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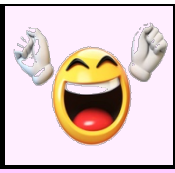
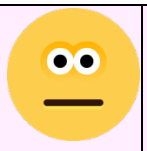
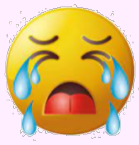
Cambridge iGCSE Additional Maths Topic Checklist

Topics				
Functions				
understand the terms: function, domain, range (image set), one-one function, inverse function and composition of functions				
use the notation $f(x) = \sin x, f: x \mapsto \sin x, f^{-1}(x)$ and $f^2(x) = f(f(x))$				
understand the relationship between $y = f(x)$ and $y = \lvert f(x) \rvert$, where $f(x)$ may be linear, quadratic or trigonometric				
explain in words why a given function is a function or why it does not have an inverse				
find the inverse of a one-one function and form composite functions				
use sketch graphs to show the relationship between a function and its inverse				
Quadratics				
find the maximum or minimum value of the quadratic function $f: x \mapsto ax^2 + bx + c$ by any method				
use the maximum or minimum value of $f(x)$ to sketch the graph or determine the range for a given domain				
know the conditions for $f(x) = 0$ to have: i. two real roots ii. two equal roots iii. no real roots and the related conditions for a given line to i. intersect a given curve ii. be a tangent to a given curve iii. not intersect a given curve				
solve quadratic equations for real roots and find the solution set for quadratic inequalities				
Equations, Inequalities and graphs				
solve graphically or algebraically equations of the type $\lvert ax + b \rvert = c$ ($c \geqslant 0$) and $\lvert ax + b \rvert = \lvert cx + d \rvert$				
solve graphically or algebraically inequalities of the type $\lvert ax + b \rvert > c$ ($c \geqslant 0$), $\lvert ax + b \rvert \leqslant c$ ($c > 0$) and $\lvert ax + b \rvert \leqslant (cx + d)$				
use substitution to form and solve a quadratic equation in order to solve a related equation				
sketch the graphs of cubic polynomials and their moduli, when given in factorised form $y = k(x - a)(x - b)(x - c)$				
solve cubic inequalities in the form $k(x - a)(x - b)(x - c) \leqslant d$ graphically				
Indices and surds				
perform simple operations with indices and with surds, including rationalising the denominator				
Factors of polynomials				
know and use the remainder and factor theorems				
find factors of polynomials				
solve cubic equations				
Simultaneous equations				
solve simple simultaneous equations in two unknowns by elimination or substitution				
Logarithmic and exponential functions				
know simple properties and graphs of the logarithmic and exponential functions including $\ln x$ and e^x (series expansions are not required) and graphs of $ke^{nx} + a$ and $k\ln(ax + b)$where n, k, a, and b are integers				
know and use the laws of logarithms (including change of base of logarithms)				
solve equations of the form $a^x = b$				
Straight line graphs				
Interpret the equation of a straight line graph in the form $y = mx + c$				

transform given relationships, including $y = ax^n$ and $y = Ab^x$, to straight line form and hence determine unknown constants by calculating the gradient or intercept of the transformed graph				
solve questions involving mid-point and length of a line				
know and use the condition for two lines to be parallel or perpendicular, including finding the equation of perpendicular bisectors				
Circular Measure				
solve problems involving the arc length and sector area of a circle, including knowledge and use of radian measure				
Trigonometry				
know the six trigonometric functions of angles of any magnitude (sine, cosine, tangent, secant, cosecant, cotangent)				
understand amplitude and periodicity and the relationship between graphs of related trigonometric functions, e.g. sin *x* and sin 2*x*				
draw and use the graphs of $y = a\sin bx + c$ $y = a\cos bx + c$ $y = a\tan bx + c$ where a is a positive integer, *b* is a simple fraction or integer (fractions will have a denominator of 2, 3, 4, 6 or 8 only), and c is an integer				
use the relationships $\sin^2 x + \cos^2 x = 1$ $1 + \tan^2 x = \sec^2 x$ $1 + \cot^2 x = \operatorname{cosec}^2 x$ $\frac{\sin A}{\cos A} = \tan A, \frac{\cos A}{\sin A} = \cot A$				
solve simple trigonometric equations involving the six trigonometric functions and the above relationships (not including general solution of trigonometric equations)				
prove simple trigonometric identities				
Permutations and combinations				
recognise and distinguish between a permutation case and a combination case				
know and use the notation *n*! (with 0! = 1), and the expressions for permutations and combinations of *n* items taken *r* at a time				
answer simple problems on arrangement and selection (cases with repetition of objects, or with objects arranged in a circle, or involving both permutations and combinations, are excluded)				
Series				
use the Binomial Theorem for expansion of $(a + b)^n$ for positive integer n				
Use the general term $\binom{n}{r} a^{n-r} b^r, o \le r \le n$ knowledge of the greatest term and properties of the coefficients is not required				
recognise arithmetic and geometric progressions				
use the formulae for the *n*th term and for the sum of the first *n* terms to solve problems involving arithmetic or geometric progressions				
use the condition for the convergence of a geometric progression, and the formula for the sum to infinity of a convergent geometric progression				
Vectors in two dimensions				
Use vectors in any form e.g. $\binom{a}{b}, \overrightarrow{AB}, \boldsymbol{p}, a\boldsymbol{i} - b\boldsymbol{j}$				
know and use position vectors and unit vectors				
find the magnitude of a vector; add and subtract vectors and multiply vectors by scalars				
compose and resolve velocities				
Differentiation and integration				
understand the idea of a derived function				
Use the notations $f'(x), f''(x), \frac{dy}{dx}, \frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{dy}{dx}\right)$				
use the derivatives of the standard functions x^n (for any rational *n*), sin *x*, cos *x*, tan *x*, e , ln *x*, together with constant multiples, sums and composite functions of these				
differentiate products and quotients of functions				

apply differentiation to gradients, tangents and normals, stationary points, connected rates of change, small increments and approximations and practical maxima and minima problems				
use the first and second derivative tests to discriminate between maxima and minima				
understand integration as the reverse process of differentiation				
integrate sums of terms in powers of *x* including $\frac{1}{x}$ and $\frac{1}{ax+b}$				
integrate functions of the form $(ax+b)^n$ for any rational n, $sin\,(ax+b)$ $cos\,(ax+b)$, e^{ax+b}				
evaluate definite integrals and apply integration to the evaluation of plane areas				
apply differentiation and integration to kinematics problems that involve displacement, velocity and acceleration of a particle moving in a straight line with variable or constant acceleration, and the use of *x*–*t* and *v*–*t* graphs				