# Year 11 Methods– Glossary

This glossary is provided to enable a common understanding of the key terms in this syllabus.

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| **Unit 1** | |
| **Functions and graphs** | |
| **Asymptote** | A line is an asymptote to a curve if the distance between the line and the curve approaches zero as they ‘tend to infinity’. For example, the line with equation is a vertical asymptote to the graph of and the line with equation is a horizontal asymptote to the graph of . |
| **Binomial distribution** | The expansion is known as the binomial theorem. The numbers are called binomial coefficients. |
| **Completing the square** | The quadratic expression can be rewritten as Re-writing it in this way is called completing the square. |
| **Discriminant** | The discriminant of the quadratic expression is the quantity |
| **Function** | A function is a rule that associates with each element in a set , a unique element in a set We write to indicate the mapping of to . The set is called the domain of and the set is called the codomain. The subset of consisting of all the elements is called the range of If we write we say that is the independent variable and is the dependent variable. |
| **Graph of a function** | The graph of a function is the set of all points in Cartesian plane where is in the domain of and . |
| **Quadratic formula** | If with then . This formula for the roots is called the quadratic formula. |
| **Vertical line test** | A relation between two real variables and is a function and for some function if and only if each vertical line, i.e. each line parallel to the -axis, intersects the graph of the relation in, at most, one point. This test to determine whether a relation is, in fact, a function is known as the vertical line test. |
| **Trigonometric functions** | |
| **Angle sum and difference identites** | The angle sum and difference identites for sine and cosine are given by |
| **Area of a sector** | The area of a sector of a circle is given by , where is the sector area,  is the radius and is the angle subtended at the centre, measured in radians. |
| **Area of a segment** | The area of a segment of a circle is given by , where is the segment area, is the radius and is the angle subtended at the centre, measured in radians. |
| **Circular measure** | Circular measure is the measurement of angle size in radians. |
| **Length of an arc** | The length of an arc in a circle is given by , where is the arc length, is the radius and is the angle subtended at the centre, measured in radians. This is simply a rearrangement of the formula defining the radian measure of an angle. |
| **Length of a chord** | The length of a chord in a circle is given by , where is the chord length, is the radius and is the angle subtended at the centre, measured in radians. |
| **Period of a function** | The period of a function is the smallest positive number with the property that for all . The functions and both have period and has period . |
| **Radian measure** | The radian measure of an angle in a sector of a circle is defined by , where is the radius and is the arc length. Thus, an angle whose degree measure is has radian measure . |
| **Sine rule and cosine rule** | The lengths of the sides of a triangle are related to the sine of its angles by the equations  This is known as the sine rule.  E:\Maths Syllabus Glossarys 2016\Mathematics Methods year 11 Glossary 2016\sine cosine rule.jpg  The lengths of the sides of a triangle are related to the cosine of one of its angles by the equation  This is known as the cosine rule.  E:\Maths Syllabus Glossarys 2016\Mathematics Methods year 11 Glossary 2016\sine cosine rule.jpg |
| **Sine, cosine and tangent functions** | Since each angle measured anticlockwise from the positive -axis determines a point on the unit circle, we will define  the cosine of to be the ‐coordinate of the point  the sine of to be the ‐coordinate of the point  the tangent of is the gradient of the line segment *.*  E:\Maths Syllabus Glossarys 2016\Mathematics Methods year 11 Glossary 2016\sine cosine and tangent functions.jpg |
| **Counting and probability** | |
| **Conditional probability** | The probability that an event occurs can change if it becomes known that another event occurs. The new probability is known as a conditional probability and is written as If has occurred, the sample space is reduced by discarding all outcomes that are not in the event The new sample space, called the reduced sample space, is The conditional probability of event is given by . |
| **Independent events** | Two events are independent if knowing that one occurs tells us nothing about the other. The concept can be defined formally using probabilities in various ways: events and are independent if , if or if For events and with non-zero probabilities, any one of these equations implies any other. |
| **Mutually exclusive** | Two events are mutually exclusive if there is no outcome in which both events occur. |
| **Pascal’s triangle** | Pascal’s triangle is a triangular arrangement of binomial coefficients. The row consists of the binomial coefficients for , each interior entry is the sum of the two entries above it, and sum of the entries in the row is  For example, 10 = 4 + 6. |
| **Relative frequency** | If an event occurs times when a chance experiment is repeated times, the relativefrequency of is . |
| **Exponential functions** | |
| **Algebraic properties of exponential functions** | The algebraic properties of exponential functions are the index laws: , , , , for any real numbers , with . |
| **Index laws** | The index laws are the rules: , , , , and , for any real numbers , with . |
| **Arithmetic and geometric sequences and series** | |
| **Arithmetic sequence** | An arithmetic sequence is a sequence of numbers such that the difference of any two successive members of the sequence is a constant. For instance, the sequence  2, 5, 8, 11, 14, 17, …  is an arithmetic sequence with common difference 3.  If the initial term of an arithmetic sequence is and the common difference of successive members is , then the th term of the sequence, is given by:  for .  A recursive definition is  , where is the common difference and . |
| **Geometric sequence** | A geometric sequence is a sequence of numbers where each term after the first is found by multiplying the previous one by a fixed number called the common ratio. For example, the sequence  3, 6, 12, 24, ...  is a geometric sequence with common ratio 2. Similarly the sequence  40, 20, 10, 5, 2.5, …  is a geometric sequence with common ratio .  If the initial term of a geometric sequence is and the common ratio of successive members is , then the th term of the sequence, is given by:  for .  A recursive definition is  for and where is the constant ratio. |
| **Partial sums of a geometric sequence (geometric series)** | The partial sum of the first terms of a geometric sequence with first term and common ratio ,  is , .  The partial sums form a sequence with and |
| **Partial sum of an arithmetic sequence (arithmetic series)** | The partial sum of the first terms of an arithmetic sequence with first term and common difference .  …  is where is the th term of the sequence.  The partial sums form a sequence with |
| **Partial sums of a sequence (series)** | The sequence of partial sums of a sequence is defined by |
| **Introduction to differential calculus** | |
| **Anti-differentiation** | An anti-derivative, primitive or indefinite integral of a function is a function whose derivative is , i.e.  The process of solving for anti-derivatives is called anti-differentiation.  Anti-derivatives are not unique. If is an anti-derivative of then so too is the function where is any number. We write to denote the set of all anti-derivatives of The number is called the constant of integration. For example, since we can write |
| **Gradient (Slope)** | The gradient of the straight line passing through points and is the ratio **.** Slope is a synonym for gradient. |
| **Linearity property of the derivative** | The linearity property of the derivative is summarised by the equations:  for any constant and . |
| **Local and global maximum and minimum** | A stationary point on the graph of a differentiable function is a point where .  We say that is a local maximum of the function if for all values of near . We say that is a global maximum of the function if for all values of in the domain of .  We say that is a local minimum of the function if for all values of near . We say that is a global minimum of the function if for all values of in the domain of . |
| **Secant** | A secant of the graph of a function is the straight line passing through two points on the graph. The line segment between the two points is called a chord. |
| **Simple polynomial** | A simple polynomial is one which is easily factorised and whose stationary points may be easily determined using traditional calculus techniques. |
| **Tangent line** | The tangent line (or simply the tangent) to a curve at a given point can be described intuitively as the straight line that "just touches" the curve at that point. At where the curve meets the tangent, the curve has "the same direction" as the tangent line. In this sense, it is the best straight-line approximation to the curve at the point . |