Year 9

Week	Strand	Topic	
1	N2, N3, N5, N14, N15	Number 1a – Calculations and rounding	
2		Number 1a – Calculations and rounding	
3	N1, N3, A1, A2, A3, A4, A7	Algebra 2a - expressions	
4		Algebra 2a - expressions	
5	G14, S2, S3, S4, S5	Statistics 3a – Averages, range and tables	
6		Statistics 3a – Averages, range and tables	
7		REVIEW/ASSESS/DIRT WEEK 1	
8	G1, G3, G4, G6, G11	Geometry 5a – angles	
9		Geometry 5a – angles	
10	N2, N3, N10, N12, R3	Number 4a – Fractions and applications	
11		Number 4a – Fractions and applications	
12	N1, N8, A1, A2, A5, A6, A17, A20, A21	Algebra 2b - Equations	
13		Algebra 2b - Equations	
14		REVIEW/ASSESS/DIRT WEEK 2	
15	N3, N6, N7	Number 1b – Indices and BIDMAS	
16		Number 1b – Indices and BIDMAS	
17	N9, A23, A24, A25	Algebra 2c - Sequences	
18		Algebra 2c - Sequences	
19	S4, S6	Statistics 3c – Scatter graphs	
20		REVIEW/ASSESS/DIRT WEEK 3	
21	N8, N12, N13, R9	Number 4b – Percentages	
22		Number 4b – Percentages	
23	N13, N15, A8, A10, A14, A15, R1, R11	Algebra 6a – Graphs including real life	
24		Algebra 6a – Graphs including real life	
25		REVIEW/ASSESS/DIRT WEEK 4	
26	N3, N4	Number 1c – Types of numbers	
27	N8, N14, N15, R1, G1, G9, G14, G16, G17, G18	Geometry 7a – Area, perimeter and circles	
28		Geometry 7a – Area, perimeter and circles	
29	N11, N12, N13, R3, R4, R5, R6, R7, R8, R10	Number/Ratio 4c – Ratio and proportion	
30		Number/Ratio 4c – Ratio and proportion	
31		REVIEW/ASSESS/DIRT WEEK 5	
32	N5, P1, P2, P3, P4, P5, P6, P7, P8, P9	Statistics 10 pt1 – Single probability, independent events	
33		Statistics 10 pt1 – Single probability, independent events	
34		EXAM WEEK	
35		REVIEW/ASSESS/DIRT WEEK 5	
36		DofE week	
37	S1, S2, S3, S4	Statistics 3b – averages, ranges and graphs	
38		Statistics 3b – averages, ranges and graphs	
39			

Number 1a

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Use and order positive and negative numbers (integers);
- Order integers, decimals, use the symbols <, > and understand the ≠ symbol;
- Add and subtract positive and negative numbers (integers);
- Recall all multiplication facts to 10 × 10, and use them to derive quickly the corresponding division facts;
- Multiply or divide any number by powers of 10;
- Multiply and divide positive and negative numbers (integers);
- Use brackets and the hierarchy of operations (not including powers);
- Round numbers to a given power of 10;
- Check answers by rounding and using inverse operations.

POSSIBLE SUCCESS CRITERIA

Given 5 digits, what is the largest even number, largest odd number, or largest or smallest answers when subtracting a two-digit number from a three-digit number?

Given 2.6 × 15.8 = 41.08 what is 26 × 0.158? What is 4108 ÷ 26?

COMMON MISCONCEPTIONS

Significant figure and decimal place rounding are often confused. Some pupils may think 35 934 = 36 to two significant figures.

NOTES

The expectation for Higher tier is that much of this work will be reinforced throughout the course.

Particular emphasis should be given to the importance of clear presentation of work.

Formal written methods of addition, subtraction and multiplication work from right to left, whilst formal division works from left to right.

Any correct method of multiplication will still gain full marks, for example, the grid method, the traditional method, Napier's bones.

Encourage the exploration of different calculation methods.

Amounts of money should always be rounded to the nearest penny.

Make sure students are absolutely clear about the difference between significant figures and decimal places.

Algebra 2a

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Use algebraic notation and symbols correctly;
- Write an expression;
- Know the difference between a term, expression, equation, formula and an identity;
- Manipulate an expression by collecting like terms;
- Substitute positive and negative numbers into expressions such as $3x + 4$ and $2x^3$ and then into expressions involving brackets and powers;
- Substitute numbers into formulae from mathematics and other subject using simple linear formulae, e.g. $l \times w$, $v = u + at$;
- Simplify expressions by cancelling, e.g. $\frac{4x}{2} = 2x$
- Use instances of index laws for positive integer powers;
- Use index notation (positive powers) when multiplying or dividing algebraic terms;
- Use instances of index laws, including use of zero, fractional and negative powers;
- Multiply a single term over a bracket;
- Recognise factors of algebraic terms involving single brackets and simplify expressions by factorising, including subsequently collecting like terms;
- Expand the product of two linear expressions, i.e. double brackets working up to negatives in both brackets and also similar to $(2x + 3y)(3x - y)$;
- Know that squaring a linear expression is the same as expanding double brackets;
- **Factorise quadratic expressions of the form $ax^2 + bx + c$;**
  Factorise quadratic expressions using the difference of two squares.

POSSIBLE SUCCESS CRITERIA

Simplify $4p - 2q^2 + 1 - 3p + 5q^2$.

Evaluate $4x^2 - 2x$ when $x = -5$.

Simplify $z^4 \times z^3$, $y^3 \div y^2$, $(a^7)^2$, $\left(8x^6y^4\right)^{\frac{1}{3}}$.

Expand and simplify $3(t - 1) + 57$.

Factorise $15x^2y - 35x^2y^2$.

Expand and simplify $(3x + 2)(4x - 1)$.

Factorise $6x^2 - 7x + 1$.

COMMON MISCONCEPTIONS

When expanding two linear expressions, poor number skills involving negatives and times tables will become evident.

Statistics 3a

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Design and use two-way tables for discrete and grouped data;
- Use information provided to complete a two-way table;
- Sort, classify and tabulate data and discrete or continuous quantitative data;
- Calculate mean and range, find median and mode from small data set;
- Use a spreadsheet to calculate mean and range, and find median and mode;
- Recognise the advantages and disadvantages between measures of average;
- Construct and interpret stem and leaf diagrams (including back-to-back diagrams):
  - find the mode, median, range, as well as the greatest and least values from stem and leaf diagrams, and compare two distributions from stem and leaf diagrams (mode, median, range);
- Calculate the mean, mode, median and range from a frequency table (discrete data);
- Construct and interpret grouped frequency tables for continuous data:
  - for grouped data, find the interval which contains the median and the modal class;
  - estimate the mean with grouped data;

understand that the expression 'estimate' will be used where appropriate, when finding the mean of grouped data using mid-interval values.

POSSIBLE SUCCESS CRITERIA

Be able to state the median, mode, mean and range from a small data set.
Extract the averages from a stem and leaf diagram.
Estimate the mean from a table.

COMMON MISCONCEPTIONS

Students often forget the difference between continuous and discrete data.
Often the $\Sigma(m \times f)$ is divided by the number of classes rather than Σf when estimating the mean.

NOTES

Encourage students to cross out the midpoints of each group once they have used these numbers to in $m \times f$. This helps students to avoid summing m instead of f.
Remind students how to find the midpoint of two numbers.
Emphasise that continuous data is measured, i.e. length, weight, and discrete data can be counted, i.e. number of shoes.
Designing and using data collection is no longer in the specification, but may remain a useful topic as part of the overall data handling process.

Geometry 5a

OBJECTIVES By the end of the sub-unit, students should be able to: • Classify quadrilaterals by their geometric properties and distinguish between scalene, isosceles and equilateral triangles; • Understand 'regular' and 'irregular' as applied to polygons; • Understand the proof that the angle sum of a triangle is 180°, and derive and use the sum of angles in a triangle; • Use symmetry property of an isosceles triangle to show that base angles are equal; • Find missing angles in a triangle using the angle sum in a triangle AND the properties of an isosceles triangle; • Understand a proof of, and use the fact that, the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices; • Explain why the angle sum of a quadrilateral is 360°; • Understand and use the angle properties of quadrilaterals and the fact that the angle sum of a quadrilateral is 360°; • Understand and use the angle properties of parallel lines and find missing angles using the properties of corresponding and alternate angles, giving reasons; • Use the angle sums of irregular polygons; • Calculate and use the sums of the interior angles of polygons, use the sum of angles in a triangle to deduce and use the angle sum in any polygon and to derive the properties of regular polygons; • Use the sum of the exterior angles of any polygon is 360°; • Use the sum of the interior angles of an n-sided polygon; • Use the sum of the interior angle and the exterior angle is 180°; • Find the size of each interior angle, or the size of each exterior angle, or the number of sides of a regular polygon, and use the sum of angles of irregular polygons; • Calculate the angles of regular polygons and use these to solve problems; • Use the side/angle properties of compound shapes made up of triangles, lines and quadrilaterals, including solving angle and symmetry problems for shapes in the first quadrant, more complex problems and using algebra; Use angle facts to demonstrate how shapes would 'fit together', and work out interior angles of shapes in a pattern.	**POSSIBLE SUCCESS CRITERIA** Name all quadrilaterals that have a specific property. Given the size of its exterior angle, how many sides does the polygon have?

BOLD – Higher tier

<u>UNDERLINED</u> – higher and foundation tier

Number 4a

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Express a given number as a fraction of another;
- Find equivalent fractions and compare the size of fractions;
- Write a fraction in its simplest form, including using it to simplify a calculation, e.g. $50 \div 20 = \frac{50}{20} = \frac{5}{2} = 2.5$;
- Find a fraction of a quantity or measurement, including within a context;
- Convert a fraction to a decimal to make a calculation easier;
- Convert between mixed numbers and improper fractions;
- Add, subtract, multiply and divide fractions;
- Multiply and divide fractions, including mixed numbers and whole numbers and vice versa;
- Add and subtract fractions, including mixed numbers;
- Understand and use unit fractions as multiplicative inverses;
- By writing the denominator in terms of its prime factors, **decide whether fractions can be converted to recurring or terminating decimals**;
- **Convert a fraction to a recurring decimal;**
- **Convert a recurring decimal to a fraction;**

  Find the reciprocal of an integer, decimal or fraction.

POSSIBLE SUCCESS CRITERIA

Express a given number as a fraction of another, including where the fraction is, for example, greater than 1, e.g. $\frac{120}{100} = 1\frac{2}{10} = 1\frac{1}{5}$.

Answer the following: James delivers 56 newspapers. $\frac{3}{8}$ of the newspapers have a magazine. How many of the newspapers have a magazine?

Prove whether a fraction is terminating or recurring.

Convert a fraction to a decimal including where the fraction is greater than 1.

COMMON MISCONCEPTIONS

The larger the denominator, the larger the fraction.

NOTES

Ensure that you include fractions where only one of the denominators needs to be changed, in addition to where both need to be changed for addition and subtraction.

Include multiplying and dividing integers by fractions.

Use a calculator for changing fractions into decimals and look for patterns.

Recognise that every terminating decimal has its fraction with a 2 and/or 5 as a common factor in the denominator.

Use long division to illustrate recurring decimals.

Amounts of money should always be rounded to the nearest penny.

Encourage use of the fraction button.

Algebra 2b

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Set up simple equations from word problems and derive simple formulae;
- Understand the ≠ symbol (not equal), e.g. $6x + 4 \neq 3(x + 2)$, and introduce identity ≡ sign;
- Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation;
- Solve linear equations which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution;
- Solve linear equations in one unknown, with integer or **fractional coefficients;**
- Set up and solve linear equations to solve to solve a problem;
- Derive a formula and set up simple equations from word problems, then solve these equations, interpreting the solution in the context of the problem;
- Substitute positive and negative numbers into a formula, solve the resulting equation including brackets, powers or standard form;
- Use and substitute formulae from mathematics and other subjects, including the kinematics formulae $v = u + at$, $v^2 - u^2 = 2as$, and $s = ut + \frac{1}{2} at^2$;
- Change the subject of a simple formula, i.e. linear one-step, such as $x = 4y$;
- Change the subject of a formula, including cases where the subject is on both sides of the original formula, or involving fractions and small powers of the subject;
- **Simple proofs and use of ≡ in "show that" style questions**; know the difference between an equation and an identity;

Use iteration to find approximate solutions to equations, for simple equations in the first instance, then quadratic and cubic equations.

POSSIBLE SUCCESS CRITERIA

A room is 2 m longer than it is wide. If its area is 30 m^2 what is its perimeter?
Use fractions when working in algebraic situations.
Substitute positive and negative numbers into formulae.
Be aware of common scientific formulae.
Know the meaning of the 'subject' of a formula.
Change the subject of a formula when one step is required.
Change the subject of a formula when two steps are required.

COMMON MISCONCEPTIONS

Hierarchy of operations applied in the wrong order when changing the subject of a formula.
$a^0 = 0$.
$3xy$ and $5yx$ are different "types of term" and cannot be "collected" when simplifying expressions.
The square and cube operations on a calculator may not be similar on all makes.
Not using brackets with negative numbers on a calculator.
Not writing down all the digits on the display.

Number 1b

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Use index notation for integer powers of 10, including negative powers;
- Recognise powers of 2, 3, 4, 5;
- Use the square, cube and power keys on a calculator and **estimate powers and roots of any given positive number**, by considering the values it must lie between, e.g. the square root of 42 must be between 6 and 7;
- Find the value of calculations using indices including positive, **fractional and negative indices**;
- **Recall that $n^0 = 1$ and $n^{-1} = \frac{1}{n}$ for positive integers n as well as, $n^{\frac{1}{2}} = \sqrt{n}$ and $n^{\frac{1}{3}} = \sqrt[3]{n}$ for any positive number n;**
- **Understand that the inverse operation of raising a positive number to a power n is raising the result of this operation to the power $\frac{1}{n}$;**
- Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, **fractional and negative powers**, and powers of a power;
- Solve problems using index laws;
- Use brackets and the hierarchy of operations up to and including with powers and roots inside the brackets, or raising brackets to powers or taking roots of brackets;
- Use an extended range of calculator functions, including +, −, ×, ÷, x^2, $\sqrt{x}$, memory, x^y, $x^{\frac{1}{y}}$, brackets;

Use calculators for all calculations: positive and negative numbers, brackets, powers and roots, four operations.

POSSIBLE SUCCESS CRITERIA

What is the value of 2^5?

Prove that the square root of 45 lies between 6 and 7.

Evaluate $(2^3 \times 2^5) \div 2^4$, 4^0, $8^{-\frac{2}{3}}$.

Work out the value of n in $40 = 5 \times 2^n$.

COMMON MISCONCEPTIONS

The order of operations is often not applied correctly when squaring negative numbers, and many calculators will reinforce this misconception.

NOTES

Students need to know how to enter negative numbers into their calculator.

Use negative number and not minus number to avoid confusion with calculations.

Algebra 2c

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Recognise simple sequences including at the most basic level odd, even, triangular, square and cube numbers and Fibonacci-type sequences;
- Generate sequences of numbers, squared integers and sequences derived from diagrams;
- Describe in words a term-to-term sequence and identify which terms cannot be in a sequence;
- Generate specific terms in a sequence using the position-to-term rule and term-to-term rule;
- Find and use (to generate terms) the nth term of an arithmetic sequence;
- Use the nth term of an arithmetic sequence to decide if a given number is a term in the sequence, or find the first term above or below a given number;
- Identify which terms cannot be in a sequence by finding the nth term;
- Continue a quadratic sequence and use the nth term to generate terms;
- **Find the nth term of quadratic sequences;**
- Distinguish between arithmetic and geometric sequences;
- Use finite/infinite and ascending/descending to describe sequences;
- Recognise and use simple geometric progressions (rn where n is an integer, and r is a rational number > 0 **or a surd**);
- Continue geometric progression and find term to term rule, including negative, fraction and decimal terms;
- Solve problems involving sequences from real life situations.

POSSIBLE SUCCESS CRITERIA

Given a sequence, 'which is the 1st term greater than 50?'

Be able to solve problems involving sequences from real-life situations, such as:

- 1 grain of rice on first square, 2 grains on second, 4 grains on third, etc (geometric progression), or person saves £10 one week, £20 the next, £30 the next, etc;
- What is the amount of money after x months saving the same amount, or the height of tree that grows 6 m per year;
- Compare two pocket money options, e.g. same number of £ per week as your age from 5 until 21, or starting with £5 a week aged 5 and increasing by 15% a year until 21.

COMMON MISCONCEPTIONS

Students struggle to relate the position of the term to "n".

NOTES

Emphasise use of $3n$ meaning $3 \times n$.

Students need to be clear on the description of the pattern in words, the difference between the terms and the algebraic description of the nth term.

Statistics 3c

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Draw and interpret scatter graphs;
- Interpret scatter graphs in terms of the relationship between two variables;
- Draw lines of best fit by eye, understanding what these represent;
- Identify outliers and ignore them on scatter graphs;
- Use a line of best fit, or otherwise, to predict values of a variable given values of the other variable;
- Distinguish between positive, negative and zero correlation using lines of best fit, and interpret correlation in terms of the problem;
- Understand that correlation does not imply causality, and appreciate that correlation is a measure of the strength of the association between two variables and that zero correlation does not necessarily imply 'no relationship' but merely 'no linear correlation';
- Explain an isolated point on a scatter graph;

Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing.

POSSIBLE SUCCESS CRITERIA

Be able to justify an estimate they have made using a line of best fit.
Identify outliers and explain why they may occur.
Given two sets of data in a table, model the relationship and make predictions.

COMMON MISCONCEPTIONS

Students often forget the difference between continuous and discrete data.
Lines of best fit are often forgotten, but correct answers still obtained by sight.

NOTES

Students need to be constantly reminded of the importance of drawing a line of best fit.
A possible extension includes drawing the line of best fit through the mean point (mean of x, mean of y).

Number 4b

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Convert between fractions, decimals and percentages;
- Express a given number as a percentage of another number;
- Express one quantity as a percentage of another where the percentage is greater than 100%
- Find a percentage of a quantity;
- Find the new amount after a percentage increase or decrease;
- Work out a percentage increase or decrease, including: simple interest, income tax calculations, value of profit or loss, percentage profit or loss;
- Compare two quantities using percentages, including a range of calculations and contexts such as those involving time or money;
- Find a percentage of a quantity using a multiplier;
- Use a multiplier to increase or decrease by a percentage in any scenario where percentages are used;
- Find the original amount given the final amount after a percentage increase or decrease (reverse percentages), including VAT;
- Use calculators for reverse percentage calculations by doing an appropriate division;
- Use percentages in real-life situations, including percentages greater than 100%;
- Describe percentage increase/decrease with fractions, e.g. 150% increase means $2\frac{1}{2}$ times as big;

Understand that fractions are more accurate in calculations than rounded percentage or decimal equivalents, and choose fractions, decimals or percentages appropriately for calculations.

POSSIBLE SUCCESS CRITERIA

Be able to work out the price of a deposit, given the price of a sofa is £480 and the deposit is 15% of the price, without a calculator.

Find fractional percentages of amounts, with and without using a calculator.

Convince me that 0.125 is $\frac{1}{8}$.

COMMON MISCONCEPTIONS

Incorrect links between fractions and decimals, such as thinking that $\frac{1}{5}$ = 0.15, 5% = 0.5, 4% = 0.4, etc.

It is not possible to have a percentage greater than 100%.

NOTES

Students should be reminded of basic percentages.

Amounts of money should always be rounded to the nearest penny, except where successive calculations are done (i.e. <u>compound interest,</u> which is covered in a later unit).

Emphasise the use of percentages in real-life situations.

Algebra 6a

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Recognise a linear, quadratic, cubic, reciprocal and circle graph from its shape;
- Generate points and plot graphs of simple quadratic functions, then more general quadratic functions;
- Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function;
- Interpret graphs of quadratic functions from real-life problems;
- Draw graphs of simple cubic functions using tables of values;
- Interpret graphs of simple cubic functions, including finding solutions to cubic equations;
- Draw graphs of the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$ using tables of values;

Draw circles, centre the origin, equation $x^2 + y^2 = r^2$.

POSSIBLE SUCCESS CRITERIA

Select and use the correct mathematical techniques to draw linear, quadratic, cubic and reciprocal graphs.
Identify a variety of functions by the shape of the graph.

COMMON MISCONCEPTIONS

Students struggle with the concept of solutions and what they represent in concrete terms.

NOTES

Use lots of practical examples to help model the quadratic function, e.g. draw a graph to model the trajectory of a projectile and predict when/where it will land.
Ensure axes are labelled and pencils used for drawing.
Graphical calculations or appropriate ICT will allow students to see the impact of changing variables within a function.

Number 1c

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Identify factors, multiples and prime numbers;
- Find the prime factor decomposition of positive integers – write as a product using index notation;
- Find common factors and common multiples of two numbers;
- Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors – include finding LCM and HCF given the prime factorisation of two numbers;
- Solve problems using HCF and LCM, and prime numbers;

Understand that the prime factor decomposition of a positive integer is unique, whichever factor pair you start with, and that every number can be written as a product of prime factors.

POSSIBLE SUCCESS CRITERIA

Know how to test if a number up to 120 is prime.
Understand that every number can be written as a unique product of its prime factors.
Recall prime numbers up to 100.
Understand the meaning of prime factor.
Write a number as a product of its prime factors.
Use a Venn diagram to sort information.

COMMON MISCONCEPTIONS

1 is a prime number.
Particular emphasis should be made on the definition of "product" as multiplication, as many students get confused and think it relates to addition.

NOTES

Use a number square to find primes (Eratosthenes sieve).
Using a calculator to check the factors of large numbers can be useful.
Students need to be encouraged to learn squares from 2 × 2 to 15 × 15 and cubes of 2, 3, 4, 5 and 10, and corresponding square and cube completi.

Geometry 7a

OBJECTIVES

By the end of the unit, students should be able to:

- Recall and use the formulae for the area of a triangle, rectangle, trapezium and parallelogram using a variety of metric measures;
- Calculate the area of compound shapes made from triangles, rectangles, trapezia and parallelograms using a variety of metric measures;
- Find the perimeter of a rectangle, trapezium and parallelogram using a variety of metric measures;
- Calculate the perimeter of compound shapes made from triangles and rectangles;
- Estimate area and perimeter by rounding measurements to 1 significant figure to check reasonableness of answers.
- Recall the definition of a circle and name and draw parts of a circle;
- Recall and use formulae for the circumference of a circle and the area enclosed by a circle (using circumference = $2\pi r = \pi d$ and area of a circle = πr^2) using a variety of metric measures;
- Use $\pi \approx 3.142$ or use the π button on a calculator;
- Calculate perimeters and areas of composite shapes made from circles and parts of circles (including semicircles, quarter-circles, combinations of these and also incorporating other polygons);
- <u>Calculate arc lengths, angles and areas of sectors of circles;</u>
- <u>Find radius or diameter, given area or circumference of circles in a variety of metric measures;</u>
- Give answers in terms of π;

Form equations involving more complex shapes and solve these equations.

POSSIBLE SUCCESS CRITERIA

Calculate the area and/or perimeter of shapes with different units of measurement.
Understand that answers in terms of π are more accurate.
Calculate the perimeters and/or areas of circles, semicircles and quarter-circles given the radius or diameter and vice versa.

COMMON MISCONCEPTIONS

Students often get the concepts of area and perimeter confused.
Shapes involving missing lengths of sides often result in incorrect answers.
Diameter and radius are often confused, and recollection of area and circumference of circles involves incorrect radius or diameter.

NOTES

Encourage students to draw a sketch where one isn't provided.
Emphasise the functional elements with carpets, tiles for walls, boxes in a larger box, etc. Best value and minimum cost can be incorporated too.
Ensure that examples use different metric units of length, including decimals.
Emphasise the need to learn the circle formulae; "Cherry Pie's Delicious" and "Apple Pies are too" are good ways to remember them.
Ensure that students know it is more accurate to leave answers in terms of π, but only when asked to do so.

Number/Ratio 4c

OBJECTIVES By the end of the sub-unit, students should be able to: • Express the division of a quantity into a number parts as a ratio; • Write ratios in form 1 : m or m : 1 and to describe a situation; • Write ratios in their simplest form, including three-part ratios; • Divide a given quantity into two or more parts in a given part : part or part : whole ratio; • Use a ratio to find one quantity when the other is known; • Write a ratio as a fraction; • Write a ratio as a linear function; • <u>Identify direct proportion from a table of values, by comparing ratios of values;</u> • Use a ratio to compare a scale model to real-life object; • Use a ratio to convert between measures and currencies, e.g. £1.00 = €1.36; • Scale up recipes; Convert between currencies.	**POSSIBLE SUCCESS CRITERIA** Write/interpret a ratio to describe a situation such as 1 blue for every 2 red …, 3 adults for every 10 children … Recognise that two paints mixed red to yellow 5 : 4 and 20 : 16 are the same colour. When a quantity is split in the ratio 3:5, what fraction does each person get? Find amounts for three people when amount for one given. Express the statement 'There are twice as many girls as boys' as the ratio 2 : 1 or the linear function $y = 2x$, where x is the number of boys and y is the number of girls. **NOTES** Three-part ratios are usually difficult for students to understand. Also include using decimals to find quantities. Use a variety of measures in ratio and proportion problems. Include metric to imperial and vice versa, but give them the conversion factor, e.g. 5 miles = 8 km, 1 inch = 2.4 cm – these aren't specifically in the programme of study but are still useful.

Probability 10 pt1

OBJECTIVES	**POSSIBLE SUCCESS CRITERIA**
By the end of the unit, students should be able to: • Write probabilities using fractions, percentages or decimals; • Understand and use experimental and theoretical measures of probability, including relative frequency to include outcomes using dice, spinners, coins, etc; • Estimate the number of times an event will occur, given the probability and the number of trials; • Find the probability of successive events, such as several throws of a single dice; • List all outcomes for single events, and combined events, systematically; • Draw sample space diagrams and use them for adding simple probabilities; • Know that the sum of the probabilities of all outcomes is 1; Use $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring;	If the probability of outcomes are x, $2x$, $4x$, $3x$, calculate x.

Statistics 3b

OBJECTIVES

By the end of the sub-unit, students should be able to:

- Know which charts to use for different types of data sets;
- Produce and interpret composite bar charts;
- Produce and interpret comparative and dual bar charts;
- Produce and interpret pie charts:
  - find the mode and the frequency represented by each sector;
  - compare data from pie charts that represent different-sized samples;
- Produce and interpret frequency polygons for grouped data:
  - from frequency polygons, read off frequency values, compare distributions, calculate total population, mean, estimate greatest and least possible values (and range);
- Produce frequency diagrams for grouped discrete data:
  - read off frequency values, calculate total population, find greatest and least values;
- Produce histograms with equal class intervals:
  - estimate the median from a histogram with equal class width or any other information, such as the number of people in a given interval;
- Produce line graphs:
  - read off frequency values, calculate total population, find greatest and least values;
- <u>Construct and interpret time–series graphs, comment on trends;</u>
- Compare the mean and range of two distributions, or median or mode as appropriate;

Recognise simple patterns, characteristics relationships in bar charts, line graphs and frequency polygons.

POSSIBLE SUCCESS CRITERIA

Use a time–series data graph to make a prediction about a future value.

Explain why same-size sectors on pie charts with different data sets do not represent the same number of items, but do represent the same proportion.

Make comparisons between two data sets.

NOTES

Interquartile range is covered in unit 16.

Misleading graphs are a useful activity for covering AO2 strand 5: Critically evaluate a given way of presenting information.

When doing time–series graphs, use examples from science, geography.

NB <u>Moving averages</u> are not explicitly mentioned in the programme of study but may be worth covering too.