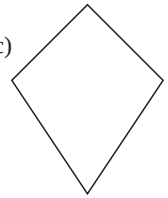
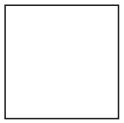
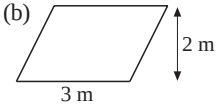
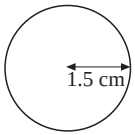
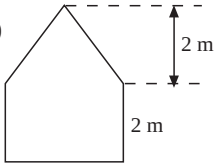
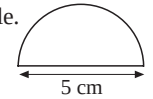
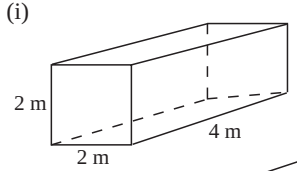
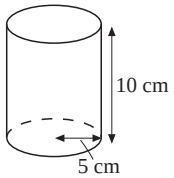
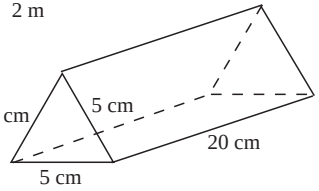
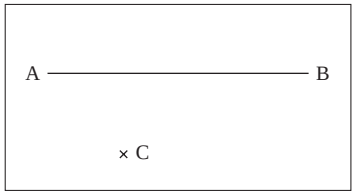
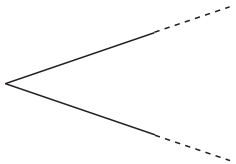
Unit	Notes	Examples
9 AREA, PERIMETER and VOLUME		
9.1 2-D Shapes	Recap common names, and properties of 2-D shapes	What is the name of each shape illustrated? Draw on the lines of symmetry and state the order of rotational symmetry for each shape. (a)  (b)  (c) 
9.2 Area of Special Shapes	Square, rectangle, parallelogram, triangle, circle and compound shapes	Find the area of the following shapes: (a)  (b)  (c)  (d) 
9.3 Perimeter of Special Shapes	Square, rectangle, circle and compound shapes	Find the perimeter lengths of the shapes above. Find the perimeter length of the semicircle. 
9.4 Surface Area and Volume of 3-D Shapes	Recap common names (cube, cuboid, prism and cylinder) Volume and surface area of these shapes	Find the (a) volume, (b) surface area of each of these shapes: (i)  (ii)  (iii) 

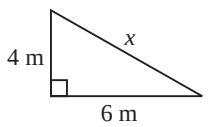
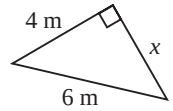
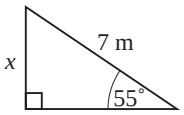
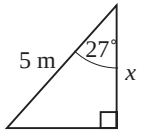
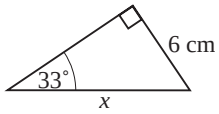
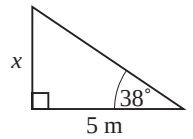
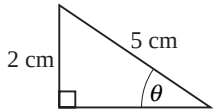
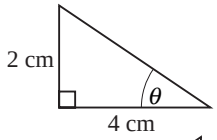
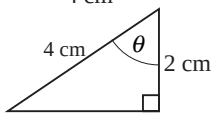
Unit	Notes	Examples
10 SEQUENCES		
10.1 Constant Differences	Generating sequence from formula	Write down the first 5 terms of the sequence defined by $6n-2, \quad (n=1, 2, 3, ...)$ What do you notice about the differences?
10.2 Finding the Formula	Determining general term for sequence	What is the general term for the sequence 7, 10, 13, 16, 19, . . . ?
10.3 Linear and Quadratic Differences	Generating sequence from formula	Write down the first 6 terms for the sequences defined by: (a) $u_n = n^2 + n + 1, \quad u_n = 2n^2 - n^2 \quad (n=1, 2, 3, ...)$ What do you notice about the differences for each sequence?
	Understanding the consequences of having constant linear or quadratic differences	What is the general term for the sequence –1, 0, 3, 8, 15, . . . ?
10.4 Special Sequences	Recognise common sequences such as Fibonacci and exponential sequences Sequences of the form $u_n = \dfrac{an+b}{cn+d}, \quad n = 1, 2, 3, ...$	Find the first 10 terms of the sequence defined by $u_n = u_{n-1} + u_{n-2}$ when $u_1 = 2, \; u_2 = 4$. Investigate the limit as $n \to \infty$ for the value of the nth term, where (a) $u_n = \dfrac{n}{n+1}$, (b) $u_n = \dfrac{2n-1}{n+1}$

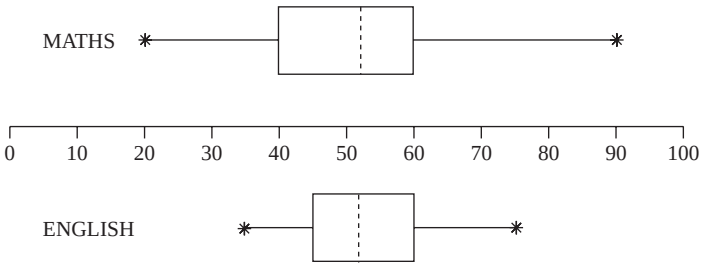
Unit	Notes	Examples
11 ALGEBRAIC MANIPULATION		
11.1 Equation, Formula and Identity	Recap simple equations Understanding the difference between, and using, (a) equations, (b) formulae, (c) identities	Equations: solve for x: (i) $x+6=8$ (ii) $3x+2=11$ (iii) $3x+2=4x-7$ Formulae: $C=\frac{5}{9}(°F-32°)$; what is the value of C when F $=68°$? Identity: show that $(x+y)^2 \equiv x^2+2xy+y^2$ for all values of x and y.
11.2 Simplifying Expressions	Collecting like items Multiply bracket by single term Multiply two brackets	Simplify (a) $4x^2+2y^2-x^2-y^2$ (b) $x^3+4x^3-3x^3$ Multiply out (a) $4(x+3)$ (b) $x(3-x)$ (c) $2x(3x-4)$ Multiply out (a) $(x+1)(x+2)$ (b) $(2x-1)(2x+1)$ (c) $(4x+3)(2-3x)$
11.3 Factorising	Single term factorisation Simple quadratic expressions (by inspection)	Factorise (a) $(2x-8)$ (b) (x^2-3x) (c) $(3x^2-6x^3)$ (d) (x^2-3x+2) (e) (x^2+5x+6)
11.4 Using Formulae	Substituting positive and negative numbers into formulae (or expressions) Change of subject of a formula Deriving formula from context	The cost of a removal firm is a fixed charge of £80 and £2 for each km travelled. Write this as a formula. What is the cost of a move of 473 km ?

Unit	Notes	Examples
12 ANGLES, CONSTRUCTIONS and LOCI		
12.1 Constructions	Drawing lines and angles accurately	Draw accurately line AB of length 8.2 cm and angle CAB = 37 ° with CA = 4.7 cm, using ruler and protractor.
	Constructing triangles given SSS, SAS, ASA and RHS (noting that SSA is not unique)	Construct triangle with sides of lengths 8 cm, 7.3 cm, 6.7 cm.
	Midpoint and perpendicular bisector of a line segment	Construct the midpoint and perpendicular bisector of the line AB, shown below:
	Perpendicular from a point to a line	
	Perpendicular from a point on a line	Also construct the perpendicular from the point C to the line AB. 
	Constructing 90 °, 60 ° and 120 ° angles	
	Bisecting an angle, to get for example, 45 ° and 30 ° angles,	
12.2 Loci	Determine locus of a point moving according to a given rule	Construct the locus of points equidistant from both lines: 
		On a scale drawing, 1 cm = 1 m, draw the locus of points 1 m from the line on the scale drawing below. 

Unit	Notes	Examples
13 GRAPHS, EQUATIONS and INEQUALITIES		
13.1 Linear Inequalities	Using number lines to find and illustrate solutions Solving linear inequalities of the form $ax + b < c$	Illustrate $-1 < x \leq 2$ on a number line. Solve for x: (a) $2x > 8$ (b) $2x + 6 \geq 3$ (c) $1 + 4x \leq 13$ (d) $1 \leq 2x - 3 \leq 7$
13.2 Graphs of Quadratic Functions	Plot graphs of quadratic functions, given formulae Appreciate their characteristics Drawing graphs of straight lines General equation, $y = mx + c$; interpretation of m and c	Draw graphs of: (a) $y = x^2$ (b) $y = x^2 + 2$ (c) $y = x^2 - 1$ Describe and illustrate the set of graphs, $y = 2x^2 + c$. Draw the graph of $y = 2x + 1$. What is the equation of the line of gradient 2 and intercept with the y-axis – 1 ?
13.3 Graphs of Cubic and Reciprocal Functions	Plot graphs of cubic functions, given formulae, and appreciate their general shape and characteristics Plot graphs of reciprocal functions, given formulae	Sketch graphs of: (a) $y = x^3$ (b) $y = x^3 - 1$ (c) $y = x^3 + 1$ Draw graph of $y = x^3 - x$ for $-5 \leq x \leq 5$. Draw the graph of $y = \frac{2}{x}$. Where does it intersect the straight line $y = 2x$?
13.4 Solving Non-Linear Equations	Trial and improvement (recap)	Find approximate solutions of the equation $x^3 + x = 100$ using (a) graphical method, (b) trial and improvement.
13.5 Quadratic Inequalities	Finding solutions to quadratic inequalities, when expression factorises Appreciate that $y = -\frac{1}{m}x$ is perpendicular to $y = mx + c$	Solve for x: (a) $x^2 - 25 \geq 0$ (b) $x^2 - 2 - 20 \leq 0$ Give three lines which are parallel to $y = 4 - 2x$ and one line that is perpendicular. Draw graphs of the lines.

Unit	Notes	Examples
14 ESTIMATION and APPROXIMATION		
14.1 Rounding	Rounding whole numbers and decimals to given number of	
	(a) nearest 10, 100, etc.	Round 27651 to the nearest (a) 100 (b) 1000
	(b) significant figures	Write 4749 to (a) 3 significant figures, (b) 2 significant figures.
	(c) decimal places	Write 27.493 to (a) 2 d.p. (b) 1 d.p. (c) 3 significant figures
14.2 Estimation	Estimating the values of complex calculations	Estimate the value of $\sqrt{\frac{27.2 \times 33.2}{50.21}}$.
	Appreciating the order of magnitude of expressions	Which of the following answers is the correct value of $\frac{\left(2.78^{2}+5.1\right)}{0.87}$? (a) (b) (c) (d)
14.3 Calculator Use	Efficient use of calculators; memory and brackets	Calculate (a) $\left(2.5^{2}+4.3^{3}\right)^{4}$ (b) $(2.51+4.34)(3.62-1.59)$
14.4 Error Propagation	Illustrating error propagation in simple expressions, e.g. quadratic terms; upper and lower bounds	The radius of a ball is estimated as 5 cm to the nearest cm. What are the possible errors in its surface area and volume using 5 cm as its radius in the calculations?

Unit	Notes	Examples
15 TRIGONOMETRY		
15.1 Pythagoras' Theorem	Recap; Pythagorean triples	Determine x in: (a)  (b) 
15.2 Trigonometric Functions	Definitions for right-angled triangles; common values e.g. 0 °, 30 °, 45 °, 60 °, 90 °	
15.3 Calculating Sides	For right-angled triangles, with given angle and side Questions in context	Determine x in: (a)  (b)  (c)  (d) 
15.4 Calculating Angles	Right-angled triangles with 2 sides given Questions in context	Determine θ in: (a)  (b)  (c) 

Unit	Notes	Examples
16 CUMULATIVE FREQUENCY		
16.1 Averages	Recap: data collection and measures of central tendency (mean, median and mode); range	Measure (a) heights, (b) weights, of all memebers of class. Choose appropriate class intervals to summarise data.
16.2 Grouped Data	Representation by bar charts with equal class intervals Frequency polygons Estimating mean and modal class	Use (a) bar chart, (b) frequency polygon, to summarise data above.
16.3 Cumulative Frequency	Cumulative frequency graphs (polygons)	Find the shoe size of all Y9 pupils in your school. Illustrate this with a cumulative frequency graph.
	Estiamting median, upper and lower quartiles	Estimate (a) median, (b) upper quartile, (c) lower quartile, and find the semi-interquartile range.
	Measures of dispersion: interquartile and semi-interquartile range	
16.4 Box and Whisker Plots	Advantages of this method of summarising data	Illustrate the data above with a box and whisker plot. The scores on MATHS and ENGLISH test papers are illustrated below:  Compare and contrast the data.

Unit	Notes	Examples
17 QUADRATIC FUNCTIONS		
17.1 Quadratic Expressions	Recap concept; quadratic formulae	Sketch the graphs of: (a) x^2 (b) $x^2 + x$ (c) $x^2 + 1$ (d) $x^2 - 1$ (e) $x^2 - 3x + 2$ (f) $x^2 + 4x + 1$
	Change of graph for $y = ax^2 + bx + c$ for varying a, b, c	
17.2 Quadratic Equations: Factorisation	Factorising simple quadratic expression	Factorise (a) $x^2 + x$ (b) $x^2 - 3x + 2$ (c) $x^2 - 4$
	Solving quadratic equations by factorisation	Solve the equations (a) $x^2 = 9$ (b) $x^2 + 3x + 2 = 0$ (c) $x^2 + 2x = 0$
17.3 Quadratic Equations: Completing the Square	Completing the square for quadratic expressions	Write each of these quadratic expressions in the form $(ax + b)^2 + c$. (a) $x^2 + 3x + 2$ (b) $x^2 + 2x$
	Solving quadratic equations by completing the square	
	Deriving formula for solution of quadratics	Hence solve the equations $x^2 + 3x + 2 = 0$ and $x^2 + 2x = 0$

Unit	Notes	Examples
18 SAMPLING		
18.1 Random Samples	Concept of random samples, and why they are needed	Use a table of random numbers to find a sample of size 10 from a population of size 200.
	Differences between samples and census	What are the advantages / disadvantages of a sample rather than a census?
	Advantages and disadvantages	
18.2 Sampling Techniques	Different methods of sampling; e.g. quota sampling, systematic sampling	When is it applicable to use a quota sample? Explain how to find a systematic sample of size 10 from a population of size 200. Is it a random sample? What are its advantages / disadvantages?
18.3 Stratified Samples	Concept of the need for stratified samples	Explain how to find stratified sample of size 30 to represent the views of a school population of pupils, where there are the following number in each year: *Year* | 7 | 8 | 9 | 10 | 11 *No. of Pupils* | 137 | 132 | 95 | 86 | 150 Why is a stratified sample needed?