

## YEAR 8: AUTUMN TERM

### Teaching objectives for the oral and mental activities

<ul style="list-style-type: none"> <li>• Order, add, subtract, multiply and divide integers.</li> <li>• Multiply and divide decimals by 10, 100, 1000, 0.1 and 0.01.</li> <li>• Count on and back in steps of 0.4, 0.75, <math>\frac{3}{4}</math>...</li> <li>• Round numbers, including to one or two decimal places.</li> <li>• Know and use squares, cubes, roots and index notation.</li> <li>• Know or derive quickly prime numbers less than 30 and factor pairs for a given number.</li> <li>• Convert between fractions, decimals and percentages. Know that 0.005 is half of one per cent.</li> <li>• Find fractions and percentages of quantities.</li> </ul> <ul style="list-style-type: none"> <li>• Know or derive complements of 0.1, 1, 10, 50, 100, 1000.</li> <li>• Add and subtract several small numbers or several multiples of 10, e.g. <math>250 + 120 - 190</math>.</li> <li>• Use jottings to support addition and subtraction of whole numbers and decimals.</li> <li>• Use knowledge of place value to multiply and divide, e.g. <math>432 \times 0.01</math>, <math>37 \div 0.01</math>, <math>0.04 \times 8</math>, <math>0.03 \div 5</math>, <math>13 \times 1.4</math>.</li> <li>• Recall multiplication and division facts to <math>10 \times 10</math>. Derive products and quotients of multiples of 10, 100, 1000.</li> <li>• Use factors to multiply and divide mentally, e.g. <math>22 \times 0.02</math>, <math>420 \div 15</math>.</li> </ul>	<ul style="list-style-type: none"> <li>• Multiply and divide a two-digit number by a one-digit number.</li> <li>• Use approximations to estimate the answers to calculations, e.g. <math>39 \times 2.8</math>.</li> </ul> <ul style="list-style-type: none"> <li>• Solve equations, e.g. <math>n(n - 1) = 56</math>, <math>\square + \square = 746</math>.</li> </ul> <ul style="list-style-type: none"> <li>• Visualise, describe and sketch 2-D shapes.</li> <li>• Recall and use formulae for the perimeter of a rectangle, and areas of rectangles and triangles.</li> <li>• Calculate volumes of cuboids.</li> <li>• Estimate and order acute, obtuse and reflex angles.</li> </ul> <ul style="list-style-type: none"> <li>• Use metric units (length, mass, capacity) and units of time for calculations.</li> <li>• Use metric units for estimation (length, mass, capacity).</li> <li>• Convert between metric units, including area, volume and capacity measures.</li> </ul> <ul style="list-style-type: none"> <li>• Discuss and interpret graphs.</li> <li>• Calculate a mean using an assumed mean.</li> </ul> <ul style="list-style-type: none"> <li>• Apply mental skills to solve simple problems.</li> </ul>
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	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Number 1</b> (6 hours) Approximation &amp; Estimation. NNS Y789 examples p42-47.</p> <p>Calculation. NNS Y789 examples p82-83.</p>	<ul style="list-style-type: none"> <li>• Round numbers, including to a given number of decimal places. <b>Investigation 2:2 p34.</b></li> <li>• Multiply and divide numbers by 0.1 and 0.01.</li> </ul>	<ul style="list-style-type: none"> <li>• Round numbers to a given number of significant figures. <b>Ex 2:3 p36/37. Ex 2:4 p39/40. Review p40. Investigation 2:5 p41. Exam Questions p41/2.</b></li> <li>• Use rounding to make estimates. <b>Ex 2:4 p39/40.</b></li> <li>• Understand the effects of multiplying and dividing numbers between 0 and 1. <b>Discussion Ex 3:1 p44. Ex 3:2 p45. Review p45. Discussion Ex 3:3 p46/7. Ex 3:4 p47/8. Review p48.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Write numbers in standard form.</li> <li>• Understand upper and lower bounds.</li> <li>• Round numbers to three decimal places.</li> <li>• Recognise and use reciprocals.</li> </ul>

	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Algebra 1</b> (6 hours) Inequalities. NNS Y789 examples p130-131.</p>		<ul style="list-style-type: none"> <li>Understand and use notation for inequalities. <b>Discussion Ex 6:1 p107/8.</b></li> <li>Display inequalities on a number line. <b>Discussion Ex 6:2 p108/9. Ex 6:3 p109/110. Review p110.</b></li> <li>Solve linear inequalities in one variable. <b>Discussion Ex 6:4 p110. Discussion Ex 6:5 p113. Ex 6:7 p115/16. Review p116. Investigation 6:8 p116. Exam Questions p17.</b></li> </ul>	<ul style="list-style-type: none"> <li>Begin to solve linear inequalities in two variables.</li> </ul>
<p><b>Shape, space and measures 1</b> (6 hours). Constructions. NNS Y789 examples p220-223.</p> <p>Locus NNS Y789 examples p224-227.</p>	<ul style="list-style-type: none"> <li>Construct triangles with ruler, protractor &amp; compasses (SAS, ASA or SSS).</li> <li>Construct nets of solids.</li> <li>Find simple loci both by reasoning [and by using ICT] to produce shapes and graphs.</li> <li>Use straight edge and compasses to construct:                             <ul style="list-style-type: none"> <li>the mid-point and perpendicular bisector of a line segment;</li> <li>the bisector of an angle;</li> <li>the perpendicular from a point to a line;</li> <li>the perpendicular from a point on a line;</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Use straight edge and compasses for constructions. <b>Discussion &amp; Practical Ex 11:1 p201/2. Discussion Ex 11:2 p205. Ex 11:3 p206/7. Review p208. Puzzle 11:4 p209.</b></li> <li>Construct triangles. <b>Discussion Ex 11:5 p210. Ex 11:6 p210. Review p211. Investigation 11:7 p211.</b></li> <li>Find loci both by reasoning [and by using ICT] to produce shapes and graphs. <b>Discussion &amp; Practical Ex 12:1 p213. Investigation 12:2 p24. Discussion Ex 12:3 p215/16. Ex 12:4 p217/18. Review p218. Investigation 12:5 p219. Investigation 12:6 p220/221.</b></li> <li>Investigate problems using loci and simple constructions. <b>Ex 12:7 p223/224. Review p224. Investigation 12:8 p225. Game &amp; Puzzle 12:10 p226/227. Exam Questions p227-232.</b></li> </ul>	<ul style="list-style-type: none"> <li>Know from experience of constructing them that triangles given SSS, SAS, ASA &amp; RHS are unique but SSA &amp; AAA aren't.</li> <li>Find the locus of a point that moves according to a more complex rule involving loci and simple constructions both by reasoning [and using ICT].</li> </ul>

	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Handling data 1</b> (6 hours) Surveys. Questionnaires. Testing Hypotheses. NNS Y789 examples 248-255.</p>	<ul style="list-style-type: none"> <li>Discuss a problem that can be solved by statistical methods. Identify related questions to explore.</li> <li>Collect data using a suitable method, such as observation, controlled experiment, including data logging using ICT, or questionnaire.</li> <li>Interpret tables, graphs and diagrams for discrete data and draw inferences that relate to the problem being discussed; relate summarised data to the questions being explored.</li> <li>Construct, on paper and using ICT: <ul style="list-style-type: none"> <li>pie charts for categorical data;</li> <li>bar charts and frequency diagrams for discrete data;</li> </ul> identify which are most useful in the context of the problem.</li> <li>Design and use simple two way tables.</li> </ul>	<ul style="list-style-type: none"> <li>Suggest a problem to explore using statistical methods, frame questions and raise conjectures. <b>Discussion Ex 19:1 p386/7.</b></li> <li>Design a survey or experiment to capture the necessary data from one or more sources; determine the sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets. <b>Discussion Ex 19:2 p389. Practical Ex 19:3 p389. Discussion Ex 19:4 p390. Discussion Ex 19:5 p390/391. Discussion Ex 19:7 p396/7.</b></li> <li>Identify possible sources of bias and plan how to minimise it. <b>Discussion Ex 19:8 p397. Discussion Ex 19:9 p398. Discussion &amp; Practical Ex 19:10 p398/9.</b></li> <li>Design and test hypotheses. Construct tables, including two way tables, for large discrete sets of raw data. <b>Discussion Ex 19:11 p400. Practical Ex 19:12 p401. Practical Ex 19:13 p402. Discussion Ex 19:14 p402. Discussion Ex 19:15 p406. Practical Ex 19:16 p407.</b></li> <li>Communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams in support, using ICT as appropriate. <b>Exam Questions p408-413.</b></li> </ul>	<ul style="list-style-type: none"> <li>Identify what extra information may be required to pursue a further line of enquiry.</li> <li>Examine critically the results of a statistical enquiry, and justify choice of statistical representation in written presentations, recognising the limitations of any assumptions and their effect on conclusions drawn.</li> <li>Analyse data to find patterns and exceptions, look for cause and effect and try to explain anomalies.</li> </ul>
<p><b>Shape, space and measures 2</b> (6 hours) Perimeter. Area. Volume. NNS Y789 examples p234-241.</p>	<ul style="list-style-type: none"> <li>Use formulae for the area of a triangle, parallelogram and trapezium.</li> <li>Calculate areas of compound shapes made from rectangles and triangles.</li> <li>Know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons).</li> <li>Know and use the formula for the volume of a cuboid; calculate volumes and surface areas of cuboids and shapes made from cuboids.</li> </ul>	<ul style="list-style-type: none"> <li>Know and use the formulae for the circumference and area of a circle. Calculate perimeter and area of compound shapes made from circles, part circles, triangles and various quadrilaterals. <b>Investigation 15:1 p272. Ex 15:2 p274-278. Review p279. Investigation 15:3 p280. Puzzles 15:4 p281. Practical Ex 15:5 p282. Investigation 15:6 p282.</b></li> <li>Use units of measurement to calculate, estimate, measure and solve problems in a variety of contexts; convert between area measures (<math>\text{mm}^2</math> to <math>\text{cm}^2</math>, <math>\text{cm}^2</math> to <math>\text{m}^2</math>, and vice versa) and between volume measures (<math>\text{mm}^3</math> to <math>\text{cm}^3</math>, <math>\text{cm}^3</math> to <math>\text{m}^3</math>, and vice versa). <b>Ex 15:7 p284/5. Review p285. Discussion &amp; Practical Ex 15:9 p285/6. Investigations 15:10 p286.</b></li> <li>Calculate the volume of a prism and a cylinder. <b>Discussion Ex 15:11 p287/88. Ex 15:12 p290-292. Review p292. Discussion Ex 15:13 p292-293. Investigation 15:14 p293. Exam Questions p294-298.</b></li> </ul>	<ul style="list-style-type: none"> <li>Know and use the formulae for length of arcs and area of sectors of circles.</li> <li>Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction.</li> <li>Calculate lengths, areas and volumes in right prisms, including cylinders.</li> </ul>

	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Algebra 2</b> (6 hours) Simultaneous Equations. NNS Y789 examples p126-129.</p> <p>Shape, space and measures 3 (6 hours) Transformations NNS Y789 examples p202-217</p>	<ul style="list-style-type: none"> <li>Recognise that equations of the form <math>y = mx + c</math> correspond to straight-line graphs.</li> <li>Understand and use the language and notation associated with enlargement. Enlarge 2D shapes given a centre of enlargement and a positive whole number scale factor. Explore enlargement using ICT.</li> <li>Transform 2D shapes by rotation or reflection on paper and using ICT.</li> <li>Identify all the symmetries of 2-D shapes.</li> </ul>	<ul style="list-style-type: none"> <li>Solve a pair of simultaneous equations by eliminating one variable through adding or subtracting the equations. <b>Discussion Ex 7:1 p119. Investigation &amp; Discussion Ex 7:2 p120. Ex 7:3 p121. Review p122. Discussion Ex 7:4 p122. Ex 7:5 p123/4. Review p124.</b></li> <li>Solve a pair of simultaneous equations by eliminating one variable through substitution. <b>Investigation &amp; Discussion Ex 7:6 p124. Ex 7:7 p126. Review p126.</b></li> <li>Use a graphical method to solve simultaneous equations and check algebraically. <b>Discussion Ex 7:8 p127. Ex 7:9 p28-130. Review p131.</b></li> <li>Form and solve linear simultaneous equations to solve problems. <b>Ex 7:11 p132-135. Review p135-136. Exam Questions p137-139.</b></li> <li>Understand and use the language and notation associated with enlargement. Enlarge 2D shapes given a centre of enlargement and fractional scale factors. Understand and apply calculations involving fractional scale factors. <b>Discussion Ex 17:1 p326. Ex 17:2 p328/9. Review p329-330. Investigations 17:3 p330. Ex 17:4 p331-332. Review p332.</b></li> <li>Translate 2D shapes on paper. Understand and apply vector notation to translate shapes in 2D. <b>Ex 17:5 p334/5. Review p335. Game 17:6 p336.</b></li> <li>Transform 2-D shapes by combinations of translations, rotations and reflections, on paper [and using ICT]. <b>Ex 17:7 p337-340. Review p340. Discussion &amp; Practical Ex 17:8 p341. Game 17:9 p342. Practical Ex 17:10 p342. Exam Questions p343.</b></li> </ul>	<ul style="list-style-type: none"> <li>Solve a pair of simultaneous equations by eliminating one variable.</li> <li>Link a graphical representation of equation or pair of equations to the algebraic solution.</li> <li>Consider simultaneous equations with no solutions or an infinite number of solutions.</li> <li>Solve linear simultaneous equations with more than two variables.</li> <li>Enlarge 2-D shapes, given a fractional scale factor; recognise the similarity of the resulting shapes; understand the implications of enlargement for area and volume.</li> <li>Know that translations, rotations and reflections preserve length and angle and map objects on to congruent images.</li> <li>Identify reflection symmetry in 3D shapes.</li> <li>Use and interpret maps and scale drawings.</li> </ul>

## YEAR 8: SPRING TERM

### Teaching objectives for the oral and mental activities

<ul style="list-style-type: none"> <li>Order, add, subtract, multiply and divide integers.</li> <li>Find products of small integer powers.</li> <li>Know and use squares, cubes, roots and index notation.</li> <li>Know or derive quickly the prime factorisation of numbers to 30 and factor pairs for a given number.</li> <li>Find highest common factors (HCF) and lowest common multiples (LCM), e.g. the HCF of 36 and 48.</li> <li>Convert between improper fractions and mixed numbers. Simplify fractions by cancelling.</li> <li>Find the outcome of a given percentage increase or decrease.</li> <li>Know or derive complements of 0.1, 1, 10, 50, 100, 1000.</li> <li>Use jottings to support addition, subtraction, multiplication and division.</li> <li>Recall multiplication and division facts to <math>10 \times 10</math>. Derive products and quotients of multiples of 10, 100, 1000.</li> <li>Use known facts to derive unknown facts, e.g. derive <math>36 \times 24</math> from <math>36 \times 25</math>.</li> </ul>	<ul style="list-style-type: none"> <li>Use knowledge of place value to multiply and divide decimals by multiples of 0.1 and 0.01, e.g. <math>0.24 \times 0.4</math>, <math>720 \div 0.03</math>.</li> <li>Use approximations to estimate the answers to calculations, e.g. <math>39 \times 2.8</math>.</li> <li>Solve equations, e.g. <math>n(n-1) = 56</math>, <math>\square + \square = 46</math>, <math>(3+x)^2 = 25</math>.</li> <li>Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci.</li> <li>Estimate bearings.</li> <li>Use metric units (length, area and volume) and units of time for calculations.</li> <li>Use metric units for estimation (length, area and volume).</li> <li>Convert between metric units, including area, volume and capacity measures.</li> <li>Recall and use formulae for areas of rectangle, triangle, parallelogram, trapezium and circle.</li> <li>Calculate volumes of cuboids and prisms.</li> <li>Discuss and interpret graphs.</li> <li>Solve simple problems involving probabilities.</li> <li>Apply mental skills to solve simple problems.</li> </ul>
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	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Number 2</b> (6 hours) Calculation. NNS Y789 examples p108-109.</p> <p>NNS Y789 examples p122-123.</p> <p>NNS Y789 examples p52-55.</p>	<ul style="list-style-type: none"> <li>Read and write positive integer powers of 10; multiply and divide integers and decimals by 0.1, 0.01.</li> <li>Consolidate standard column procedures for addition and subtraction of integers and decimals with up to two places.</li> <li>Use standard column procedures for multiplication and division of integers and decimals, including by decimals such as 0.6 or 0.06; understand where to position the decimal point by considering equivalent calculations</li> </ul>	<ul style="list-style-type: none"> <li>Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation; use the constant, <math>\pi</math> and sign change keys, function keys for powers, roots and fractions, brackets and the memory. <b>Ex 3:5 p49. Review p50. Investigation 3:6 p50. Puzzle 3:7 p51. Investigation 3:8 p51. Investigation 3:9 p53. Ex 3:10 p53/4. Review p55. Puzzle 3:11 p55.</b></li> <li>Enter directed numbers and perform calculations using the four operations. <b>Ex 3:13 p56. Ex 3:14 p57/8. Review p58. Ex 3:15 p59-60. Review p60. Investigation 3:16 p61.</b></li> <li>Solve linear equations with negative solutions. <b>Ex 3:17 p62. Puzzles 3:18 p63.</b></li> <li>Find HCF and LCM by rewriting numbers as products of prime numbers. <b>Discussion Ex 3:19 p63/4. Ex 3:20 p64/5. Review p65. Exam Questions p65-67.</b></li> </ul>	<ul style="list-style-type: none"> <li>Use a calculator efficiently and appropriately, including using the reciprocal key and entering and interpreting numbers in standard form.</li> <li>Use algebraic methods to convert a recurring decimal to a fraction in simple cases.</li> </ul>

	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<b>Handling data 2</b> (6 hours) Estimating Probability. NNS Y789 examples p282-285.	<ul style="list-style-type: none"> <li>Use the vocabulary of probability in interpreting results involving uncertainty and prediction.</li> <li>Know that if the probability of an event occurring is <math>p</math>, then the probability of it not occurring is <math>1 - p</math>.</li> </ul>	<ul style="list-style-type: none"> <li>Estimate probabilities based on experimental data and use relative frequency as an estimate of probability. <b>Game 22:1 p450. Ex 22:2 p452/3. Review p453. Game &amp; Investigation 22:3 p453. Discussion &amp; Practical Ex 22:4 p454. Investigation 22:5 p455. Discussion &amp; Practical Ex 22:6 p456/7. Investigation 22:7 p457. Game 22:8 p458. Practical Ex p458.</b> <b>Exam Questions p459-461.</b></li> </ul>	<ul style="list-style-type: none"> <li>Understand that increasing the number of times an experiment is repeated generally leads to better estimates of probability.</li> <li>Understand relative frequency as an estimate of probability and use this to compare outcomes of experiments.</li> </ul>
<b>Shape, space and measures 4</b> (9 hours) Bearings. NNS Y789 examples p232-233.  Pythagoras Theorem. NNS Y789 examples p186-189.	<ul style="list-style-type: none"> <li>Use angle measure.</li> <li>Know and use side, angle and symmetry properties of equilateral, isosceles and right-angled triangles.</li> </ul>	<ul style="list-style-type: none"> <li>Use bearings to specify direction, fix position and solve problems, including making simple scale drawings. <b>Discussion Ex 13:1 p234. Ex 13:2 p236-238. Review p239. Ex 13:4 p242. Review p242. Ex 13:7 p246/7. Review p247. Exam Questions p249-253.</b></li> <li>Understand, recall and use Pythagoras' Theorem and it's converse. <b>Investigation 14:1 p255. Investigation 14:2 p255/6. Ex 14:3 p256. Review p256. Ex 14:4 p258/9. Review p260. Investigation 14:5 p260. Ex 14:6 p261. Review p261. Investigation 14:7 p262. Investigation 14:8 p262. Ex 14:9 p263-265. Review p265/6. Ex 14:10 p266. Discussion Ex 14:11 p267. Investigation 14:12 p267. Exam Questions p268-270.</b></li> </ul>	<ul style="list-style-type: none"> <li>Understand and apply Pythagoras' Theorem.</li> </ul>
<b>Algebra 3</b> (6 hours) Sequences NNS Y789 examples p146-163.	<ul style="list-style-type: none"> <li>Generate terms of a linear sequence using term to term and position to term definitions of the sequence</li> <li>Generate sequences from practical contexts.</li> <li>Generate terms of a sequence given a rule for finding each term from the previous term.</li> </ul>	<ul style="list-style-type: none"> <li>Begin to use linear expressions to describe the <math>n</math>th term of an arithmetic sequence, justifying its form by referring to the activity or practical context from which it was generated. <b>Investigation 8:1 p41. Investigation 8:2 p142. Ex 8:3 p143/4. Review p144/5. Ex 8:4 p145/6. Review p146. Puzzles 8:5 p146. Ex 8:6 p147-149. Review p150. Investigation 8:7 p151.</b></li> <li>Find the next term and the <math>n</math>th term of quadratic sequences and explore their properties. <b>Discussion Ex &amp; Investigation p151/2. Ex 8:9 p153. Review p154. Investigation 8:10 p154.</b></li> <li>Generate rules for sequences other than linear and quadratic. <b>Discussion Ex 8:11 p154. Investigation 8:12 p155. Exam Questions p155-158.</b></li> </ul>	<ul style="list-style-type: none"> <li>Represent problems and synthesise information in algebraic, geometric or graphical form; move from one form to another to gain a different perspective on the problem.</li> <li>Deduce properties of the sequences of triangular and square numbers from spatial patterns.</li> </ul>
<b>Shape, space and measures 5</b> (3 hours) Error in measurement. NNS Y789 examples p230-231. NNS Y789 examples p46-47.	<ul style="list-style-type: none"> <li>Suggest and justify an appropriate degree of accuracy for a measurement.</li> </ul>	<ul style="list-style-type: none"> <li>Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction. <b>Discussion Ex 10:1 p193. Ex 10:2 p194/5. Review p195.</b></li> <li>Begin to recognize and understand upper and lower bounds. <b>Discussion Ex 10:3 p195/6. Ex 10:4 p197. Review p197/8. Practical Ex 10:5 p198. Exam Questions p198-199.</b></li> </ul>	<ul style="list-style-type: none"> <li>Identify upper and lower bounds of compound measures such as speed.</li> </ul>

<p><b>Handling Data 3</b> (3 hours).                  Scatter Diagrams                  NNS Y789 examples p266-267.</p>	<p><b>STARTER ACTIVITY OBJECTIVES</b>                  From previous teaching programmes.</p> <ul style="list-style-type: none"> <li>Construct on paper [and using ICT] simple scatter graphs.</li> <li>Identify and interpret correlations.</li> </ul>	<p><b>CORE</b>                  From the Level 7 teaching programme</p> <ul style="list-style-type: none"> <li>Draw a line of best fit and understand that a prediction based on a line of best fit is an estimate.</li> </ul> <p><b>Discussion Ex 20:1 p415. Discussion Ex 20:2 p415.</b></p> <ul style="list-style-type: none"> <li>Interpret graphs and diagrams and draw inferences to support or cast doubt on initial conjectures; have a basic understanding of correlation.</li> </ul> <p><b>Discussion Ex 20:3 p417-418. Ex 20:4 p418/19. Review p420. Practical Ex 20:5 p420. Exam Questions p421-426.</b></p>	<p><b>EXTENSION</b>                  From future teaching programmes.</p> <ul style="list-style-type: none"> <li>Select, construct and modify, on paper and using ICT, suitable graphical representation to progress an enquiry.</li> </ul>
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## YEAR 8: SUMMER TERM

### Teaching objectives for the oral and mental activities

<ul style="list-style-type: none"> <li>Order, add, subtract, multiply and divide integers.</li> <li>Round integers and decimals.</li> <li>Know and use squares, cubes, roots and index notation.</li> <li>Find highest common factors (HCF) and lowest common multiples (LCM).</li> <li>Convert between fractions, decimals and percentages, and between improper fractions and mixed numbers.</li> <li>Find fractions and percentages of quantities and the outcome of a given percentage increase or decrease.</li> <li>Know or derive complements of 0.1, 1, 10, 50, 100, 1000.</li> <li>Use jottings to support addition, subtraction, multiplication and division.</li> <li>Recall multiplication and division facts to <math>10 \times 10</math>. Derive products and quotients of multiples of 10, 100, 1000.</li> <li>Use knowledge of place value to multiply and divide decimals by 0.1 and 0.01, e.g. <math>0.24 \times 0.4</math>, <math>720 \div 0.03</math>.</li> <li>Use approximations to estimate the answers to calculations, e.g. <math>0.39 \times 2.8</math>.</li> </ul>	<ul style="list-style-type: none"> <li>Solve equations, e.g. <math>n(n-1) = 56</math>, <math>\square + \square = 46</math>, <math>(3+x)^2 = 25</math>, <math>(12-x)^2 = 49</math>, <math>\square \times \square \times \square = 0.008</math></li> <li>Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci.</li> <li>Estimate and order angles and bearings.</li> <li>Use metric units (length, mass, capacity, area and volume) and units of time for calculations.</li> <li>Use metric units for estimation (length, mass, capacity, area and volume).</li> <li>Convert between metric units including area, volume and capacity measures.</li> <li>Recall and use formulae for the perimeter of a rectangle and the circumference of a circle.</li> <li>Recall and use formulae for areas of rectangle, triangle, parallelogram, trapezium and circle.</li> <li>Calculate volumes of cuboids and prisms.</li> <li>Discuss and interpret graphs.</li> <li>Solve simple problems involving probabilities.</li> <li>Apply mental skills to solve simple problems.</li> </ul>
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<p><b>Number 3</b> (6 hours).                  Proportional Changes.                  NNS Y789 examples p74-81.</p>	<p><b>STARTER ACTIVITY OBJECTIVES</b>                  From previous teaching programmes.</p> <ul style="list-style-type: none"> <li>Use the equivalence of fractions, decimals and percentages to compare simple proportions and solve problems.</li> <li>Link ratio to fractional notation.</li> <li>Find the outcome of a given percentage increase or decrease.</li> </ul>	<p><b>CORE</b>                  From the Level 7 teaching programme</p> <ul style="list-style-type: none"> <li>Recognise when fractions or percentages are needed to compare proportions and solve problems.</li> </ul> <p><b>Discussion Ex 4:1 p69. Ex 4:2 p69. Review p69.</b></p> <ul style="list-style-type: none"> <li>Interpret and use ratio in a range of contexts.</li> </ul> <p><b>Ex 4:3 p71/2. Review p72. Investigation 4:4 p72/3. Practical Ex 4:5 p73.</b></p> <ul style="list-style-type: none"> <li>Use percentage changes to solve problems.</li> </ul> <p><b>Discussion Ex 4:6 p74. Ex 4:7 p74/5. Review p75. Practical Ex 4:8 p76. Discussion Ex 4:9 p76. Discussion Ex 4:10 p77. Ex 4:11 p78/9. Review p79. Exam Questions p80-83.</b></p>	<p><b>EXTENSION</b>                  From future teaching programmes.</p> <ul style="list-style-type: none"> <li>Understand and use proportionality and calculate the result of any proportional change using multiplicative methods.</li> <li>Understand the implications of enlargement for area and volume.</li> </ul>
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	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Handling Data 4</b> (6 hours). Analysing Data NNS Y789 examples p256-267.</p> <p><b>Shape Space and Measures 6.</b> (6 hours). Compound Measures. NNS Y789 examples p232-233.</p> <p>NNS Y789 examples p172-177.</p>	<ul style="list-style-type: none"> <li>Calculate the mean, mode and median for a small set of discrete data.</li> <li>Find and use the range of a small set of discrete data.</li> </ul>	<ul style="list-style-type: none"> <li>Calculate the mean for a large set of data. <b>Discussion Ex 2:1 p428. Ex 21:2 p430/31. Review p431. Practical Ex 21:3 p431.</b></li> <li>Calculate an estimate for the mean of a large set of grouped data. <b>Ex 21:4 p433. Review p433.</b></li> <li>Estimate the median for a large set of grouped data. <b>Ex 21:5 p234. Review p234.</b></li> <li>Calculate an approximate mean for a large set of continuous data. Find the modal class and an estimate of the median for a set of continuous data. <b>Ex 21:6 p436/7. Review p437. Ex 21:7 p437. Discussion Ex 21:8 p438. Practical Ex 21:9 p439.</b></li> <li>Construct graphs and diagrams to represent data, on paper [and using ICT], and identify key features. <b>Discussion Ex 21:10 p440. Ex 21:11 p441-443. Review p443/44. Practical Ex 21:12 p444. Investigation 21:13 p444. Exam Questions p445-448.</b></li> <li>Solve problems involving average rates of change. <b>Discussion Ex 16:1 p300. Ex 16:2 p303-305. Review p305. Discussion Ex 16:3 p306.</b></li> <li>Discuss and interpret a range of functions arising from real life situations. <b>Discussion Ex 16:6 p308. Ex 16:7 p309-312. Review p312.</b></li> <li>Construct linear functions arising from real life problems and plot their corresponding graphs. <b>Ex 16:8 p314. Review p314. Investigation 16:9 p314.</b></li> <li>Solving problems involving other compound measures. <b>Discussion Ex 16:10 p315. Ex 16:11 p317/8. Review p318. Investigation 16:12 p319. Ex 16:13 p320. Review p320. Exam Questions p321-324.</b></li> </ul>	<ul style="list-style-type: none"> <li>Calculate the inter quartile range for a large set of data.</li> <li>Begin to analyse the distribution of large sets of data.</li> <li>Understand and use measures of speed (and other compound measures such as density or pressure) to solve problems.</li> </ul>

- Revision time between end of scheme of work and school exams.
- School exam will be KS3 papers 1 and 2 level 5-7 and mental arithmetic test (class time).

After school exams time spent on

- Investigations (any suggestions!)
- Consolidation of work covered in Y8 from pink pages in Level 8 book.
- Problem solving activities (see grid below for aims and objectives).
- ICT statistics.

	<b>STARTER ACTIVITY OBJECTIVES</b> From previous teaching programmes.	<b>CORE</b> From the Level 7 teaching programme	<b>EXTENSION</b> From future teaching programmes.
<p><b>Solving problems and revision</b> (6 hours) Number, algebra, shape, space and measures, handling data Solving problems (2–35)</p> <p>Percentages and proportion (75–81)</p> <p>Sequences, functions and graphs (172–177) Geometrical reasoning: lines, angles and shapes (184–189)</p>	<ul style="list-style-type: none"> <li>• <b>Identify the necessary information to solve a problem.</b></li> <li>• Solve more complex problems by breaking them into smaller steps or tasks, choosing and using efficient techniques for calculation.</li> <li>• <b>Use logical argument to establish the truth of a statement.</b></li> <li>• <b>Use the unitary method to solve simple word problems involving ratio and direct proportion.</b></li> <li>• Solve geometrical problems using side and angle properties of equilateral, isosceles and right-angled triangles and special quadrilaterals, explaining reasoning with diagrams and text; classify quadrilaterals by their geometric properties.</li> </ul>	<ul style="list-style-type: none"> <li>• Solve increasingly demanding problems and evaluate solutions; explore connections in mathematics across a range of contexts: number, algebra, shape, space and measures, handling data.</li> <li>• Represent problems and synthesise information in algebraic, geometric or graphical form; move from one form to another to gain a different perspective on the problem.</li> <li>• <b>Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT;</b> use trial and improvement where a more efficient method is not obvious.</li> <li>• <b>Present a concise, reasoned argument, using symbols, diagrams, graphs and related explanatory text; give solutions to problems to an appropriate degree of accuracy.</b></li> <li>• Suggest extensions to problems, conjecture and generalise; identify exceptional cases or counter-examples, explaining why.</li> <li>• Solve problems involving percentage changes.</li> <li>• <b>Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole;</b> interpret and use ratio in a range of contexts, including solving word problems.</li> <li>• <b>Construct functions arising from real-life problems and plot their corresponding graphs.</b></li> <li>• <b>Solve problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons,</b> justifying inferences and explaining reasoning with diagrams and text.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Generate fuller solutions to increasingly demanding problems.</b></li> <li>• <b>Recognise limitations on the accuracy of data and measurements;</b> give reasons for choice of presentation, explaining selected features and showing insight into the problem's structure.</li> <li>• Justify generalisations, arguments or solutions; pose extra constraints and investigate whether particular cases can be generalised further.</li> </ul>