



## Unit 2 Higher Tier

**Note:** Questions will assume knowledge from Unit 1 and Unit 2 Foundation Tier and Unit 1 Higher Tier subject content.

Remind yourself what is included in the formula sheet: It is in the inside cover of the exam papers and can be found here: [Higher Tier](#).

Revision sheets can be found on the Pearson website, in the Assessment support section, [here](#).

Content	Notes	Y/N
<b>Number</b>		
<b>Percentages: Unit 2 Revision Sheet A Number Higher</b>		
Use repeated percentage change	Calculate the total percentage increase when an increase of 30% is followed by a decrease of 20%	
Solve compound interest problems	Joan invests £6000 in a savings account. The savings account pays compound interest at a rate of 2.4% for the first year and 1.7% for each extra year. Work out the value of Joan's investment at the end of 3 years	
<b>Standard form: Unit 2 Revision Sheet A Number Higher</b>		
Solve problems involving standard form	a) Write $5.7 \times 10^6$ as an ordinary number. b) Write 2 840 000 000 in standard form. c) $a = 4.2 \times 10^{-24}$ $b = 3 \times 10^{145}$ . Work out the value of $a \times b$ . Give your answer in standard form	
<b>Algebra</b>		
<b>Algebraic manipulation: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Use algebra to support and construct proofs	Prove that the difference between two consecutive square numbers is always an odd number. Show clear algebraic working	
<b>Expressions and formulae: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Understand the process of manipulating formulae or equations to change the subject, to include cases where the subject may appear twice or a power of the subject occurs	<p>Make <math>r</math> the subject of <math>V = \frac{4}{3}\pi r^3</math></p> <p>Make <math>a</math> the subject of <math>3a + 5 = \frac{4-a}{r}</math></p> <p>Make <math>l</math> the subject of <math>T = 2\pi\sqrt{\frac{l}{g}}</math></p>	



Content	Notes	Y/N
<b>Proportion: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Set up problems involving direct or inverse proportion and relate algebraic solutions to graphical representation of the equations	<p>To include only the following:</p> $y \propto x, y \propto \frac{1}{x}$ $y \propto x^2, y \propto \frac{1}{x^2}$ $y \propto x^3, y \propto \frac{1}{x^3}$ $y \propto \sqrt{x}, y \propto \frac{1}{\sqrt{x}}$	
<b>Simultaneous linear equations: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Calculate the exact solution of two simultaneous equations in two unknowns	$2x + 3y = 17$ $3x - 5y = 35$	
Interpret the equations as lines and the common solution as the point of intersection	Find the coordinates of the point of intersection of the line with equation $3x + 4y = 10$ and the line with equation $5x - 6y = 23$	
<b>Quadratic equations: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Solve simultaneous equations in two unknowns, one equation being linear and the other being quadratic	$y = 2x - 11 \text{ and } x^2 + y^2 = 25$ $y = 11x - 2 \text{ and } y = 5x^2$	
<b>Inequalities: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Solve quadratic inequalities in one unknown and represent the solution set on a number line	$x^2 \leq 25, 4x^2 > 25$ $x^2 + 3x + 2 > 0$	
Identify harder examples of regions defined by linear inequalities	<p>Shade the region defined by the inequalities</p> $x \leq 4,$ $y \leq 2x + 1,$ $5x + 2y \leq 20$	



Content	Notes	Y/N
<b>Sequences: Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher</b>		
Understand and use common difference ( $d$ ) and first term ( $a$ ) in an arithmetic sequence	e.g. given 2 <sup>nd</sup> term is 7 and 5 <sup>th</sup> term is 19, find $a$ and $d$	
Know and use $n$ th term $= a + (n - 1)d$	An arithmetic series has first term 1 and common difference 4. Work out the value of the 50 <sup>th</sup> term	
Find the sum of the first $n$ terms of an arithmetic series ( $S_n$ )	e.g. given $4 + 7 + 10 + 13 + \dots$ find sum of first 50 terms  This formula is included on the formula sheet in the inside front cover of an exam paper	
<b>Function notation: Unit 2 Revision Sheet C Function Notation Transformation of Graphs Differentiation Higher</b>		
Understand the concept that a function is a mapping between elements of two sets		
Use function notations of the form $f(x) = \dots$ and $f : x \mapsto \dots$	$g$ is the function with domain $x \geq -3$ such that $g(x) = x^2 + 6x$ . (a) Write down the range of $g^{-1}(x)$ . (b) Express the inverse function $g^{-1}$ in the form $g^{-1} : x \mapsto \dots$	
Understand the terms 'domain' and 'range' and which values may need to be excluded from a domain	$f(x) = \frac{1}{x - 2}$ exclude $x = 2$	
Understand and find the composite function $fg$ and the inverse function $f^{-1}$	' $fg$ ' will mean 'do $g$ first, then $f$ '	
<b>Graphs: Unit 2 Revision Sheet C Function Notation Transformation of Graphs Differentiation Higher</b>		
Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$ , $y = f(ax)$ , $y = f(x + a)$ , $y = af(x)$ for linear, quadratic, sine and cosine functions	A curve has equation $y = f(x)$ . The coordinates of the minimum point on this curve are $(-9, 15)$ . Write down the coordinates of the minimum point on the curve with equation $y = f(x + 3)$	
Interpret and analyse transformations of functions and write the functions algebraically	The curve <b>S</b> has equation $y = f(x)$ where $f(x) = x^2$ . The curve <b>T</b> has equation $y = g(x)$ where $g(x) = 2x^2 - 12x + 13$ By writing $g(x)$ in the form $a(x - b)^2 - c$ , where $a$ , $b$ and $c$ are constants, describe fully a series of transformations that map the curve <b>S</b> onto the curve <b>T</b>	



Content	Notes	Y/N
Find the gradients of non-linear graphs	By drawing a tangent	
Find the intersection points of two graphs, one linear ( $y_1$ ) and one non-linear ( $y_2$ ) and recognise that the solutions correspond to the solutions of $(y_2 - y_1) = 0$	The x values of the intersection of the two graphs: $y = 2x + 1$ $y = x^2 + 3x - 2$ are the solutions of: $x^2 + x - 3 = 0$ Similarly, the x values of the intersection of the two graphs: $y = 5$ $y = x^3 - 3x^2 + 7$ are the solutions of: $x^3 - 3x^2 + 2 = 0$	
<b>Calculus: Unit 2 Revision Sheet C Function Notation Transformation of Graphs Differentiation Higher</b>		
Understand the concept of a variable rate of change	The displacement, s metres, of a particle is given by $s = 2t^3 - 5t^2 + 6t - 5$ . Find the value of t when the acceleration of the particle is $5 \text{ m/s}^2$	
Differentiate integer powers of x	A curve has equation $y = 4x^3 - 8x + 5$ . Find the x coordinates of the two points on the curve where the gradient is $1/3$	
Determine gradients, rates of change, stationary points, turning points (maxima and minima) by differentiation and relate these to graphs	Find the coordinates of the maximum and minimum points	
Distinguish between maxima and minima by considering the general shape of the graph only	The curve $y = x^2 - 6x + 8$ has a turning point at $x = -3$ . By considering the shape of the curve write down whether this turning point is a maximum or minimum	
Apply calculus to linear kinematics and to other simple practical problems	The displacement, s metres, of a particle from a fixed point O after t seconds is given by: $s = 24t^2 - t^3$ , $0 \leq t \leq 20$ Find expressions for the velocity and the acceleration	



Content	Notes	Y/N
<b>Shape and Space</b>		
<b>Circle properties: Unit 2 Revision Sheet E Circle Theorems Higher</b>		
Understand and use the internal and external intersecting chord properties		
Recognise the term 'cyclic quadrilateral'		
Understand and use angle properties of the circle including: (i) angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the remaining part of the circumference (ii) angle subtended at the circumference by a diameter is a right angle (iii) angles in the same segment are equal (iv) the sum of the opposite angles of a cyclic quadrilateral is $180^\circ$ (v) the alternate segment theorem	Formal proof of these theorems is not required	
<b>3D shapes and volume: Unit 2 Revision Sheet F 3D Shapes Similarity Higher</b>		
Find the surface area and volume of a sphere and a right circular cone using relevant formulae	The formula for the volumes and curved surface area of a cone are included in the formula sheet in the inside front cover of an exam paper. Note the total surface area of a cone includes the area of the circle as its base	
<b>Similarity: Unit 2 Revision Sheet F 3D Shapes Similarity Higher</b>		
Understand that areas of similar figures are in the ratio of the square of corresponding sides		
Understand that volumes of similar figures are in the ratio of the cube of corresponding sides		
Use areas and volumes of similar figures in solving problems		
<b>Vectors: Unit 2 Revision Sheet G Transformations and Vectors Higher</b>		
Understand that a vector has both magnitude and direction		
Understand and use vector notation including column vectors	The notations $\overrightarrow{OA}$ and $\mathbf{a}$ will be used	
Multiply vectors by scalar quantities		
Add and subtract vectors		
Calculate the modulus (magnitude) of a vector	Find the magnitude of: $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$	



Content	Notes	Y/N
Find the resultant of two or more vectors	$\vec{OA} = 3\mathbf{a}$ , $\vec{AB} = 2\mathbf{b}$ , $\vec{BC} = \mathbf{c}$ so: $\vec{OC} = 3\mathbf{a} + 2\mathbf{b} + \mathbf{c}$ $\vec{CA} = -\mathbf{c} - 2\mathbf{b}$	
Apply vector methods for simple geometrical proofs		
<b>Handling Data</b>		
<b>Graphical representation of data: Unit 2 Revision Sheet H Representation of Data and Statistical Measures Higher</b>		
Construct cumulative frequency diagrams from tabulated data		
Use cumulative frequency diagrams		
<b>Statistical measures: Unit 2 Revision Sheet H Representation of Data and Statistical Measures Higher</b>		
Estimate the median from a cumulative frequency diagram		
Understand the concept of a measure of spread		
Find the interquartile range from a discrete data set	The terms 'upper quartile' and 'lower quartile' may be used	
Estimate the interquartile range from a cumulative frequency diagram		