

YEAR 10: AUTUMN TERM

Teaching objectives for the oral and mental activities

<ul style="list-style-type: none"> • Order, add, subtract, multiply and divide integers. • Multiply and divide decimals by 10, 100, 1000, 0.1 and 0.01. • Count on and back in steps of 0.4, 0.75, $\frac{3}{4}$... • Round numbers, including to one or two decimal places. • Know and use squares, cubes, roots and index notation. • Know or derive quickly prime numbers less than 30 and factor pairs for a given number. • Convert between fractions, decimals and percentages. Know that 0.005 is half of one per cent. • Find fractions and percentages of quantities. <ul style="list-style-type: none"> • Know or derive complements of 0.1, 1, 10, 50, 100, 1000. • Add and subtract several small numbers or several multiples of 10, e.g. $250 + 120 - 190$. • Use jottings to support addition and subtraction of whole numbers and decimals. • Use knowledge of place value to multiply and divide, e.g. 432×0.01, $37 \div 0.01$, 0.04×8, $0.03 \div 5$, 13×1.4. • Recall multiplication and division facts to 10×10. Derive products and quotients of multiples of 10, 100, 1000. • Use factors to multiply and divide mentally, e.g. 22×0.02, $420 \div 15$. 	<ul style="list-style-type: none"> • Multiply and divide a two-digit number by a one-digit number. • Use approximations to estimate the answers to calculations, e.g. 39×2.8. <ul style="list-style-type: none"> • Solve equations, e.g. $n(n - 1) = 56$, $\square + \square = 746$. <ul style="list-style-type: none"> • Visualise, describe and sketch 2-D shapes. • Recall and use formulae for the perimeter of a rectangle, and areas of rectangles and triangles. • Calculate volumes of cuboids. • Estimate and order acute, obtuse and reflex angles. <ul style="list-style-type: none"> • Use metric units (length, mass, capacity) and units of time for calculations. • Use metric units for estimation (length, mass, capacity). • Convert between metric units, including area, volume and capacity measures. <ul style="list-style-type: none"> • Discuss and interpret graphs. • Calculate a mean using an assumed mean. <ul style="list-style-type: none"> • Apply mental skills to solve simple problems.
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	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
Number 1 (4 hours) Approximation. Accuracy. Errors.	<ul style="list-style-type: none"> • Round numbers, including to a given number of decimal places or significant figures. 	<ul style="list-style-type: none"> • Use calculators, or written methods, to calculate the upper and lower bounds of calculations, particularly when working with measurements. <p><i>Discussion Ex 1:1 p28. Ex 1:2 p29/30. Discussion Ex 1:3 p30. Discussion Ex 1:4 p31/32. Ex 1:5 p33/34. Ex 1:6 p35. Chapter Review p38.</i></p>	

	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
Algebra 1 (3 hours) Graphical Solution of Equations.		Find the intersection points of the graphs of a linear and quadratic function, knowing that these are the approximate solutions of the corresponding simultaneous equations representing the linear and quadratic functions. Ex 6:1 p118/119. Review p120. Chapter Review p125.	<ul style="list-style-type: none"> Iterations. Ex 6:3 p123/124.
Shape, space and measures 1 (6 hours). Similar Shapes. Congruent Triangles. Proofs.	<ul style="list-style-type: none"> Construct triangles with ruler, protractor & compasses (SAS, ASA or SSS). <ul style="list-style-type: none"> Know from experience of constructing them that triangles given SSS, SAS, ASA & RHS are unique but SSA & AAA aren't. Use straight edge and compasses to construct: <ul style="list-style-type: none"> the mid-point and perpendicular bisector of a line segment; the bisector of an angle; the perpendicular from a point to a line; the perpendicular from a point on a line; Construct nets of solids. 	<ul style="list-style-type: none"> Understand and use the effect of enlargement on areas and volumes of shapes and solids. Investigation 14:1 p285. Ex 14:2 p287-290. Review 1-6 p290/291. Discussion Ex 14:3 p291. Chapter Review p302. Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles using formal arguments, and to verify standard ruler and compass constructions. Investigation 14:4 p293. Ex 14:5 p294-298. Review 123 p298. Use precise formal language and exact methods for analysing geometrical configurations. Ex 14:6 p300-302. 	

	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
Handling data 1 (4 hours) Histograms. Representing and Analysing Data.	<ul style="list-style-type: none"> Draw and produce, using paper and ICT, cumulative frequency tables and diagrams and box plots. 	<ul style="list-style-type: none"> Draw and produce, using paper and ICT, histograms for grouped continuous data. Understand frequency density. <p>Discussion Ex 23:1 p491. Ex 23:2 p493-495. Review 123 p496.</p> <p>Chapter Review p501.</p>	
Shape, space and measures 2 (6 hours) Perimeter. Area. Volume.	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Solve problems involving more complex shapes and solids, including segments of circles. Calculate the lengths of arcs and the areas of sectors. <p>Discussion Ex 15:1 p306. Ex 15:2 p308-310. Review 1-4 p310/311.</p> <ul style="list-style-type: none"> Solve problems involving surface areas and volumes of cones, spheres and frustrums. <p>Discussion Ex 15:3 p311. Investigation & Discussion Ex 15:4 p312. Ex 15:5 p313/314. Review 1-5 p315. Ex 15:7 p317-319. Review 1-4 p320. Discussion Ex 15:8. Chapter Review p321.</p>	<ul style="list-style-type: none"> Know and use the formulae for length of arcs and area of sectors of circles. <p>Research project 15:9 p320.</p>

	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
<p>Algebra 2 (6 hours) Indices.</p> <p>Shape, space and measures 3 (6 hours) Angle and Tangent Properties of Circles.</p> <p>Number 2 (6 hours) Proportion.</p>	<ul style="list-style-type: none"> Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers. 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. 	<ul style="list-style-type: none"> Use index laws to simplify and calculate (without a calculator for simple/nice expressions) the value of numerical expressions involving multiplication and division of fractional and negative powers. <p>Discussion Ex 7:1 p129. Discussion Ex 7:2 p131. Ex 7:3 p131-132. Review 1-3.</p> <p>Understanding that the inverse operation of raising a positive number to power n is raising the result of this operation to power $1/n$.</p> <p>Ex 7:4 p134. Review 1-4 p134-135.</p> <ul style="list-style-type: none"> Plot graphs of the exponential function $y = k$ to power x for integer values of x and simple positive values of k. <p>Ex 7:5 p135-136. Review p136.</p> <p>Chapter Review p137.</p> <ul style="list-style-type: none"> Prove and use the fact that the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference, the angle subtended at the circumference by a semi-circle is a right angle, that angles in the same segment are equal, and that opposite angles of a cyclic quadrilateral sum to 180 degrees. <p>Investigation 16:1 p324. Ex 16:2</p> <ul style="list-style-type: none"> Set up and use equations to solve word and other problems involving direct proportion and relate algebraic solutions to graphical representation of the equations. <p>Discussion Ex 2:1 p44. Ex 2:2 p46-47. Review 1,2 p48. Ex 2:3 p49-50. Review 1-3 p50. Discussion Ex 2:4 p51.</p> <ul style="list-style-type: none"> Set up and use equations to solve word and other problems involving inverse proportion and relate algebraic solutions to graphical representation of the equations. <p>Discussion Ex 2:5 p52. Discussion Ex 2:6 p53. Ex 2:7 p54-55. Review 1,2 p55. Investigation 2:8 p56. Investigation 2:10 p57.</p> <p>Chapter Review p59.</p>	<ul style="list-style-type: none"> Logarithms. The exponential function e. 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.

YEAR 10: SPRING TERM

Teaching objectives for the oral and mental activities

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| <ul style="list-style-type: none">• Order, add, subtract, multiply and divide integers.• Find products of small integer powers.• Know and use squares, cubes, roots and index notation.• Know or derive quickly the prime factorisation of numbers to 30 and factor pairs for a given number.• Find highest common factors (HCF) and lowest common multiples (LCM), e.g. the HCF of 36 and 48.• Convert between improper fractions and mixed numbers. Simplify fractions by cancelling.• Find the outcome of a given percentage increase or decrease.• Know or derive complements of 0.1, 1, 10, 50, 100, 1000.• Use jottings to support addition, subtraction, multiplication and division.• Recall multiplication and division facts to 10×10. Derive products and quotients of multiples of 10, 100, 1000.• Use known facts to derive unknown facts, e.g. derive 36×24 from 36×25. | <ul style="list-style-type: none">• Use knowledge of place value to multiply and divide decimals by multiples of 0.1 and 0.01, e.g. 0.24×0.4, $720 \div 0.03$.• Use approximations to estimate the answers to calculations, e.g. 39×2.8.• Solve equations, e.g. $n(n-1) = 56$, $\square + \square = \sqrt{46}$, $(3+x)^2 = 25$.• Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci.• Estimate bearings.• Use metric units (length, area and volume) and units of time for calculations.• Use metric units for estimation (length, area and volume).• Convert between metric units, including area, volume and capacity measures.• Recall and use formulae for areas of rectangle, triangle, parallelogram, trapezium and circle.• Calculate volumes of cuboids and prisms.• Discuss and interpret graphs.• Solve simple problems involving probabilities.• Apply mental skills to solve simple problems. |
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	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
<p>Algebra 3 (8 hours) Expressions and equations.</p> <p>Shape, space and measures 4 (6 hours) Trigonometrical Ratios and Graphs.</p> <p>Handling Data 2 (9 hours) Probability</p> <p>Algebra Coursework Task (6 hours + 2 enrichment days*) *subject to confirmation.</p>	<ul style="list-style-type: none"> Review sin, cos and tan of acute angles. Use tree diagrams to represent outcomes of compound events, recognising when events are independent . 	<ul style="list-style-type: none"> Factorising quadratic equations. Discussion Ex 10:1 p178. Ex 10:2 p178. Discussion Ex 10:3 p179-180. Ex 10:4 p180. Review p181. Simplifying expressions involving fractions. Discussion Ex 10:5 p182. Ex 10:6 p183-184. Review p184. Solving quadratic equations using factors. Ex 10:9 p188-190. Review 1-5 p191-192. Solving quadratic equations by completing the square. Discussion Ex 10:7 p185. Ex 10:8 p185-186. Review 1,2 p186. Discussion Ex 10:10 p192. Ex 10:11 p193. Solving quadratic equations using the formula. Discussion Ex 10:12 p193. Ex 10:13 p194-195. Review 1,2 p195. Draw, sketch and describe the graphs of trigonometric functions for angles of any size, including transformations involving scalings in either or both the x and y directions. Investigation 17:1 p348. Discussion Ex 17:2 p349-350. Ex 17:3 p351-352. Review 1-4 p353. Discussion Ex 17:4 p353. Discussion Ex 17:5 p354. Ex 17:6 p355-361. Review 1-3 p361-362. Chapter Review p363. Know when to add or multiply two probabilities: if A and B are mutually exclusive, then the probability of A or B occurring is $P(A) + P(B)$, whereas if A and B are independent events the probability of A or B occurring is $P(A) \times P(B)$. Ex 26:3 p537. Discussion Ex 26:4 p538. Discussion Ex 26:6 p540. Review 1,2 p541. Ex 26:7 p541-542. Review p542. Ex 26:8 p543-544. Review 1,2 p544. Ex 26:9 p545. Ex 26:12 p550-552. Ex 26:14 p554-558. Chapter Review p560. Introductory work may involve Chapter 5 'Sequences' p108 onwards. 	<ul style="list-style-type: none"> Partial Fractions. Research into the other three trig ratios. Research projects 17:9 p363..

YEAR 10: SUMMER TERM

Teaching objectives for the oral and mental activities

<ul style="list-style-type: none">• Order, add, subtract, multiply and divide integers.• Round integers and decimals.• Know and use squares, cubes, roots and index notation.• Find highest common factors (HCF) and lowest common multiples (LCM).• Convert between fractions, decimals and percentages, and between improper fractions and mixed numbers.• Find fractions and percentages of quantities and the outcome of a given percentage increase or decrease.• Know or derive complements of 0.1, 1, 10, 50, 100, 1000.• Use jottings to support addition, subtraction, multiplication and division.• Recall multiplication and division facts to 10×10. Derive products and quotients of multiples of 10, 100, 1000.• Use knowledge of place value to multiply and divide decimals by 0.1 and 0.01, e.g. 0.24×0.4, $720 \div 0.03$.• Use approximations to estimate the answers to calculations, e.g. 0.39×2.8.	<ul style="list-style-type: none">• Solve equations, e.g. $n(n - 1) = 56$, $\square + \square = -46$, $(3 + x)^2 = 25$, $(12 - x)^2 = 49$, $\square \times \square \times \square = 0.008$• Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci.• Estimate and order angles and bearings.• Use metric units (length, mass, capacity, area and volume) and units of time for calculations.• Use metric units for estimation (length, mass, capacity, area and volume).• Convert between metric units including area, volume and capacity measures.• Recall and use formulae for the perimeter of a rectangle and the circumference of a circle.• Recall and use formulae for areas of rectangle, triangle, parallelogram, trapezium and circle.• Calculate volumes of cuboids and prisms.• Discuss and interpret graphs.• Solve simple problems involving probabilities.• Apply mental skills to solve simple problems.
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	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programme.
<p>Data Handling 3 (6 hours). Sampling. Surveys. Dispersion.</p> <p>Data Handling Coursework Task (6 hours + 2 enrichment days*) *subject to confirmation.</p> <p>Shape, space and measures 5 (8 hours) Vectors.</p> <p>Shape, space and measures 6 (8 hours) 3D Shapes. Calculations with Right-Angled Triangles.</p>	<ul style="list-style-type: none"> Understand, recall and use Pythagoras' Theorem in 2D problems. Discussion Ex 18:1 p367. Ex 18:2 p369-371. Review 1-3 p371. Understand, recall and use trigonometrical relationships in right- angled triangles, and use these to solve problems, including those involving bearings. 	<ul style="list-style-type: none"> Select and justify a sampling scheme and a method to investigate a population, including random and stratified sampling. Discussion Ex 24:2 p507-508. Discussion Ex 24:3 p508-509. Discussion Ex 24:4 p509. Ex 24:7 p511-513. Review 1-3 p513. Chapter Review p514. Calculate and represent graphically the sum of two vectors, the difference of two vectors and a scalar multiple of a vector. Calculate the resultant of two vectors. Ex 19:1 p386-387. Discussion Ex 19:2 p389. Ex 19:3 p390-391. Discussion Ex 19:6 p393. Ex 19:7 p395-396. Review 1-3 p396. Understand and use the commutative and associative properties of vector addition. Solve simple geometrical problems in 2D using vector methods. Calculate the resultant of two vectors. Ex 19:8 p398-400. Discussion Ex 19:9 p401. Ex 19:10 p404-405. Review 1-3 p406. Chapter Review p407. Use Pythagoras' Theorem in 3D problems. Discussion Ex 18:1 p367. Ex 18:2 p369-371. Review 1-3 p371. Understand, recall and use trigonometrical relationships in right- angled triangles, and use these relationships in 3D contexts, including finding the angle between a line and a plane (but not the angle between two planes or between two skew lines). Ex 18:3 p373-374. Review 1,2 p374. Ex 18:4 (select questions carefully) p376-377. Review 1,2 p378. Ex 18:5 (select questions carefully) p379-381. Review 1-3 p381-382. Chapter Review p383. 	<ul style="list-style-type: none"> Standard Deviation. Discussion Ex 25:1 p517-518. Ex 25:2 p518. Discussion Ex 25:3 p518. Discussion Ex 25:8 p524. Ex 25:9 p525-528. Chapter Review p531. Vector equation of a straight line. Scalar product. Finding the angle between two planes or tween two skew lines.

YEAR 11: AUTUMN TERM

Teaching objectives for the oral and mental activities

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| <ul style="list-style-type: none">• Order, add, subtract, multiply and divide integers.• Multiply and divide decimals by 10, 100, 1000, 0.1 and 0.01.• Count on and back in steps of 0.4, 0.75, $\frac{3}{4}$...• Round numbers, including to one or two decimal places.• Know and use squares, cubes, roots and index notation.• Know or derive quickly prime numbers less than 30 and factor pairs for a given number.• Convert between fractions, decimals and percentages.
Know that 0.005 is half of one per cent.• Find fractions and percentages of quantities.
• Know or derive complements of 0.1, 1, 10, 50, 100, 1000.• Add and subtract several small numbers or several multiples of 10, e.g. $250 + 120 - 190$.• Use jottings to support addition and subtraction of whole numbers and decimals.• Use knowledge of place value to multiply and divide, e.g. 432×0.01, $37 \div 0.01$, 0.04×8, $0.03 \div 5$, 13×1.4.• Recall multiplication and division facts to 10×10. Derive products and quotients of multiples of 10, 100, 1000.• Use factors to multiply and divide mentally, e.g. 22×0.02, $420 \div 15$. | <ul style="list-style-type: none">• Multiply and divide a two-digit number by a one-digit number.• Use approximations to estimate the answers to calculations, e.g. 39×2.8.
• Solve equations, e.g. $n(n - 1) = 56$, $\square + \square = 46$.
• Visualise, describe and sketch 2-D shapes.• Recall and use formulae for the perimeter of a rectangle, and areas of rectangles and triangles.• Calculate volumes of cuboids.• Estimate and order acute, obtuse and reflex angles.
• Use metric units (length, mass, capacity) and units of time for calculations.• Use metric units for estimation (length, mass, capacity).• Convert between metric units, including area, volume and capacity measures.
• Discuss and interpret graphs.• Calculate a mean using an assumed mean.
• Apply mental skills to solve simple problems. |
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	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
Algebra 4 (8 hours) Expressions and Equations.		<ul style="list-style-type: none"> Choose an appropriate method to solve a quadratic equation. Ex 10:16 p198-199. Review 1,2 p200. Solve exactly, by elimination of an unknown, two simultaneous equations in two unknowns, one of which is linear in each unknown, and the other is linear in one unknown and quadratic in the other unknown, or where the second is the equation of a circle centre (0,0) and radius r. <u>Not explicitly covered in the text book, own resources needed.</u> Solving linear equations in one unknown, with integer or fractional coefficients. Discussion Ex 10:18 p201-202. Ex 10:19 p203-204. Review 1-3 p204. Present a concise reasoned argument. Derive proofs using short chains of deductive reasoning. Ex 10:20 p206. Review 1,2 p206. Investigation 10:21 p207. Chapter Review p208. 	<ul style="list-style-type: none"> Partial Fractions. Research Project 10:22 p207. Remainder Theorem. Research Project 10:23 p208.
Shape, space and measures 7 (6 hours). Calculations with Non Right-Angled Triangles. Number 3 (4 hours) Rational and Irrational Numbers.		<ul style="list-style-type: none"> Use the sine and cosine rules to solve 2D and 3D problems. Discussion Ex 20:1 p409. Ex 20:2 p411-412. Discussion Ex 20:3 p413. Ex 20:4 p414-415. Review p416. Ex 20:5 p418-422. Investigation 20:6 p423. Calculate the area of a triangle using $\frac{1}{2} ab \sin C$. Discussion Ex 20:7 p424. Ex 20:8 p425-427. Chapter Review p428. Rationalising denominators (from surd form). Converting a recurring decimal into a fraction. Discussion Ex 3:1 p61. Investigation 3:2 p61. Ex 3:3 p62. Review 1-3 p63. Ex 3:7 p66. Chapter Review p67. 	<ul style="list-style-type: none"> Complex Numbers. Research Project 3:8 p66.

	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
Shape, space and measures 8 (4 hours) Transformations..		<ul style="list-style-type: none"> Use congruence to show that translations, rotations and reflection preserve length and angle, so that any figure is congruent to its image under any of these transformations. <p>Ex 21:2 p433. Review p433. Practical Ex 21:4 p436-437. Ex 21:6 p438-441. Chapter Review p442.</p>	
Algebra 5 (hours) Graphs of related functions.		<ul style="list-style-type: none"> 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. <p>Discussion Ex 11:1 p214. Ex 11:2 p218-220. Review 1,2 p220. Discussion Ex 11:3 p220. Investigation 11:4 p221. Ex 11:5 p222. Review 1-3 p222. Ex 11:7 p224. Review 1,2 p224. Chapter Review p224.</p>	

	STARTER ACTIVITY OBJECTIVES From previous teaching programmes.	CORE From the Level 9/10 teaching programme	EXTENSION From A level teaching programmes.
<p>Algebra 2 (6 hours) Indices.</p> <p>Shape, space and measures 3 (6 hours) Angle and Tangent Properties of Circles.</p> <p>Number 2 (6 hours) Proportion.</p>	<ul style="list-style-type: none"> Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers. 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. 	<ul style="list-style-type: none"> Use index laws to simplify and calculate (without a calculator for simple/nice expressions) the value of numerical expressions involving multiplication and division of fractional and negative powers. <p>Discussion Ex 7:1 p129. Discussion Ex 7:2 p131. Ex 7:3 p131-132. Review 1-3.</p> <p>Understanding that the inverse operation of raising a positive number to power n is raising the result of this operation to power $1/n$.</p> <p>Ex 7:4 p134. Review 1-4 p134-135.</p> <ul style="list-style-type: none"> Plot graphs of the exponential function $y = k$ to power x for integer values of x and simple positive values of k. <p>Ex 7:5 p135-136. Review p136.</p> <p>Chapter Review p137.</p> <ul style="list-style-type: none"> Prove and use the fact that the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference, the angle subtended at the circumference by a semi-circle is a right angle, that angles in the same segment are equal, and that opposite angles of a cyclic quadrilateral sum to 180 degrees. <p>Investigation 16:1 p324. Ex 16:2</p> <ul style="list-style-type: none"> Set up and use equations to solve word and other problems involving direct proportion and relate algebraic solutions to graphical representation of the equations. <p>Discussion Ex 2:1 p44. Ex 2:2 p46-47. Review 1,2 p48. Ex 2:3 p49-50. Review 1-3 p50. Discussion Ex 2:4 p51.</p> <ul style="list-style-type: none"> Set up and use equations to solve word and other problems involving inverse proportion and relate algebraic solutions to graphical representation of the equations. <p>Discussion Ex 2:5 p52. Discussion Ex 2:6 p53. Ex 2:7 p54-55. Review 1,2 p55. Investigation 2:8 p56. Investigation 2:10 p57.</p> <p>Chapter Review p59.</p>	<ul style="list-style-type: none"> Logarithms. The exponential function e. 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.

KS4 Mathematics (Two Tier) Scheme of Work

NUMBER

STARTER ACTIVITY OBJECTIVES (below grade B material)	MAIN ACTIVITY (Grade B and above material)	EXTENSION MATERIALS (eg from AS/AL teaching programmes)
<p>Use their previous understanding of integers and place value to deal with arbitrarily large positive numbers and round them to a given power of 10</p> <p>Understand and use negative numbers both as positions and translations on a number line</p> <p>Order integers</p> <p>Use the concepts and vocabulary of factor (divisor) multiple, common factor, least common multiple, prime number and prime factor decomposition</p> <p>Use the terms square, positive and negative square root, cube and cube root</p> <p>Use index notation and index laws for multiplication and division of integer powers</p> <p>Use standard index form, expressed in conventional notation and on a calculator display</p> <p>Understand equivalent fractions, simplifying a fraction by cancelling all common factors</p> <p>Order fractions by rewriting them with a common denominator</p>		

<p>Recognize that each terminating decimal is a fraction</p> <p>Recognize that recurring decimals are exact fractions, and that some exact fractions are recurring decimals</p> <p>Order decimals</p> <p>Understand that percentage means 'number of parts per 100' and use this to compare proportions</p> <p>Interpret percentage as the operator 'so many hundredths of'</p> <p>Use percentage in real life situations</p> <p>Use ratio notation including reduction to its simplest form and its various links to fraction notation</p> <p>Multiply or divide any number by powers of 10 and any positive number by a number between 0 and 1</p> <p>Find the prime factor decomposition of positive integers</p> <p>Understand 'reciprocal' as a multiplicative inverse, knowing that any non zero number multiplied by it's reciprocal is 1</p> <p>Multiply and divide by a negative number</p> <p>Use index laws to simplify and calculate the value of numerical expressions involving multiplication of</p>	<p>Use index laws to simplify and calculate the value of numerical expressions involving multiplication of</p>	
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<p>integer powers</p> <p>Use brackets and the hierarchy of operations</p> <p>Calculate a given fraction of a given quantity, expressing the answer as a fraction</p> <p>Express a given number as a fraction of another</p> <p>Add and subtract fractions by writing them with a common denominator</p> <p>Perform short division to convert a simple fraction to a decimal</p> <p>Understand and use unit fractions as multiplicative inverses</p> <p>Multiply and divide a given fraction by an integer, by a unit fraction and by a general fraction</p> <p>Convert simple fractions of a whole to percentages of a whole and vice versa</p> <p>Understand the multiplicative nature of percentages as operators</p> <p>Divide a quantity in a given ratio</p> <p>Convert between ordinary and standard index form representations, converting to standard index form to make sensible estimates for calculations involving multiplication and/or division</p> <p>Division by decimal (up to 2 dp's) by division using an integer</p>	<p>fractional and negative powers</p> <p>Use inverse operations understanding that the inverse operation of raising a positive number to power n is raising the result of the operation to power $1/n$</p> <p>Distinguish between fractions with denominators that have only prime factors of 2 and 5 (which are represented by terminating decimals), and other fractions (which are represented by recurring decimals)</p> <p>Convert a recurring decimal to a fraction</p> <p>Calculate an original amount when given the transformed amount after a percentage change</p> <p>Reverse percentage problems</p> <p>Round to a given number of significant figures</p>	
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<p>Solve percentage problems</p> <p>Solve word problems about ratio and proportion, including using informal strategies and the unitary method of solution</p> <p>Use surds and π in exact calculations, without a calculator</p>	<p>Solve percentage problems including percentage increase and decrease</p> <p>Reverse percentages</p> <p>Represent repeated proportional change using a multiplier raised to a power</p> <p>Calculate an unknown quantity from quantities that vary in direct or inverse proportion</p> <p>Rationalize a denominator such as $\sqrt{3}/3$</p> <p>Use calculators, or written methods, to calculate the upper and lower bounds of calculations, particularly when working with measurements</p> <p>Use standard index form display and know how to enter numbers in standard index form</p> <p>Select and justify appropriate degree of accuracy for answers to problems</p> <p>Check and estimate answers to problems</p>	
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STARTER ACTIVITY OBJECTIVES (below grade B material)	MAIN ACTIVITY (Grade B and above material)	EXTENSION MATERIALS (eg from AS/AL teaching programmes)

STARTER ACTIVITY OBJECTIVES (below grade B material)	MAIN ACTIVITY (Grade B and above material)	EXTENSION MATERIALS (eg from AS/AL teaching programmes)