Sir Joseph Williamson's Mathematical School

Mathematics Department

KS3 Mathematics (Year 7)

Scheme of Work
2015 onwards

Sir Joseph Williamson's Mathematical School - Mathematics Department KS3 Mathematics (year 7 - 9) 2015 onwards

Assessments sheets are available to be completed by the student to assess the grade at which they working

Introduction

The main part of the work is based around the Pearsons, KS3 Maths Progress Textbook. The Teachers guide gives extensive guidance with a full lesson plan for each exercise identified in the scheme of work, including starter activities and plenary suggestions.

All staff should endeavour to introduce opportunities for students to develop the PLTS skills through any part of each lesson. The starter or Plenary would be a good place to provide this opportunity. The scheme of work is a working document and we should be looking to share good practice please pass on any good activities you use so the scheme of work can be updated.

Problem solving questions are built in to each part of a unit. Strengthen and Extend section of the textbook should be used for assessment for learning.

Literacy opportunities could arise in the Starters especially in verbal communication and using technical language. This could also apply to all lessons.

Specific Guidance includes;

- Writing better targets meaning the students need to be specific, i.e. write proper sentences where appropriate. Students should also refer to specific areas to improve rather than moving from level 6 to 7 for example.

- Showing working will help to improve the students' Quality of Written Communication. Example includes, it is not sufficient for the student to say that x, y or z = 3.2 as a final answer. They must conclude by writing - e.g. therefore the length of the side AB = 3.2 cm to 1 d.p. or 2 s.f. as required by the question.

- Other Literacy opportunities include understanding the meaning of the key words and key points with correct spelling and pronunciation.

Sir Joseph Williamson's Mathematical School - Mathematics Department KS3 Mathematics (year 7 - 9) 2015 onwards

Year 7 course overview

The table below shows an overview of topics in the Higher Scheme of Work. Estimated teaching hours are **approximate** and are a guideline only.

Unit Number	Title	Estimated teaching hours	Problem Solving & Assessment
1	Analysing and displaying data	11	5
2	Number skills	11	7
3	Equations, functions and formulae	11	5
4	Fractions	11	7
5	Angles and shape	9	4
6	Decimals	11	7
7	Equations	9	6
8	Ratio and proportion	11	5
9	Perimeter, area and volume	11	7
10	Sequences and graphs	10	8
		105 hours	60 hours

New Scheme of Work KS3 Mathematics (Year 7)

Delta 1-3 Scheme of Work		
Activities	**Resources (including ICT)**	**Extension Activities**
The students will use Pearson KS3 Maths Progress text book Delta 1 in year 7, Delta 2 in year 8 and Delta 3 in year 9.The exercises contain questions relating to real life situations, mathematical modelling, reasoning and problem solving as well as the opportunity for skills practice. In line with the new National Curriculum the text book also contains some investigation tasks.	The course delivery will be supported by the Pearson KS3 Maths Progress suite of materials. This includes ActiveLearn, which gives students access to a digital text book, and a digital homework facility (including structured support). Additionally ActiveTeach is available to the teachers to provide digital lesson materials including videos. A list of resources broken down by lesson is available to teachers in the Teacher Guide which is also part of the provision from Pearson. Hardcopy text books will be provided for use in the classroom.	The 'extend' section of the text book in every unit contains more challenging material. In addition teachers may choose additional extension activities from various sources such as the Nrich web-site.
Competencies Developed	**Assessment for Learning Opportunities**	**Cross Curricular Links** (SMSCD with other subjects)
Problem solving, Mathematical reasoning, Mathematical communication, investigation skills, teamwork.	In every unit there is a lesson scheduled for a 'check up' to assess learning on the topic and decide the next step. Dependent on the result of the check up students will choose whether to 'strengthen' or 'extend' their knowledge. The material provided for those wishing to 'strengthen' their knowledge is broken into subtopics so that areas for improvement can be targeted. The 'extend' material provides more challenge and typically includes more problem solving and often an investigative task.	Throughout the course the text book indicates questions relating to Finance, and STEM questions (Science, Technology, Engineering and Maths).

Sir Joseph Williamson's Mathematical School - Mathematics Department KS3 Mathematics (year 7 - 9) 2015 onwards

Term	Units	Learning Intentions/Outcomes (Topics Covered)
Term 1	1 Analysis and displaying data	Two way tables and bar charts, averages and range, grouped data, more graph, pie charts, scatter graphs and correlation. Check-up, strengthen and extend
	2 Number skills Unit 1 and 2 Test	Factors, primes and multiples, using negative numbers, multiplying and dividing, squares and square roots, more powers and roots, calculations. Check-up, strengthen and extend
	3 Equations functions and formulae	Simplifying algebraic expressions, writing algebraic expressions, using formulae, writing formulae, brackets and powers, factorising expressions. Check-up, strengthen and extend
Term 2	4 Fractions Unit 1 to 4 Test	Working with fractions, adding and subtracting fractions, fractions, decimals and percentages, multiplying and dividing fractions, working with mixed numbers. Check-up, strengthen and extend
	5 Angles and shapes	Angles and parallel lines, triangles, quadrilaterals, polygons. Check-up, strengthen and extend
Term 3	6 Decimals Unit 5 and 6 Test	Ordering decimals, rounding decimals, adding and subtracting decimals, multiplying and dividing decimals, fractions decimals and percentages, working with percentages. Check-up, strengthen and extend
	7 Equations Unit 7 Test	Solving one-step equations, solving two-step equations, more complex equations, trial and improvement. Check-up, strengthen and extend
Term 4	8 Ratio and proportion	Metric and imperial units, writing ratios, sharing a given ratio, proportion, proportional reasoning, using the unitary method. Check-up, strengthen and extend
	9 Perimeter, area and volume	Triangles, parallelograms and trapeziums, perimeter and area od compound shapes, properties of 3D solids, surface area, volume, measuring area and volume. Check-up, strengthen and extend

		10 Sequences and graphs (first half)	Sequences, the nth term rule, patterns and sequences
Term 5		10 Sequences and graphs (second half) Unit 10 test - optional	Coordinates and line segments, graphs Check-up, strengthen and extend
		Revision/Slack and End of Year 7 Exams	Revision, exams
Term 6		Starting Delta 2 (Year 8) SOW	

Sir Joseph Williamson's Mathematical School - Mathematics Department KS3 Mathematics (year 7 - 9) 2015 onwards

Assessment will be as follows:

Paper 1

- Non-Calculator Paper
- Time allocated 1 hour
- 50 Marks

Paper 2

- Calculator Paper
- Time allocated 1 hour
- 50 Marks

The specification for KS3 Year 7 Mathematics can be found on the following pages

Delta 1 (Year 7) Scheme of Work			
Unit	**2014 Programme of Study**	**Unit description**	
1 Analysing and displaying data	describe, interpret and compare observed distributions of a single variable through: appropriate measures of central tendency (mean, mode, median) construct and interpret frequency tables construct and interpret bar charts construct and interpret pie charts construct and interpret vertical line (or bar) charts for ungrouped data construct and interpret vertical line (or bar) charts for grouped numerical data Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts Illustrate simple mathematical relationships between two variables (bivariate data) using scatter graphs	Compare two simple distributions using appropriate measures Calculate the mean from a simple frequency table Compare two distributions given summary statistics. Recognise when it is appropriate to use mean median or mode. (put in extreme values) Use two way tables for discrete data. Make inferences about data through extracting information from a two way table Construct and interpret pie charts and line graphs Use questionnaire responses to complete a data collection sheet Construct and interpret compound and dual (comparative) bar charts Interpret and/or compare bar graphs and frequency diagrams which are misleading (with false origins, different scales etc). Construct a simple frequency table with equal class intervals for continuous data. Be able to use > or < correctly between two positive decimals. Decimals should be to 4 or 5 significant figures. Be able to use > or < correctly between two negative decimals. Decimals should be to 2 or 3 significant figures. Construct a frequency table with given equal class intervals for continuous data (boundary data given) Construct a frequency diagram from a grouped frequency table, Find the modal class of a set of continuous data Construct line graphs for time series Construct and interpret scatter graphs Identify which graphs are the most useful in the context of the problem. Use correlation to describe relations between sets of data Draw and use a line a best fit to estimate a missing value	

2 Number skills	order positive and negative integers use the concepts and vocabulary of prime numbers use the concepts and vocabulary of factors (or divisors) use the concepts and vocabulary of multiples use the concepts and vocabulary of common factors use the concepts and vocabulary of common multiples use the concepts and vocabulary of highest common factor use the concepts and vocabulary of lowest common multiple use the four operations, including formal written methods, with positive and negative integers use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals use integer powers and associated real roots (square, cube and higher) recognise powers of 2, 3, 4, 5	Find factor pairs using any whole number
		Find the HCF or LCM of 2 numbers less than 20
		Multiply and divide negative integers by a positive integer
		Add and subtract integers – positive and negative integers
		Add and subtract negative integers from positive and negative integers
		Multiply and divide integers – positive and negative integers
		Multiply and divide negative integers by a negative integer
		Use index notation for squares and cubes and for positive integer powers of 10. (e.g. write 27 as 3^3 and 1000 as 10^3)
		Know all the squares of numbers less than 16 and be able to know the square root given the square number.
		Give the positive and negative square root of a square number.
		Extend mental calculations to squares and square roots
		Be able to estimate square roots of non square numbers less than 100
		Mentally be able to calculate the squares of numbers less than 16 multiplied by a multiple of ten (e.g. 0.2, 300, 0.400)
		Divide three-digit by two-digit whole numbers
		Using rounding to the nearest 10 or a nice number (e.g. 62 to 63 when dividing by 9 etc.)
		Use mental strategies for multiplication – doubling and halving strategies
		Checking by an inverse operation (questions other than four rules, e.g. square roots checked with squaring)
		Be able to estimate answers to calculations involving 2 or more operations and BIDMAS
		Use index notation for small integer powers (e.g. $3 \times 2^3 = 24$)
		Extend mental calculations to cubes and cube roots
		Extend calculations to cubes and cube roots using mental methods and a calculator when appropriate
		Be able to find square roots by factorising e.g. square root of 324 is square root of 4 x 81 which is 18. 324 = 4x81 should be given to them.
		Be able to find cube roots by factorising e.g. cube root of 216 is cube root of 8 x 27 which is 6. 216 = 8x27 should be given to them

		Be able to use mental strategies to solve word problems set in context using square roots and cubes roots mentally	
		be able to work with calculations where the brackets are squared or square rooted	
		Combine laws of arithmetic for brackets with mental calculations of cubes and squares	
		Combine laws of arithmetic for brackets with mental calculations of cubes, (e.g. $(23-13+4-8)^3$)	
		Combine laws of arithmetic for brackets with mental calculations of square roots	
		Combine laws of arithmetic for brackets with mental calculations of cube roots and square roots	
		Understand which part of an expression is raised to a power by knowing the difference between $3 \times (7 + 8)^2$ and $3^2 \times (7+8)$ and $(3x (7+8))^2$	
3 Equations, functions and formulae	use and interpret algebraic notation: ab in place of a × b use and interpret algebraic notation: 3y in place of y + y + y and 3 × y use and interpret algebraic notation: a^2 in place of a × a use and interpret algebraic notation: a^3 in place of a × a × a use and interpret algebraic notation: a^2b in place of a × a × b use and interpret algebraic notation: b/a in place of a ÷ b use and interpret algebraic notation: brackets substitute numerical values into formulae and expressions, including scientific formulae understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms simplify and manipulate algebraic expressions to maintain equivalence:	Simplify simple expressions by collecting like terms	
		Understand the difference between 2n and n²	
		Know that expressions involving repeated multiplication can be written as n, n^2, n^3	
		Simplify simple expressions involving powers but not brackets, by collecting like terms	
		Construct expressions from worded description, using addition, subtraction and multiplication, (e.g. 3a, a + b, 2 + a + b + 3 = 5 + a + b, a x b, a x a)	
		Construct expressions from worded description, using all 4 basic operations, (e.g. 30/x, x – y, m/2, 3m + 4, a + a + 3, a²)	
		Express simple functions in symbols	
		Know that the contents of brackets are evaluated first when using algebra, (e.g. a(2a + b) the 2a + b must be calculated first)	
		Know that multiplication and division are carried out before addition and subtraction e.g. ab + cd, a x b and c x d must be calculated before adding	
		Substitute positive integers into expressions involving small powers	
		Evaluate an expression by substituting a positive value into the expression x^2	

	multiplying a single term over a bracket simplify and manipulate algebraic expressions to maintain equivalence: taking out common factors model situations or procedures by translating them into algebraic expressions or formulae	Substitute positive integers into expressions involving small powers up to 3	
		Use the distributive law to take out numerical common factors e.g. 6a + 8b=2(3a + 4b)	
		Multiply a single term over a bracket e.g. x(x + 4), 3x(2x – 3)	
		Begin to multiply a positive integer over a bracket containing linear terms (e.g. 4(x + 3))	
		Add, subtract, multiply and divide integers - extend to the distributive law a(b + c)	
		Substitute positive integers into simple formulae expressed in words	
		Substitute integers into more complex formulae expressed in letter symbols, (e.g. a/b, ax +/– b)	
		Substitute positive integers into simple formulae expressed in letter symbols (e.g. V = l x b x h)	
		Substitute integers into more complex formulae (involving brackets and more than one operation) expressed in letter symbols (e.g. D = n(n – 3)/2 where D is the number of diagonals in a polygon of n sides)	
		Substitute positive and negative integers into simple formulae (eg distance = speed x time)	
		Identify the unknowns in a formula and a function	
		Derive simple formulae expressed in letter symbols, e.g. 3a, a + b, 2 + a + b + 3 = 5 + a + b, a x b, a x a	
		Derive more complex formulae expressed in letter symbols e.g. 30/x, x – y, m/2, 3m + 4, a + a + 3, a²	
		Understand the different role of letter symbols in formulae and functions	
		Derive complex algebraic expressions and formulae (e.g. to cook a joint of beef, allow 20 mins per 1/2 kg and another 30 mins, write a formula to show the number of minutes, m, to cook the joint which weighs x kg)	
4 Fractions	order decimals and fractions use the four operations, including formal written methods, with positive and negative fractions use the four operations, including formal written methods, with positive and negative improper fractions and mixed numbers	Use a diagram to compare two or more simple fractions	
		use < and > to compare fractions with same denominator, or unit fractions with different denominators	
		Simplify fractions by cancelling all common factors	
		Express one number as a fraction of another. The numbers should be very simple (halves, quarters, thirds).	

	define percentage as 'number of parts per hundred' interpret percentages and percentage changes as a fraction or a decimal express one quantity as a fraction of another, where the fraction is less than 1 express one quantity as a fraction of another, where the fraction is greater than 1	Use fraction notation to express a smaller whole number as a fraction of a larger one
		Begin to add and subtract simple fractions and those with simple common denominators
		Add fractions by writing with a common denominator, where the denominators are 12 or less, where the answer is less than 1
		Understand that when two positive fractions are added the answer is larger than either of the original two fractions
		Subtract fractions by writing with a common denominator, where the denominators are less than 12 and the first fraction is larger than the second
		Understand that when two positive fractions are subtracted the answer is less than the first fraction but may still be larger than the second
		Add and subtract simple fractions with denominators of any size
		Check addition or subtraction of fractions with an inverse calculation.
		Add and subtract up to 3 fractions mixing both addition and subtraction into the calculation, with denominators less than or equal to 12 and the using the LCM denominator in the calculation - the answer can be a mixed number
		Extend the possible fractions that can be used in mental calculations by using halving and doubling strategies
		Calculate simple fractions of quantities and measurements (whole number answers)
		Calculate fractions of quantities and measurements (fraction answers)
		Multiply a fraction by an integer
		Multiply an integer by a fraction
		Understand the effect of multiplying a positive number by a fraction less than 1
		Recall known facts including fraction to decimal conversions
		Recall of equivalent fractions and decimals and percentage including for fractions that are greater than 1. Match across all 3 types, and need to be simple fractions (1/2, 1/4, 1/5, 1/10)
		Use division to convert a fraction to a decimal

		Use halving and doubling strategies on fractions to find decimal equivalents of other fractions)e.g. 1/4 = 0.25 so 1/8 is half of 0.25 etc.) Original fact is given	
		Interpret division as a multiplicative inverse. Know that 1 divided by 1/4 is the same as 1 x 4	
		Divide an integer by a fraction	
		Understand the effect of dividing a positive number by a fraction less than 1	
		Multiply a fraction by a fraction (without cancelling)	
		Cancel common factors before multiplying fractions	
		Divide a fraction by a fraction	
		Add mixed number fractions without common denominators, where the fraction parts add up to more than 1	
		Be able to enter time as a mixed number into a calculator.	
		Subtract mixed number fractions when the fractional part of the first fraction is all that is required for the calculation to take place	
		Subtract mixed number fractions where the whole number part of the first fraction needs to be broken down to complete the calculation.	
		Multiply a fraction by a mixed number	
		Divide a mixed number by a fraction	
5 Angles and shapes	apply the properties of angles at a pointapply the properties angles at a point on a straight lineapply the properties vertically opposite anglesunderstand and use the relationship between parallel lines and alternate and corresponding anglesderive and use the sum of angles in a triangleuse the sum of angles in a triangle to deduce the angle sum in any polygon derive properties of regular polygons	Solve simple geometrical problems showing reasoning	
		Recognise and use vertically opposite angles	
		Identify alternate angles	
		Identify corresponding angles	
		Identify alternate and corresponding angles on the same diagram	
		Calculate angles in a triangle	
		Calculate angles in a triangle	
		Solve geometric problems using side and angle properties of equilateral and isosceles triangles	
		Understand a proof that the sum of the angles of a triangle is 180 degrees	
		Understand a proof that the exterior angle of a triangle is equal to the sum of the two interior opposite angles	

		Identify all the symmetries of 2-D shapes	
		Identify and begin to use angle, side and symmetry properties of quadrilaterals	
		Find co-ordinates of points determined by geometric information	
		Classify quadrilaterals by their geometric properties	
		Understand a proof that the sum of the angles of a quadrilateral is 360 degrees	
		Explain how to find the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons	
		Calculate the interior and exterior angles of regular polygons	
		Use the interior and exterior angles of regular and irregular polygons	
6 Decimals	understand and use place value for decimals understand and use place value for integers order decimals and fractions use the symbols =, ≠, <, >, ≤, ≥ work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) interpret percentages and percentage changes as a fraction or a decimal interpret percentages multiplicatively express one quantity as a percentage of another compare two quantities using percentages work with percentages greater than 100% interpret fractions and percentages as operators use standard units of mass, length, time, money and other measures, including with decimal quantities use approximation through rounding to estimate answers solve problems involving percentage change: percentage increase solve problems involving percentage change: decrease	Order positive decimals as a list with the smallest on the left. Decimals should be to 4 or 5 significant figures	
		Order negative decimals as a list with the smallest on the left	
		Order positive decimals with the largest on the left. Decimals should be to 4 or 5 significant figures	
		Order negative decimals as a list with the smallest on the left. Decimals should be to 2 or 3 significant figures	
		Order negative decimals with the largest on the left. Decimals should be to 2 or 3 significant figures.	
		Use > or < correctly between two positive decimals. Decimals should be to 4 or 5 significant figures.	
		Use > or < correctly between two negative decimals. Decimals should be to 2 or 3 significant figures	
		Round numbers to two or three decimal places	
		Write numbers as a decimal number of millions or thousands e.g. 23 600 000 as 23.6 million	
		Round to an appropriate number of decimal places after calculations, e.g. money problems after division, perimeter when using the pi key and a radius in cm etc.	
		Work with numbers rounded to whole numbers or to 1 or two decimal places to estimate solutions, e.g. average populations of cities under certain effects.	

	solve problems involving percentage change: original value problems solve problems involving percentage change: simple interest in financial mathematics	Add and subtract more than two integers or decimals with up to two decimal places, but with varying numbers of significant figures and using a mixture of operations within the calculation	
		Use standard column procedures to add and subtract integers and decimals of any size, including a mixture of large and small numbers with differing numbers of decimal places	
		Subtract integers and decimals with up to two decimal places, but with varying numbers of significant figures	
		Know there are different ways of finding an approximate answer	
		Extend written methods to U.t x U	
		Multiply and divide decimals with one or two places by single-digit whole numbers	
		Use mental strategies for multiplication - partitioning two 2 digit numbers where one number includes a decimal (both numbers have two significant figures)	
		Multiply integers and decimals including by decimals such as 0.6 and 0.06, 0.t x 0.t or 0.t x 0.0h, 0.0h x 0.t and 0.0h x 0.0h	
		Multiply and divide by decimals, dividing by transforming to division by an integer	
		Understand the effect of multiplying a positive number by a decimal less than 1	
		Use mental strategies for multiplication of decimals - doubling and halving strategies	
		Understand where to position the decimal point by considering equivalent calculations which are given - not the basic table fact e.g. 0.06 x 70 = 4.2, what is 0.6 x 0.007	
		Use knowledge of place value to calculate the product of two decimals where one or both are less than 1 and at least one has two digits other than zero. Original fact is given	
		Use knowledge of place value to calculate the product of two decimals where one or both are less than 1 and at least one has two digits other than zero	
		Multiply any number by 0.1 and 0.01	
		Know there are different ways of finding an approximate answer	

		Divide integers and decimals including by decimals such as 0.6 and 0.06 divisions related to 0.t x 0.t or 0.t x 0.0h, 0.0h x 0.t and 0.0h x 0.0h
		Use knowledge of place value to calculate the division of two decimals where both are less than 1 and at least the first has two digits other than zero
		Multiply and divide by decimals, dividing by transforming to division by an integer
		Divide £.p by a two digit number to give £.p
		Multiply and divide decimals with one or two places by single-digit whole numbers
		Divide decimals with one or two places by single-digit whole numbers
		Understand that dividing by 0.1 or 0.01 are equivalent to dividing by 1/10th or 1/100th or multiplying by 10 or 100
		Divide any number by 0.1 and 0.01
		Know there are different ways of finding an approximate answer
		Recall of equivalent fractions, decimals and percentage including for fractions that are greater than 1. Match across all 3 types, and need to be simple fractions (1/2, 1/4, 1/5, 1/10)
		Use the equivalence of fractions, decimals and percentages to compare proportions (i.e. compare a fraction and a percentage)
		Find equivalent fractions, decimals and percentages where percentages end in 0.5
		Use strategies for finding equivalent fractions, decimals and percentages involving decimal percentages and decimals greater 0
		Order fractions by converting them to decimals or otherwise
		Simplify converted terminating decimal to fraction convert a terminating decimal to a fraction and simplify the fraction
		Write terminating decimals as fractions
		Interpret rounded off recurring decimals displayed on a calculator as fractions - 2/3, 1/6, 1 2/3, 1 1/6
		Convert terminating decimals to fractions really means like 0.745 = 745/1000, not 0.5 = 1/2
		Extend the percentage calculation strategies with jottings to find any percentage e.g. 17% by finding 10%, 5% and 2% and adding

		Express one given number as a percentage of another	
		Find the outcome of a given percentage increase	
		Find the outcome of a given percentage decrease	
		Use a unitary method e.g. if £40 is 60% find 1% by dividing by 60 and then 100% by multiplying by 100	
		Have strategies for calculating fractions and decimals of a given number	
7 Equations	rearrange formulae to change the subject use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)	Solve simple linear equations with integer coefficients, of the form ax = b or x +/− b = c e.g. 2x = 18, x + 7 = 12 or x − 3 = 15	
		Solve simple two-step linear equations with integer coefficients, of the form ax + b = c e.g. 3x + 7 = 25	
		Substitute integers into formulae to give equations and solve	
		Solve linear equations of the form ax +/− b = cx +/− d	
		Solve equations of the form a(x +/− b) = c(x +/− d) [a or c can be 1]	
		Find a positive and negative square root as a solution of an equation involving x²	
		Construct and solve equations of the form a(x +/− b) = c(x +/− d) [a or c can be 1]	
		Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as x³ + x = 50	
8 Multiplicative reasoning	use ratio notation reduce a ratio to simplest form divide a given quantity into two parts in a given part:part ratio divide a given quantity into two parts in a given part:whole ratio express the division of a quantity into two parts as a ratio understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction relate the language of ratios and the associated calculations to the arithmetic of fractions relate the language of ratios and the	Reduce a ratio to its simplest form	
		Reduce a three part ratio to its simplest form by cancelling	
		Simplify a ratio expressed in fractions or decimals	
		Convert between larger area measures to smaller ones (e.g. cm² to mm²)	
		Increase the knowledge of standard metric units to include tonne, hectare	
		Simplify a ratio expressed in different units	
		Compare ratios by changing them to the form 1:m or m:1	
		Divide a quantity into two parts in a given ratio, where ratio given in ratio notation	
		Divide a quantity into more than 2 parts in a given ratio	
		Write ratios as fractions, percentages	

	associated calculations to linear functions	Understand the relationship between ratio and proportion (convert proportions to ratios)	
		Solve word problems involving direct proportion	
		Use the unitary method to solve simple word problems involving ratio and direct proportion	
		Use the unitary method to solve simple word problems involving ratio and direct proportion	
		Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions	
9 Perimeter, area and volume	understand and use place value for measures use standard units of mass, length, time, money and other measures, including with decimal quantities round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures] understand and use standard mathematical formulae change freely between related standard units [for example time, length, area, volume/capacity, mass] derive formulae to calculate and solve problems involving perimeter of triangles, parallelograms, trapezia derive and apply formulae to calculate and solve problems involving area of triangles, parallelograms, trapezia derive and apply formulae to calculate and solve problems involving volume of cuboids (including cubes) calculate and solve problems involving composite shapes derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies	Find the area of triangles by counting i.e. adding full and partial squares	
		Use a formula to calculate the area of triangles	
		Deduce a formula for the area of a triangle	
		Use a formula to calculate the area of parallelograms	
		Deduce and use the formula for the area of a parallelogram	
		Deduce a formula for the area of a trapezium	
		Calculate the area of more complex shapes made from rectangles	
		Calculate the perimeter and area of shapes made from rectangles	
		Calculate areas of compound shapes made from rectangles and triangles	
		Know and use geometric properties of cuboids	
		Identify more complex nets of 3D shapes including irregular polyhedra.	
		Know and use geometric properties of shapes made from cuboids	
		Know and use the formula for the volume of a cuboid in a simple situation	
		Know and use the formula for the volume of a cuboid in a more complex situation	
		Calculate volumes of shapes made from cuboids, for lengths given as whole numbers	
		Calculate the surface area of cubes, without a net	
		Use nets to calculate the surface area of simple cuboids	
		Calculate the surface area of simple cuboids (without use of nets)	
		Calculate surface areas of shapes made from cuboids, for lengths given as whole numbers	

		Convert cm^3 to ml and litres and vice versa	
		Convert between area measures (e.g. mm² to cm², cm² to m², and vice versa)	
		Convert between volume measures (e.g. mm³ to cm³, cm³ to m³, and vice versa)	
		Know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons)	
10 Sequences and graphs	appreciate the infinite nature of the sets of integers, real and rational numbers generate terms of a sequence from a term-to-term rule generate terms of a sequence from a position-to-term recognise arithmetic sequences find the nth term recognise geometric sequences and appreciate other sequences that arise	Understand the infinite nature of a set of integers	
		Know that an arithmetic sequence is generated by a starting number a, then adding a constant number d	
		Generate terms of a liner sequences using term to term using positive or negative integers	
		Find a term given its position in a sequences like 10th number in 4x table is 40 (one operations on n)	
		Recognise geometric sequences and other sequences that arise.	
		Begin to use a linear expression to describe the nth term in a one-step arithmetic sequence	
		Generate terms of a linear sequence using position to term with positive integers using the nth term.	
		Begin to use linear expressions to describe the nth term in a two step arithmetic sequence (e.g nth term is 3n + 1 or 2n – 3)	
		Generate terms of a linear sequences using position to term with negative integers	
		Begin to use formal algebra to describe the nth term in an arithmetic sequence	
		Generate and describe integer sequences such as powers of 2 and growing rectangles	
		Generate terms from a complex practical context (e.g maximum crossing for a given number of lines).	
		Predict how the sequence will should continue and test for several more terms.	
		Recognise geometric sequences and appreciate other sequences that arise	
		Find the term-to-term rule for geometric sequences and continue to the next few terms.	

		Read x and y co-ordinates in all four quadrants
		Plot a coordinate in all four quadrants
		Know how to find the midpoint of a line segment
		Recognise straight line graphs parallel to x or y axis
		Find the midpoint of a horizontal or vertical line segment AB, using coordinates of these points (no diagrams)
		Find the midpoint of a diagonal line segment AB using the coordinate of these points (no diagrams)
		Plot a graph of a simple linear function in the first quadrant.
		Compare graphs of simple functions
		Generate four quadrant coordinate pairs of simple linear functions
		In tables of functions compare changes in y with corresponding changes in x and how this relates to the function (e.g if in a table they y values goes up by 3, the coefficient of x is 3)
		Plot and recognise graphs of $y = x$ and $y = -x$
		Plot the graphs of simple linear functions in the form $y = mx + c$ in four quadrants

End of year test