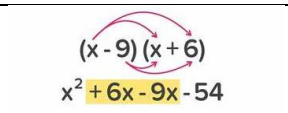
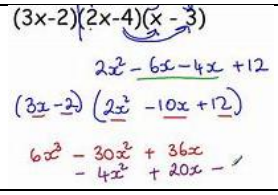
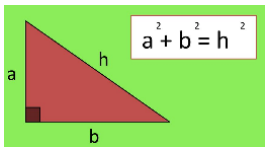
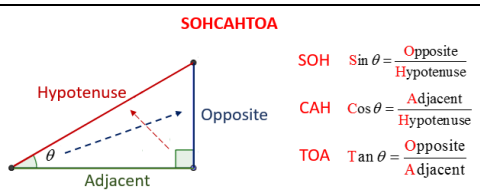
YEAR 11 HIGHER

Knowledge Organisers

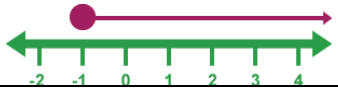
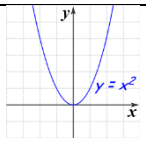
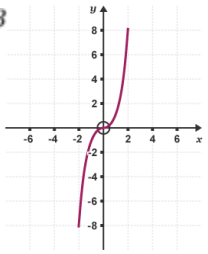
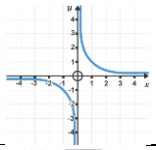
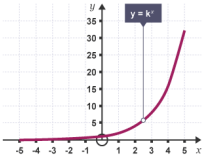
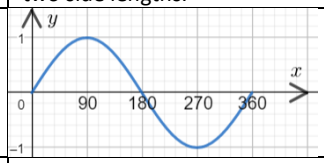
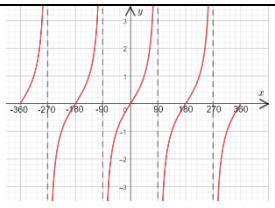
Year 11 Term 1

	Term	Definition
Algebra		
1	Expanding double brackets	
2	Expanding triple brackets	
3	Factorising quadratics	A quadratic expression can sometimes be factorised into two brackets in the form of $(x + a)(x + b)$ where a and b can be any term, positive, negative or zero. a and b can be found by using a product and sum method.
4	Difference of two squares	In mathematics, the **difference** of **two squares** is a **squared** (multiplied by itself) number subtracted from another **squared** number. $a^2 - b^2 = (a - b)(a + b)$
5	Sum	Sum is the addition of a sequence of numbers
6	Product	A **product** is the answer to any multiplication problem.
7	Formula	A set of instructions for working something out. For example, s = 4t + 3 is a formula for S. It shows you how to find s assuming you know what t is.
8	Equation	An equation is a mathematical statement that two things are equal in value. It consists of two expressions, one on each side on an equals sign. E.g. x + 3 = 10
9	Identity	An equation that no matter what values are chosen, it will always be true. It is usually given with a triple equals sign (≡) For example, $x + x \equiv 2x$. This will always be true no matter what value of x you use. For example, $y \times y \equiv y^2$ will always be true no matter what value of y is chosen.
10	Function	
11	Inverse function	An **inverse function** is a **function** that undoes another **function**; you can think of a **function** and its **inverse** as being opposite of each other. E.g. y=sinx and x= $\sin^{-1} y$ $are\ inverse\ functions$. Not every function has an inverse function.
12	Composite function	"Function Composition" is applying one function to the results of another. (g º f)(x) = g(f(x)), first apply f(), then apply g() We must also respect the domain of the first function; Some functions can be de-composed into two (or more) simpler functions.
Geometry and Measures		
13	Pythagoras' theorem	This is used when you have two sides of a right-angled triangle and you need to find out the third side. $a^2 + b^2 = h^2$ 
14	Trigonometry	
15	Exact trigonometric values	*Exact Values of Trigonometric Functions* Angle (θ): Degrees / Radians; sin(θ); cos(θ); tan(θ) 0° / 0 — 0 — 1 — 0 30° / π/6 — 1/2 — √3/2 — 1/√3 45° / π/4 — 1/√2 — 1/√2 — 1 60° / π/3 — √3/2 — 1/2 — √3 90° / π/2 — 1 — 0 — Not Defined
16	Congruence	Two shapes are exactly the same. Which means they have same shape and size.
17	Similarity	Two shapes where one is an enlargement of the other. Although the sides may be a different length, the angles will still remain the same.
Ratio, Proportion and Rates of Change		
18	Iteration	Iteration is a way of solving equations. You would usually use iteration when you cannot solve the equation any other way.
19	Growth and Decay	Something increases or decreases in relation to its current value.

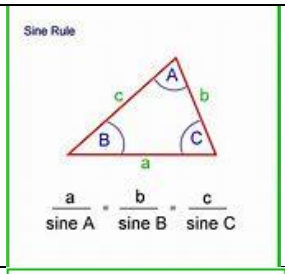
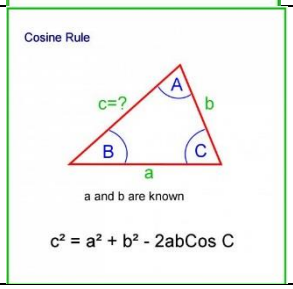
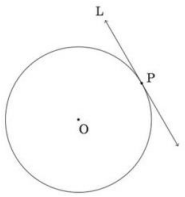
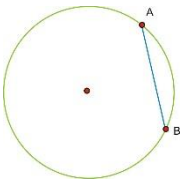
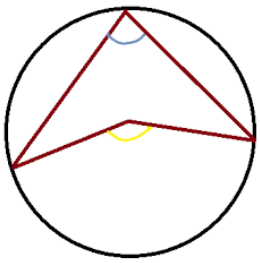
Year 11 Term 2

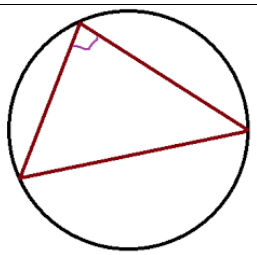
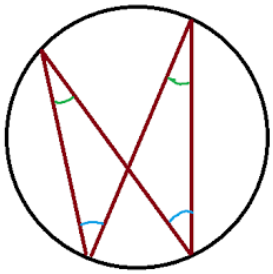
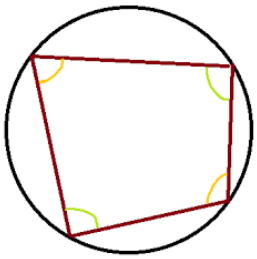
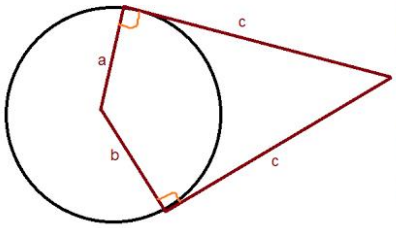
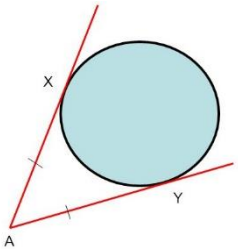
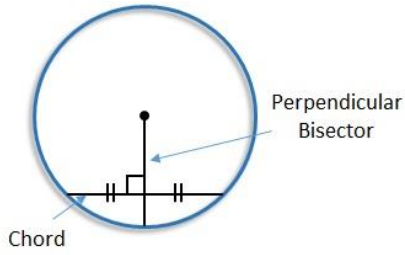
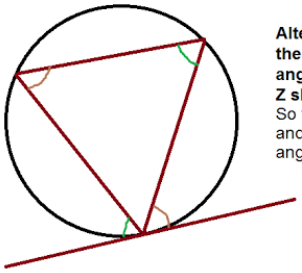
	Term	Definition
Algebra		
1	Equation of a circle	$(x-a)^2+(x-b)^2=r^2$
2	Tangent	A line which intersect the circle with one point.
3	Origin	The point where the axes of a coordinate system intersect.
4	Solve an equation with an unknown on both sides	$5x-2=3x+4$ $-3x \quad -3x$ $2x-2=4$ $+2 \quad +2$ $2x=6$ $x=3$
5	Quadratic equation	
6	Completing the square	In mathematics, the **difference** of **two squares** is a **squared** (multiplied by itself) number subtracted from another **squared** number. $a^2-b^2=(a-b)(a+b)$
7	The quadratic formula	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$
8	Roots	In algebra, **a real root is a solution to a particular equation.**
9	Turning point	A turning point is a point at which the derivative changes sign.
10	Y-intercept	The y-intercept is the point in a function where a line or curve crosses the y-axis. In other words: the value of the x-coordinate is zero.
Ratio, Proportion and Rates of change		
11	Direct proportion	As one amount increases, another amount increases at the same rate.
12	Inverse proportion	As one amount increases, another amount decreases at the same rate.

Year 11 Term 3

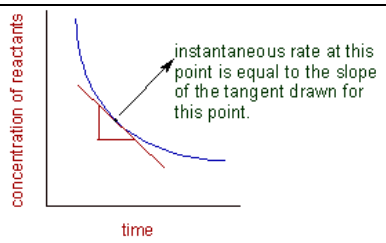
	Term	Definition
Algebra		
1	Linear inequality	In mathematics a linear inequality is an inequality which involves a linear function. $y < 2x + 3$
2	Quadratic inequality	In mathematics a quadratic inequality is an inequality which involves a quadratic function. $y < 4x^2 - 2x + 3$
3	Inequality on a number line	Inequalities can be represented on a number line. Use a hollow dot for: $<$ and $>$ Use a solid dot for: $\leq$ and $\geq$ Graph represent $x \geq -1$ 
Geometry and measures		
4	Vectors	A vector is an object that has both magnitude (how long it is) and direction.
Algebra		
5	Linear graphs	The word **Linear** simply means straight, so if you have a **linear graph** it is a straight line graphed by the equation y=mx+b where m is the slope and b is the y intercept(the point where the line crosses the y-axis).
6	Quadratic graphs	A graph drafted for a quadratic equation: $ax^2 + bx + c$ Y=x^2 is the simplest quadratic, it's graph looks like this: 
7	Cubic graphs	A **cubic equation** contains only terms up to and including $x3$. $y = x3$ Here are some examples of cubic equations: 
8	Reciprocal graphs	A graph of the form $y = \frac{1}{x}$ is known as a **reciprocal graph** and once drawn, looks like this: 
9	Exponential functions	Exponential graphs are graphs in the form $y = k^x$. These graphs increase rapidly in the y direction and will never fall below the x-axis. An exponential graph will look like this: 
10	Trigonometric functions	Trigonometric functions are real functions which relate an angle of a right-angled triangle to ratios of two side lengths.
11	Y = sinx	
12	Y = cosx	
13	Y = tanx	

Year 11 Term 4

	Term	Definition
Geometry and measures		
1	Sine rule	
2	Cosine rule	
3	Sine rule to calculate angles, sides or area of a triangle	
Algebra		
4	Transforming functions	A function transformation takes whatever is the **basic function f (x)** and then **"transforms" it (or "translates" it) by moving it around in the coordinate system.**
5	Iteration	Iteration is a way of solving equations. You would usually use iteration when you cannot solve the equation any other way.
Geometry and measures		
6	Radii	Plural of radius. The distance from the centre to the edge of the circle.
7	Tangent	A straight line that touches the edge of a circle once and once only. 
8	Chord	A straight line that goes from one side of a circle to the other. 
9	Circle theorems	Any of many theorems related to the circle
10	Angle at centre is equal to twice angle at circumference	 **Angle subtended to the centre is 2x the angle subtended to the circumference.** So the yellow angle is 2x the blue angle.
11	Angle in a semi-circle is 90^0	

		The angle subtended to the diameter of a circle is always a right angle. So the purple angle is 90. 
12	Angles in the same segment are equal	 **Angles in the same segment are equal** so the pair of green angles are the same.
13	Opposite angles in a cyclic quadrilateral sum to 180^0	**Opposite angles in a cyclic quaderalateral are suplementary.** So the two yellow and two green angles sum to 180. 
14	Tangent at any point on a circle is perpendicular to the radius at that point	 **The angles where a tangent meets a radius is 90.** So the two orange angles are right angles. **The two tangents are equal in length.** So length C is the same as length B.
15	Tangents from an external point are equal in length	• Tangents to a circle from an external point to the point of contact are equal in length. • AX = AY 
16	The perpendicular from the centre to a chord bisects a chord	
17	Alternate segment theorem	 **Alternate segment theorum. The angles that form a Z shape are equal.** So the two brown and two green angles are equal.

Year 11 Term 5

	Term	Definition
Ratio, Proportion and Rates of change		
1	Gradient at a point on a curve as the instantaneous rate of change	
Algebra		
2	Area under a graph	To find the **area under** the curve y = f(x) between x = a and x = b, integrate y = f(x) between the limits of a and b. **Areas under** the x-axis will come out negative and **areas** above the x-axis will be positive
3	Distance-time graphs	If an object moves along a straight line, the distance travelled can be represented by a distance-time graph. In a distance-time graph, the gradient of the line is equal to the speed of the object. The greater the gradient (and the steeper the line) the faster the object is moving.
4	Velocity-time graphs	Velocity-time graphs are also called speed-time graphs. The vertical axis of a velocity-time graph is the velocity of the object. The horizontal axis is the time from the start.
5	Algebraic fractions	Algebraic fractions are fractions using a **variable in the numerator or denominator**