

Maths AS Checklists for C1, C2 and S1

C1 PLC

Skills/ Knowledge/ Specification	R	A	G
NUMBER AND ALGEBRA			
Know and use the rules of indices to find a value eg $49^{-2/3}$			
Know and use the rules of indices to simplify expressions			
Factorise harder quadratics eg $3x^2 + 10x - 8$ and cubics with a common factor of x			
Simplify surds and rationalise denominators			
Solve quadratic equations by factorising			
Complete the square for quadratics and identify min/max value and corresponding x			
Solve quadratic equations by completing the square			
Know and use the Quadratic Discriminant			
Solve simultaneous equations where one is linear and one is non-linear			
Solve quadratic inequalities			
Solve a linear and a quadratic inequality simultaneously			
Identify where graphs cross the axes from their equations			
GRAPHS			
Sketch positive and negative quadratic graphs			
Sketch positive and negative cubic graphs			
Sketch positive and negative reciprocal graphs of the form $y = 12/x$ or $y = -20/x$			
Sketching two graphs on the same axes			
Form and (sometimes) solve an equation for points of intersection			
Know the transformations to graphs $f(x+a)$ and $f(x-a)$			
Know the transformations to graphs $f(x)+a$ and $f(x)-a$			
Know the transformations to graphs $kf(x)$ and $f(kx)$			
Know the transformations to graphs $-f(x)$ and $f(-x)$			
CO-ORDINATE GEOMETRY			
Able to calculate the gradient of a line through two given points			
Able to find the equation of a line using the gradient and a point			
Able to find the equation of a line parallel to a given line			
Able to find the equation of a line perpendicular to a given line			
Able to find the length of a line segment between two points			
SEQUENCES AND SERIES			
Use a formula to generate terms of a sequence eg $U_n = n^2 + 5n - 3$			
Use an iterative formula to generate terms of a sequence eg $U_{n+1} = 2U_n - 3, U_1 = 6$			

Know the formulas for U_n and S_n for an AP and use them with confidence			
Solve real life problems that consist of an AP			
Understand sigma notation for series and work out prescribed values			
CALCULUS			
Differentiate expressions containing powers and roots			
Differentiate products of brackets			
Differentiate quotients eg $(x^2 + 3x)/x^{1/2}$			
Find the gradient from an equation for a point with given x value			
Find the co-ordinates of a point with known gradient for a given equation			
Find the equation of a tangent to a curve at a given point			
Find the equation of a normal to a curve at a given point			
Find the second differential for a given equation			
Integrate expressions containing powers and roots			
Integrate products of brackets			
Integrate quotients eg $(x^2 + 3x)/x^{1/2}$			
Find the constant of integration when a point is given as well as an integral			

C2 PLC

Skills/ Knowledge/ Specification	R	A	G
ALGEBRA AND FUNCTIONS			
Use algebraic long division to divide $f(x)$ by a linear expression			
Use $f(a)$ to find the remainder when $f(x)$ is divided by $(x - a)$			
Use $f(a) = 0$ to show that $(x - a)$ is a factor of $f(x)$			
Use the remainder and factor theorems to calculate unknown coefficients in $f(x)$			
Factorise a cubic expression having been given given one linear factor			
Solve a cubic $f(x) = 0$ from the factorised format			
EXPONENTIALS AND LOGARITHMS			
Know the graphs of $y = a^x$ and $y = \log_a x$			
Know and use that if $y = a^x$ then $x = \log_a y$ and vice versa			
Know and use the rules of logs			
Use logs to solve equations such as $5^{2x-3} = 800$			
Use logs to solve equations such as $8_{x+3} = 3_{2x-1}$			
Solve equations such as $3_{2x} - 5(3_{x+1}) + 54 = 0$			
Solve equations such $\log_3(2x - 1) = \log_9(x^2 + 3x - 4)$ using the change of base formula			
Solve simple simultaneous equations involving logs and indices			
CO-ORDINATE GEOMETRY			

Know and use the coordinate geometry skills from C1			
Find the mid-point of a line between two points			
Know that the equation of a circle is $(x - a)^2 + (y - b)^2 = r^2$			
Find the equation of a circle from given information			
Use the equation of a circle to identify the centre and radius			
Calculate the equation of a tangent to a circle at a given point on the circle			
Understand how to analyse the intersection of a line and a circle - tangent or intersecting?			
THE BINOMIAL EXPANSION			
Understand the link to Pascal's triangle for the expansion $(a + b)^n$			
Use $(a + b)^n = a^n + {}_n C_1(a)^{n-1}(b) + {}_n C_2(a)^{n-2}(b)^2 + \dots$ to obtain an expansion			
Use the formula for $(1 + x)^n$ to obtain an expansion			
Use given information to find p for $(1 + px)^n$ or $(a + px)^n$			
Identify and substitute a small value of x into an expansion to approximate a value			
GEOMETRIC SEQUENCES AND SERIES			
Use the formulas for U_n and S_n			
Understand the sum to infinity for a converging GP and how to obtain it			
Set up a GP identifying a, r and n for a described practical situation			
Calculate a and r given two terms of a GP			
TRIGONOMETRY			
Use all trigonometry skills from GCSE			
Understand and convert between degrees and radians			
Know and use $r\theta$ and $\frac{1}{2} r^2\theta$ for arc length and area of a sector			
Calculate the area of a segment between an arc and a chord			
Know the graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$			
Apply transformations to the sin, cos and tan graphs eg $y = 2 \sin (x + 90)$			
Solve trig equations eg $\sin (2x + 30) = -0.5$ for x from 0 to 360 or -180 to 180			
Use $\tan x = \sin x / \cos x$ to simplify a trig equation			
Use $\sin 2x + \cos 2x = 1$ to enable quadratic trig equations to be solved			
Prove simple trig identities			
DIFFERENTIATION			
Know the differentiation techniques from C1			
Use dy/dx to identify when a function is increasing or decreasing			
Use $dy/dx = 0$ to find the coordinates of stationary points			
Use d^2y/dx^2 to determine the nature of a stationary point			
Solve practical maximum/minimum problems by justifying and using a stated equation			
INTEGRATION			
Know the integration techniques from C1			
Use the trapezium rule to approximate a given integral/area			

Understand how to use limits in integration to find a numerical answer			
Calculate the area under a graph down to the x axis between two x values			
Calculate the area enclosed by two graphs between their points of intersection			

S1 PLC

Skills/ Knowledge/ Specification	R	A	G
AVERAGES, MEASURES OF LOCATION and MEASURES OF SPREAD			
Calculate the mean of discrete data (including grouped)			
Calculate an estimated mean for grouped continuous data			
Identify the median, quartiles and percentiles for discrete data			
Calculate the median, quartiles and percentiles for grouped continuous data			
Calculate and use range, IQR and semi-IQR			
Calculate the standard deviation of discrete data (including grouped)			
Calculate an estimate of standard deviation for grouped continuous data			
Know that variance is the square of standard deviation			
Know and apply the rules to calculate mean and standard deviation by coding			
Use a prescribed method to identify outliers			
STATISTICAL GRAPHS			
Use frequency density/area to construct a histogram			
Read information from a histogram and use it to calculate frequencies			
Construct and/or interpret a scatter diagram			
Construct and/or interpret a stem and leaf diagram (including back to back)			
Construct and/or interpret a box (and whisker)plot including showing outliers			
Construct and/or interpret a cumulative frequency graph			
PROBABILITY			
Use Number Venn diagrams to solve two category number problems			
Use Number Venn diagrams to solve three category number problems			
Use Number Venn Diagrams to read off probabilities			
Know the rule $P(A \cup B) = P(A) + P(B) - P(A \cap B)$			
Know $P(A') = 1 - P(A)$			
Use two category Probability Venn Diagrams to represent and to read probabilities			
Understand conditional probability			
Know the rule for calculating any specified conditional probability "and over second"			
Recognise when best to use a probability tree diagram			
Understand two way tables and possibility space diagrams			
Know that for independent events $P(A \cap B) = P(A) \times P(B)$			
Know that for mutually exclusive events $P(A \cap B) = 0$			

CORRELATION and REGRESSION			
Look up and use the formulas for S_{xx} , S_{yy} and S_{xy}			
Look up and use the formula for r , the PMCC, substituting in S_{xx} , S_{yy} and S_{xy}			
Know that the PMCC of coded data is the same as for the original data			
Interpret the value of the PMCC as a measure of correlation			
Know the least squares regression line equation $y = a + bx$			
Look up and use the equations for a and b to find the least squares regression line			
Use coding and substitution to find the least squares regression line			
Substitute values into the least squares regression line			
Interpret the values of a and b in the least squares regression line			
DISCRETE RANDOM VARIABLES			
Know what is meant by a discrete random variable			
Understand and use the distributions $P(X=x)$ and $F(X)$			
Know and use the formula $E(X) = \sum xP(x)$			
Know and use the formula $VAR(X) = \sum x^2P(x) - (E(X))^2$			
Know and use the formula $E(aX + b) = aE(X) + b$			
Know and use the formula $VAR(aX + b) = a^2VAR(X)$			
Know what is meant by a discrete uniform distribution			
Know and use the $E(X)$ and $VAR(X)$ formulas for a discrete uniform distribution			
THE NORMAL DISTRIBUTION			
Understand the bell shaped curve and its link to probability			
Know how to calculate the value of z for any item of data in a normal distribution			
Use a positive z value to read a probability from the normal distribution table			
Use a negative z value to read a probability from the normal distribution table			
Use two z values to find a probability within a specified range			
Know how to read the normal distribution table in reverse			
Know how and when to use the Percentage Points table			
Use a given piece of information to find the mean or the standard deviation			
Use two given pieces of information to find the mean and the standard deviation			