back to start	
3	Velocity-Time Graphs The area under the graph = distance travelled	 A = steady acceleration, B = constant speed, C = steady deceleration back to a stop	

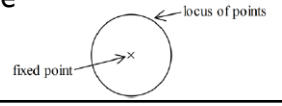
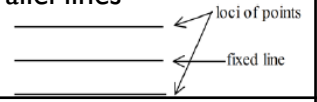
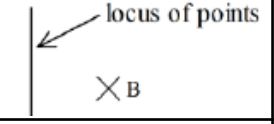
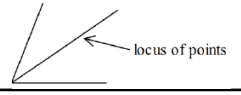
Geometry & Measure – Construction

1	Angle bisector	
2	Perpendicular bisector	
3	Constructing 60° angles	

Key Vocabulary

1	Compound Measures	Combine measures of two different quantities
2	Velocity	Speed in a given direction, measured in m/s
3	Acceleration	The rate of change of velocity, measured in m/s²

Geometry & Measure – Loci

1	Circle 	The locus of points that are a fixed distance from a fixed point
2	Parallel lines 	The locus of points a fixed distance from a fixed line
3	Perpendicular bisector 	The line that cuts another in half at right angles
4	Angle bisector 	The locus of points equidistant between two fixed points

Geometry & Measure – Enlargements

1	Enlargement - a change in the size of the object (bigger or smaller)	Describe by - a) "Enlargement" b) The scale Factor c) The centre of enlargement
2	Fractional Scale Factor	If a scale factor is smaller than 1, then the image will be smaller
3	Negative Scale Factor	If a scale factor is negative then the image will be on the opposite side of the centre of enlargement

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Subject: Maths	Term: Half Term – 5 March	Year Group: 10H

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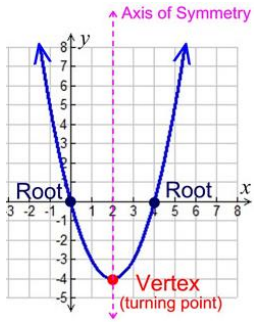
Algebra – Quadratic Equations

1	The quadratic graph is a "U-shaped" curve called a **parabola.** If a < 0, the parabola is upside down. A **root** is a solution to a quadratic equation. A quadratic equation may have no, one, or two solutions	
2	Solve a quadratic by factorising:	Make sure the equation = 0 $ax^2 + bx + c = 0$ Use the products of ac that sum to b
3	Solving a quadratic using the quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Use this method when an equation does not easily factorise
4	Solving a quadratic by completing the square: $(x + p)^2 + q = 0$	Use this method when you want to find the **vertex.** It's co-ordinates are (-p, q)

Ratio, Proportion and rates of change- Similarity

1	Scale Factor	To find the scale factor, divide a length on one shape by the corresponding length on a similar shape

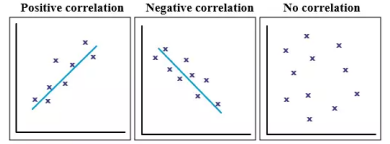
Algebra – Simultaneous Equations

1	Solving graphically	The points of intersection are the solution
2	Solving by elimination	Usually used for linear equations – same signs subtract, different signs add.
3	Solving by substitution	Usually used for quadratic equations – Rearrange and Substitute

Geometry and Measures - Vectors

1	Vector Notation	A vector can be written in 3 ways: **a** or $\overrightarrow{AB}$ or $\begin{pmatrix}1\\3\end{pmatrix}$
2	**Parallel** vectors are **multiples** of each other.	**2a+b** and **4a+2b** are parallel as **4a+2b =2(2a+b)**
3	**Collinear** vectors are vectors that are on the **same line**.	To show this you must show that they are parallel and that they share a point.
4	**Resultant** vectors	The resultant vector is the vector that results from adding two or more vectors together.
5	**Scalar** of a vector	A scalar is the number we multiply the vector by

Statistics - Scatter Graphs

1	Causality	When one variable influences another variable
2	Line of best fit	A straight line that best represents the data on a scatter graph
3	Outlier	A value that "lies outside" most of the values in the data set
4	Positive, Negative or No Correlation	

Key Vocabulary

1	**Quadratic**	A quadratic expression is of the form: $ax^2 + bx + c$
2	**Coefficient**	A number used to multiply a variable.
3	**Vector**	A vector is a quantity with both direction and magnitude.
4	**Magnitude**	The length of a vector
6	**Similar Shapes**	The same shape but different sizes
7	**Correlation**	The connection between 2 data sets

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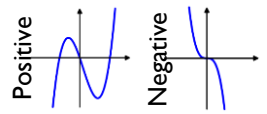
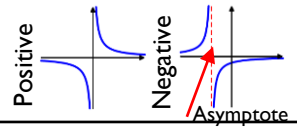
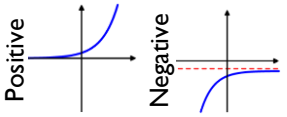
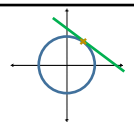
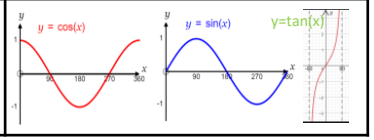
Algebra – Cubic, circular and exponential functions

1	Cubic Graphs – the highest power is of order 3	
2	Reciprocal Graphs- x is in the denominator	
3	Exponential Graphs – x is in the power.	
4	Equation of a circle – $x^2 + y^2 = r^2$	 Tangents are perpendicular to radii
5	Circular functions – trigonometric graph	

Geometry and Measure – Area and Volume 2

1	Area of a sector	$\frac{\theta}{360}\pi r^2$ 
2	Length of an arc	$\frac{\theta}{360}\pi d$ 

Geometry and Measure – Trigonometry (Non-Right Angled)

1	Sine Rule – Use if question involves 2 sides and 1 angle	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
2	Cosine Rule – Use if question involves 3 sides and 1 angle	$a^2 = b^2 + c^2 - 2bc\cos A$
3	Area of a triangle	$\frac{1}{2}ab\sin C$

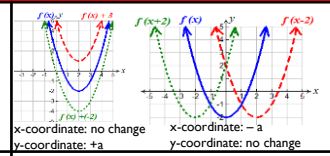
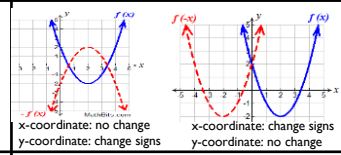
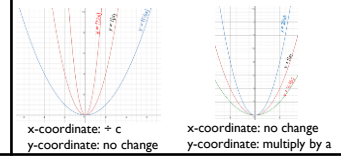
4 – Exact Trigonometry Values

	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	-

Key Vocabulary

1	Asymptote	a straight line that continually approaches a given curve but does not meet it
2	Perpendicular	Two lines are perpendicular if they meet at a right angle. Then have a gradient of m and $-\frac{1}{m}$

Algebra – Transforming Functions

1	Translations: y = f(x) + a → $\begin{pmatrix}0\\a\end{pmatrix}$ y = f(x + a) → $\begin{pmatrix}-a\\0\end{pmatrix}$	
2	Reflections: y = -f(x) → in the x-axis y = f(-x) → in the y-axis	
3	Stretch y = f(ax) → x s.f $\frac{1}{a}$ y = af(x) → y s.f. a	

Algebra – Transforming Functions

1	Function notation: f(x)	x is the input and f(x) is the output value
2	$f^{-1}(x)$ is the inverse function.	Make the function = y Make x the subject Replace y with x and x with $f^{-1}(x)$
3	Composite Functions are a combination of two or more functions	**fg(x)** means do **g** first then **f** **gf(x)** means do **f** first then **g**