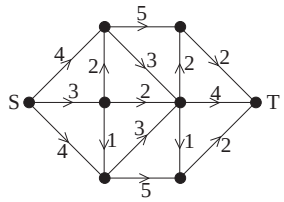
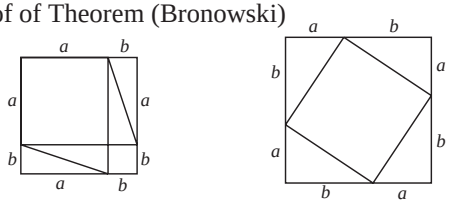
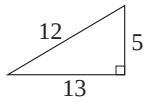
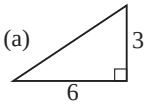
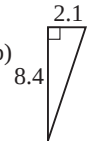
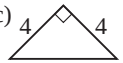
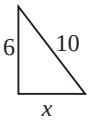
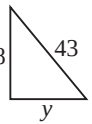
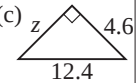
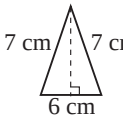
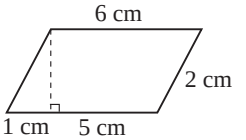
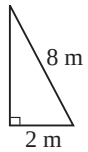
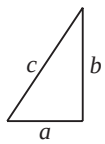
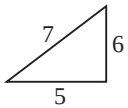
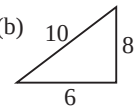
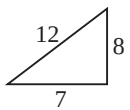
Unit	Notes	Examples
1 MATHEMATICAL DIAGRAMS		
1.1 Mileage Charts	Extracting distances from mileage chart	<table><tr><td></td><td></td><td></td><td>45</td><td>York</td></tr><tr><td>183</td><td>167</td><td>120</td><td>Doncaster</td></tr><tr><td>68</td><td>47</td><td>Peterborough</td><td></td><td></td></tr><tr><td>21</td><td>Stevenage</td><td></td><td></td><td></td></tr><tr><td>London</td><td></td><td></td><td></td><td></td></tr></table> The distances between stations on the GNER railway are shown opposite. (a) Complete the top row. (b) What is the distance between London and York?.
1.2 Using Flow Charts to Plan Practical Tasks	With/without decisions With/without loops Emphasise cross curricula links	Give instructions for shutting down computer. Plan wallpapering a room. Plan class trip to theme park. Plan school disco.
1.3 Using a Flow Chart for Classification	Cross curricula links, e.g. insect identification, plant identification	Design flowchart to classify quadrilaterals. Design flowchart to classify numbers.
1.4 Networks	Constructing and interpreting network diagrams Shortest and quickest routes through a network	Find shortest and longest routes from S to T through this network: 
1.5 Critical Path Analysis	Simple examples; time for critical path, float times Activity networks will normally be given.	Organising school play. Planning trip to London.

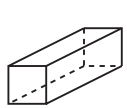
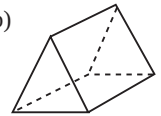
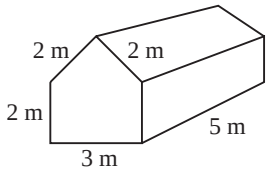
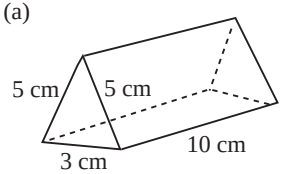
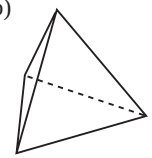
Unit	Notes	Examples
2 FACTORS		
2.1 Factors and Prime Numbers	Multiplication and division facts up to 100	(a) $4 \times 8 = ?$ (b) $24 \div 6 = ?$ (c) $6 \times 7 = ?$
	Recap on factors and multiples	Write down all the factors of: (a) 20 (b) 64
	Simple tests for divisibility, i.e. by 2, 3, 5, 10	
	Definition of prime numbers	Write down all the prime factors of 12.
	Sieve of Eratosthenes	Write down the first 5 prime numbers.
		Find the number of prime numbers in the intervals 0 - 9, 10 - 19, 20 - 29, . . . , 90 - 99
2.2 Prime Factors	Factor trees	What are the prime factors of 12?
	Express any number as a product of its prime factors	Write 100 as the product of prime factors.
2.3 Index Notation	Laws of indices *not* included	Write $2 \times 2 \times 2 \times 2 \times 2$ using index notation.
	Using the x^y key on a calculator	What is the value of $3^4 \times 2^3$?
2.4 Highest Common Factor (HCF) and Lowest Common Multiple (LCM)	Finding HCF and LCM by observation and by listing all prime factors	Find the HCF and LCM of 30 and 36. Express 60 and 105 as the product of prime factors.
	Common multiples of numbers	Hence deduce the HCF and LCM of 60 and 105.
2.5 Squares and Square Roots	Squares of integers from 1 - 20 and corresponding square roots	Using $12^2 = 144$, what is the value of $\sqrt{144}$?
		Use prime factors to find $\sqrt{225}$.
	Square root function on a calculator	
	Relating squares and square roots to areas of squares and lengths of sides of squares	What is the smallest number by which 24 must be multiplied to make it a perfect square?
	Estimating square roots of any positive integer	Show that $7 < \sqrt{53} < 8$.
		The area of a square is 135 cm^2. What is the length of a side?

Unit	Notes	Examples
3 PYTHAGORAS' THEOREM		
3.1 Pythagoras' Theorem	Hypotenuse and right-angled triangles For right-angled triangles, $a^2 + b^2 = c^2$ Developing Pythagoras' Theorem by investigating squares on sides of right-angled triangles Proof of Theorem (Bronowski) 	Verify Pythagoras' Theorem for this triangle: 
3.2 Calculating the Length of the Hypotenuse	Appropriate degree of accuracy (1 d.p. or nearest whole number)	Find the length of hypotenuse for these triangles: (a)  (b)  (c) 
3.3 Calculating the Lengths of Other Sides	Isosceles and equilateral triangles	Find the unknown side in each of these triangles: (a)  (b)  (c)  Find the perpendicular height of this isosceles triangle: 
3.4 Problems in Context	Perimeters of trapezium and parallelogram Use of N, S, E, W in problems	What is the area of this parallelogram:  A ladder of length 8 m is placed against a wall, 2 m from its base. What is the height of the ladder? 
3.5 Constructions and Angles	 $a^2 + b^2 = c^2 \Rightarrow$ right - angled $a^2 + b^2 > c^2 \Rightarrow$ acute - angled $a^2 + b^2 < c^2 \Rightarrow$ obtuse - angled Constructing triangles	Which of these triangles are *right-angled*, *acute* or *obtuse*? (a)  (b)  (c)  Using ruler and pair of compasses, construct a triangle with sides of lengths 9 cm, 12 cm and 15 cm. Is it right-angled?

Unit	Notes	Examples
4 ROUNDING and ESTIMATING		
4.1 Revision of the Four Rules: Whole Numbers	Simple addition, subtraction, multiplication and division in linear form and in vertical form	$3+6$, $23+40$, $18-7$, $45-15$, 4×27, 12×33, $123\div 3$, $900\div 15$ $234 + 126$ $\quad$ $293 - 141$ $\quad$ 37×15 $\quad$ $5\overline{)655}$
4.2 Revision of the Four Rules: Decimals	Addition, subtraction, multiplication and division (with / without calculators)	Work out (without using a calculator): (a) $5.23+8.7$ (b) $28.3-1.07$ (c) 2.8×7 (d) 4.6×2.3 (e) $282.2\div 2$ (f) $21.2\div 4$ (g) $21.4\div 0.4$
4.3 Order of Operations	BODMAS	Calculate: (a) $282+87-13$ (b) $21\times 8\times 3$ (c) $28\times 7\div 2$ (d) $2.8\times 7.1\div 0.02$ (e) $4\times 27-25$
4.4 Problems in Context	Relevant contexts	How many minibuses, each seating 17 pupils, are needed to transport 110 pupils? How much is the cost of 7 calculators at £11.99 each?
4.5 Rounding	Rounding to nearest whole number, 10, 100 and 1000 Decimal places and significant figures	What is: (a) 4.3 (b) 2.07 (c) 9.8 (d) 7.5 to the nearest whole number? Round 564.5 to nearest: (a) whole number (b) 10 (c) 100 (d) 1000. Give: (a) 4.34 (b) 4.07 (c) 2.951 (d) 0.03 to one decimal place. Give: (a) 4837 (b) 99 999 (c) 7.236 to two significant figures.
4.6 Estimating	Emphasise the importance of ESTIMATE, CALCULATE and CHECK Common sense rounding of numbers when estimating Knowing when a calculated answer is incorrect	Estimate the cost of 5 boxes of Christmas cards at £3.99 per box. Is $\frac{2.8\times 1.8}{2.2}$ approximately (a) 3 (b) 30 (c) 300 ?
4.7 Calculator Logic - Bracket and Memory Keys	Note different logic used by different calculators	Calculate (a) $\frac{2.1\times 11.3}{1.5\times 2.07}$ (b) $\frac{4.7\times(5.32+6.49)}{(2.94-1.62)\times 3.5}$ giving answers to (i) 2 significant figures, (ii) 2 decimal places.

Unit	Notes	Examples
5 DATA ANALYSIS		
5.1 Frequency Tables: Discrete Ungrouped Data	Tallying raw data to produce frequency table	(a) The results of a maths test, out of 10, for a class are: 5 7 7 3 6 5 7 9 7 6 3 8 6 7 5 6 9 2 6 7
	Illustrating data from frequency table with line graph or pie chart	Construct a frequency table and illustrate the data in a line graph.
	Interpretation of the illustrations	(b) The NC levels achieved at Key Stage 3 for a class (in maths) were: 6 5 6 4 3 4 4 5 6 4 5 6 5 6 4 4 6 6 5 5 5 6 4 6 Construct a frequency table and illustrate the data with a pie chart.
5.2 Mean, Median, Mode and Range	Note that mean, median, mode are all types of 'average', i.e. measures of central tendency	
	Finding mode and range from frequency table	Find the mode and range for examples (a) and (b) above.
	Finding median from a frequency table when total frequency is: (a) odd, (b) even	Find the median for examples (a) and (b) above. Find the median of the values 6 5 6 4 3 4 4 5 6 4 5 6 3 Find the median of the data in examples (a) and (b).
	Finding mean value from a frequency table	Copy and complete the table below, and find the mean score made by the golfer:
	Use of Σ notation; mean value, $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$ and $n = \Sigma f_i$	
	Deciding which average is most appropriate	

Golf Score	*Frequency*	*Score* × *Frequency*
67	2	$67 \times 2 = 134$
68	3	
69	4	
70	9	
71	3	
72	2	
73	2	

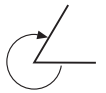
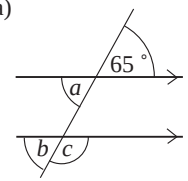
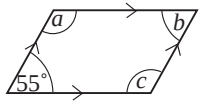
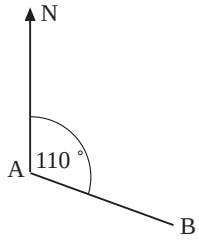
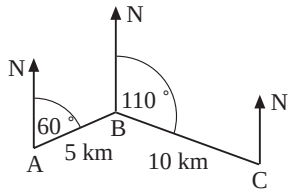
Unit	Notes	Examples
6 NETS and SURFACE AREA		
6.1 Common 2-D and 3-D Shapes	Revision of names, with definitions	What could be the name of the 2-D shape with 4 sides, which has all angles of equal size?
6.2 2-D Representation of 3-D Shapes	Names of 2-D and 3-D shapes. Accurate drawing of rectangles using ruler and protractor Accurate drawing of triangles using ruler and compasses Use of square dotted paper for cubes and cuboids Use of isometric paper	What are the names of these shapes: (a)  (b)  On isometric paper, draw a cuboid of dimensions $2\text{ cm} \times 3\text{ cm} \times 4\text{ cm}$.
6.3 Plans and Elevations	Straightforward examples	Sketch the plan and elevation for this building: 
6.4 Nets and Surface Area of Cubes and Cuboids	Also include other simple shapes Algebraic formulae for surface area of cube and cuboid	Draw an accurate net for: (a) 2 cm cube, (b) $2\text{ cm} \times 3\text{ cm} \times 4\text{ cm}$ cuboid. What are the total surface areas for (a) and (b) above?
6.5 Nets of Prisms and Pyramids	Design suitable container for a gift	Draw an accurate net for each of the following shapes: (a)  (b)  *All lengths are* 4 cm

Unit	Notes	Examples
7 RATIO and PROPORTION		
7.1 Equivalent Ratios	Revise factors and highest common factors	What are the factors of: (a) 6 (b) 12 ? What is the HCF of 6 and 12 ?
	Simplify to $n : m$, where n and m are coprime	Simplify the ratios: (a) 4 : 10 (b) 45 : 75 Write the ratio 2 : 5 in the form 1 : n.
	Use of $1 : n$ and $n : 1$	On a map, scale 1 : 50 000, what is the actual length represented by a 5 cm length?
	Note that $A : B \neq B : A$ $(A \neq B)$	
7.2 Direct Proportion	Numerical examples Unitary method	6 copies of a book cost £12. How much do 7 copies cost?
7.3 Proportional Division	By unit share	Divide £20 in the ration 2 : 3 : 5.
7.4 Linear Conversion	Recap concepts Currency conversion – investigate changing £s to Euros directly compared with £ to $ and then $ to Euros	If £1 is worth $1.63, how much is (a) £7.50 in dollars, (b) $15.25 in £s ?
7.5 Inverse Proportion	Numerical examples	How much time is saved on a 100 mile journey by driving at 80 mph rather than at 60 mph ?

Unit	Notes	Examples
8 ALGEBRA: BRACKETS		
8.1 Expansion of Single Brackets	Revise directed numbers and BODMAS Tabular method, e.g. $5(x+2)$ represented by: x | x | 2 5 | $5x$ | 10	Expand: (a) $5(x+2)$ (b) $-7(x-3)$ (c) $x(3+2x)$ (d) $x^2(x-y)$ (e) $2x(x-4)$ (f) $-3x(x-2)$
8.2 Linear Equations	Solving equations by expansion	Solve for x: (a) $5(x+2)=15$ (b) $2(x-1)=4$
8.3 Common Factors	Simple examples	Factorise: (a) $2x+4$ (b) $4x+3x^2$ (c) $5x^2+10x$ (d) $xy+xz$ (e) $3xy+12xyz$
8.4 Expansion of Two Brackets	Straightforward examples Tabular method, e.g. $(x-1)(x-2)$ represented by: x | x | -2 x | x^2 | $-2x$ -1 | $-x$ | $+2$ (Extension – Pascal's triangle)	Expand: (a) $(x+3)(x+4)$ (b) $(x+2)(x-1)$ (c) $(x+5)(x-5)$ (d) $(x-2)^2$ (e) $(2x+1)(x+2)$

Unit	Notes	Examples
9 ARITHMETIC: FRACTIONS and PERCENTAGES		
9.1 Revision of Operations with Fractions	Use of simple fractions	What is $\frac{1}{4}$ of £20 ?
	Addition, subtraction, multiplication and division	Calculate: (a) $\frac{1}{2}+\frac{1}{3}$ (b) $\frac{1}{2}-\frac{1}{6}$ (c) $2\frac{1}{3}-1\frac{1}{4}$ (d) $\frac{1}{8}\times 24$ (e) $4\times\frac{1}{2}$ (f) $\frac{1}{2}\times\frac{2}{5}$ (g) $\frac{1}{4}\div 2$ (h) $2\div\frac{1}{4}$ (i) $\frac{5}{2}\div\frac{1}{4}$
9.2 Fractions in Context	Including use of fractions button on calculator	Calculate the area of a rectangle which measures $4\frac{1}{3}$ m by $5\frac{2}{3}$ m.
9.3 Conversion of Fractions and Percentages	Also decimals, where helpful	Write: (a) 10% (b) 25% (c) $66\frac{2}{3}\%$ as fractions.
		Write: (a) $\frac{1}{5}$ (b) $\frac{3}{10}$ (c) $\frac{1}{3}$ as percentages.
9.4 Finding Percentages	Changing ratios to percentages	Calculate: (a) 10% (b) 40% of £25.
	Finding 10%, 25%, 50%, 75% of a quantity	What is 36 out of 80 as a percentage?
	VAT at $17\frac{1}{2}\%$ using $\left(10+5+2\frac{1}{2}\right)\%$	What is VAT on a bill of £250 ?
9.5 Increasing and Decreasing Quantities by a Percentage	Applications including: simple interest, population growth, inflation	Increase £250 by: (a) 10% (b) 5%.
		The population of a town is 120 000. What is the total population after a 5% increase?
	(Extension: compound interest) Equivalent multiplication, e.g. 20% increase $\Rightarrow$ multiply by 1.2	What is the multiplier for a 20% reduction?
9.6 Finding the Percentage Increase and Decrease	Including percentage profit/loss	The number of lions in India has reduced in the last 10 years from 6200 to 4000. What is the % reduction?
		A television priced at £500 is reduced in the sale to £400. What is the % reduction?
9.7 Reverse Percentage Calculations	Simple examples	A video recorder is sold for £320 after a reduction of 20%. How much was the original price?
		A bill which includes VAT is £129.25. What is the bill *without* VAT?

Unit	Notes	Examples
10 PROBABILITY - TWO EVENTS		
10.1 Recap: Basic Probability for One Event	Applications with coins, dice, cards	What is probability of throwing a fair dice and obtaining: (a) 5 (b) number greater than 4, (c) an even number?
10.2 Outcomes with Two Events	Systematic listing Two way tables Tree diagrams	List all the outcomes when throwing two fair dice. Use a tree diagram to find all the outcomes when two balls are drawn from a bag containing *red, white* and *blue* balls.
10.3 Probability Using Listings	Simple examples with dice and coins	When you toss an unbiased coin and throw a fair dice, what is the probability of obtaining 'Head' and '6' ?
10.4 Multiplication Law for Independent Events	Independent events Sampling with replacement Use of tree diagrams or 2 way tables	What is the probability of obtaining two '6s' when throwing a fair dice twice? A bag contains 2 *red*, 3 *white* and 5 *blue* balls. Two balls are chosen, one at a time, *with* replacement. What is the probability of obtaining: (a) two red balls, (b) two balls of the *same* colour ?
10.5 Conditional Probability	Sampling without replacement Use of tree diagrams	A bag contains 2 *red*, 3 *white* and 5 *blue* balls. Two balls are chosen, one at a time, *without* replacement. What is the probability of obtaining: (a) two red balls, (b) two balls of the *same* colour ?

Unit	Notes	Examples
11 ANGLES, BEARINGS and MAPS		
11.1 Angle Measures	Types of angles	Measure the angles marked: (a)  (b)  (c) 
11.2 Parallel and Intersecting Lines	Corresponding, alternate, supplementary angles Vertical opposite angles	Determine the sizes of the angles marked: (a)  (b) 
11.3 Bearings	Eight points of the compass Three figure bearings	What angle have you turned through from N to SW? Find the bearing of: (a) B from A, (b) A from B. 
11.4 Scale Drawings	Journeys including bearings Two stage journeys	The journey from A to B to C is shown below:  Measure the bearing of C from A.