



CAMI Education linked to CAPS: Mathematics

Grade 9 CAPS Curriculum		
TERM 1		
TOPIC	CONTENT	CAMI Keys
1.1 Whole numbers	<p>Properties of numbers</p> <ul style="list-style-type: none"> Describe the real number system by recognizing, defining and distinguishing properties of: <ul style="list-style-type: none"> ❖ Natural numbers ❖ Whole numbers ❖ Integers ❖ Rational numbers ❖ Irrational numbers <p>Calculations using whole numbers Revise:</p> <ul style="list-style-type: none"> Calculations using all four operations on whole numbers, estimating and using calculators where appropriate <p>Calculation techniques Use a range of strategies to perform and check written and mental calculations of whole numbers including:</p> <ul style="list-style-type: none"> Estimation Adding, subtracting and multiplying in columns Long division Rounding off and compensating Using a calculator <p>Multiples and factors Use prime factorization of numbers to find LCM and HCF</p> <p>Solving problems</p> <ul style="list-style-type: none"> Solve problems in contexts involving <ul style="list-style-type: none"> ❖ Ratio and rate ❖ Direct and indirect proportion Solve problems that involve whole 	<p>1.8.6.1 1.8.6.2</p> <p>2.6.6 2.6.3.1 2.6.3.2 2.6.3.3 2.6.3.4 4.7.1.3 4.7.1.4 4.7.2.2 4.7.2.3 2.6.1.1 2.6.1.2 2.6.1.3 2.6.1.4 2.6.1.5 2.6.2.1 2.6.2.2 2.6.2.3 3.8.7.4</p>



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	<p>numbers, percentages and decimal fractions in financial contexts such as:</p> <ul style="list-style-type: none"> ❖ Profit, loss, discount and VAT ❖ Budgets ❖ Accounts and loans ❖ Simple interest and hire purchase ❖ Exchange rates and commission ❖ Rentals ❖ Compound interest 	<p>10.6.1.3 10.6.2.7 10.6.3.1 10.6.3.2 10.6.3.4 10.6.4.1 10.6.5.6 10.7.2.3 10.7.2.6 10.7.2.5 10.7.1.3</p>
<p>1.3 Integers</p>	<p>Calculations with integers</p> <ul style="list-style-type: none"> • Revise: <ul style="list-style-type: none"> ❖ Perform calculations involving all four operations with integers ❖ Perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers <p>Properties of integers Revise:</p> <ul style="list-style-type: none"> • Commutative, associative and distributive properties of addition and multiplication for integers • Additive and multiplicative inverses for integers <p>Solving problems</p> <ul style="list-style-type: none"> • Solve problems in contexts involving multiple operations with integers 	<p>2.2.7 2.5.1.1 2.5.1.2 2.5.1.3 2.5.1.4 2.5.1.5 2.5.1.6 2.5.2.1 2.5.2.2 2.5.2.3 2.5.2.4 2.5.3.1 2.5.3.2 2.5.3.3 2.5.3.4 2.5.3.5 2.5.4.3 2.5.4.4 2.5.4.5 2.5.4.6 3.8.1.9</p>
<p>1.4 Common fractions</p>	<p>Calculations using fractions</p> <ul style="list-style-type: none"> • All four operations with common fractions and mixed numbers • All four operations, with numbers that involve the squares, cubes, square roots and cube roots of common fractions 	<p>2.2.2.4 2.2.2.5 2.2.2.6 2.2.2.7 2.2.2.8 2.2.4.1</p>



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	<p>Calculation techniques Revise:</p> <ul style="list-style-type: none"> • Convert mixed numbers to common fractions in order to perform calculations with them • Use knowledge of multiples and fractions in the simplest form before or after calculations • Use knowledge of equivalent fractions to add and subtract common fractions • Use knowledge of reciprocal relationships to divide common fractions <p>Solving problems Solve problems in contexts involving common fractions, mixed numbers and percentages</p> <p>Equivalent forms Revise equivalent forms between:</p> <ul style="list-style-type: none"> • Common fractions where one denominator is a multiple of another • Common fraction and decimal fraction forms of the same number • Common fraction, decimal fraction and percentage forms of the same number 	<p>2.2.4.2 2.2.4.3 2.2.4.4 2.2.5.10 2.2.5.8 2.2.5.9 2.2.6.1 2.2.6.2 2.3.4.10 2.3.4.8 2.3.4.9 4.7.3.1 4.7.3.2 4.7.3.3 4.8.1.3 4.8.2.1 4.8.4.4</p>
<p>1.5 Decimal fractions</p>	<p>Calculations with decimal fractions</p> <ul style="list-style-type: none"> • Multiple operations with decimal fractions, using a calculator where appropriate • Multiple operations, with or without brackets, with numbers that involve the squares, cubes, squares roots and cube roots of decimal numbers <p>Calculation techniques</p> <ul style="list-style-type: none"> • Use knowledge of place values to 	<p>2.3.2.4 2.3.2.6 2.3.2.7 2.3.3.3 2.3.6.3 2.3.6.5 2.3.6.6 2.3.6.9 2.3.7.3 2.3.7.6</p>



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	<p>estimate the number of decimal places in the result before performing calculations</p> <ul style="list-style-type: none"> • Use rounding off and a calculator to check results where appropriate <p>Solving problems Solve problems in context involving decimal fractions</p> <p>Equivalent forms Revise equivalent forms between:</p> <ul style="list-style-type: none"> • Common fraction and decimal fraction forms of the same number • Common fraction, decimal fraction and percentage forms of the same number 	
<p>1.2 Exponents</p>	<p>Comparing and representing numbers in exponential form Revise:</p> <ul style="list-style-type: none"> • Compare and represent integers in exponential form • Compare and represent numbers in scientific notation <p>Extend scientific notation to include negative exponents</p> <p>Calculations using numbers in exponential form Revise the following general laws of exponents:</p> <ul style="list-style-type: none"> • $a^m \times a^n = a^{m+n}$ • $a^m \div a^n = a^{m-n}$ if $m > n$ • $(a^m)^n = a^{mn}$ • $(a \times t)^n = a^n \times t^n$ • $a^0 = 1$ <p>Extend the general laws of exponents to include:</p>	<p>1.8.4.1 1.8.5.5 1.8.5.6 1.8.5.7 4.1.3.8 4.3.1.1 4.3.1.2 4.3.1.3 4.3.1.4 4.3.1.5 4.3.1.6 4.3.1.7 4.4.2.1 4.4.2.2 4.4.2.3 4.3.2.1 1.8.4.2 1.8.4.3 1.8.4.4</p>



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	<ul style="list-style-type: none">integer exponents$a^{-m} = \frac{1}{a^m}$ <p>Perform calculations involving all four operations using numbers in exponential form.</p> <p>Solving problems</p> <ul style="list-style-type: none">solve problems in contexts involving numbers in exponential form, including scientific notation	
2.1 Numeric and geometric patterns	<p>Investigate and extend patterns</p> <p>Investigate and extend numeric and geometric patterns looking for relationships between numbers including patterns:</p> <ul style="list-style-type: none">represented in physical or diagram formnot limited to sequences involving a constant difference or ratioof learner's own creationrepresented in tablesrepresented algebraically <p>Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language.</p>	4.1.2.8 4.1.2.9 4.1.4.4 4.1.4.6 4.1.1.8
2.2 Functions and relationships	<p>Input and output values</p> <ul style="list-style-type: none">determine input values, output values and rules for patterns and relationships using:<ul style="list-style-type: none">❖ Flow diagrams❖ Tables❖ Formulae❖ Equations <p>Equivalent forms</p> <ul style="list-style-type: none">Determine, interpret and justify equivalence of different descriptions of the same relationship or rule	3.2.6.4 3.2.6.5 3.2.6.6 4.1.3.7



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	<p>presented:</p> <ul style="list-style-type: none"> ❖ Verbally ❖ In flow diagrams ❖ In tables ❖ By formulae ❖ By equations ❖ By graphs on a Cartesian plane 	
<p>2.3 Algebraic expressions</p>	<p>Algebraic language</p> <ul style="list-style-type: none"> • Revise the following done in Grade 8: ❖ Recognize and identify conversions for writing algebraic expressions ❖ Identify and classify like and unlike terms in algebraic expressions ❖ Recognize and identify coefficients and exponents in algebraic expressions <p>Recognize and differentiate between monomials, binomials and trinomials.</p> <p>Expand and simplify algebraic expressions</p> <ul style="list-style-type: none"> • Revise the following done in Grade 8, using the commutative, associative and distributive laws for rational numbers and laws of exponents to: ❖ Add and subtract like terms in algebraic expressions ❖ Multiply integers and monomials by: <ul style="list-style-type: none"> - Monomials - Binomials - Trinomials ❖ Divide the following by integers or monomials: <ul style="list-style-type: none"> - Monomials - Binomials - Trinomials ❖ Simplify algebraic expressions involving the above operations ❖ Determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms ❖ Determine the numerical value of 	<p>4.1.2.4</p> <p>3.2.7.1</p> <p>3.2.7.2</p> <p>3.2.7.3</p> <p>3.2.7.4</p> <p>4.1.10.5</p> <p>4.1.10.3</p> <p>4.1.8.2</p> <p>4.1.8.10</p> <p>4.1.8.3</p> <p>4.1.8.4</p> <p>4.1.8.5</p> <p>4.1.8.6</p> <p>4.1.8.8</p> <p>4.1.8.9</p> <p>4.1.9.3</p> <p>4.1.9.4</p> <p>4.1.9.5</p> <p>4.4.3.1</p> <p>4.4.3.2</p> <p>4.4.3.3</p> <p>4.4.3.4</p> <p>4.4.3.5</p> <p>4.4.4.1</p> <p>4.4.4.2</p> <p>4.4.4.3</p> <p>4.4.4.4</p> <p>4.4.4.5</p> <p>4.4.5.1</p> <p>4.4.5.2</p> <p>4.4.5.3</p>



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	<p>algebraic expressions by substitution</p> <ul style="list-style-type: none"> • Extend the above algebraic manipulations to include: <ul style="list-style-type: none"> ❖ Multiply integers and monomials by polynomials ❖ Divide polynomials by integers or monomials ❖ The product of two binomials ❖ The square of a binomial <p>Factorize algebraic expressions</p> <ul style="list-style-type: none"> • Factorize algebraic expressions that involve: <ul style="list-style-type: none"> ❖ Common factors ❖ Difference of two squares ❖ Trinomials of the form: <ul style="list-style-type: none"> - $x^2 + bx + c$ - $ax^2 + bx + c$, where a is a common factor • simplify algebraic expressions that involve the above factorization process • simplify algebraic fractions using factorization 	<p>4.4.6.1 4.4.6.2 4.4.6.3 4.4.6.4</p> <p>4.5.1.1 4.5.1.2 4.5.1.3 4.5.1.4 4.5.1.5 4.5.3.1 4.5.3.2 4.5.3.3 4.5.3.4 4.5.3.5 4.8.2.2 4.8.3.1 4.8.3.2</p>
<p>2.4 Algebraic equations</p>	<p>Equations Revise the following done in Grade 8:</p> <ul style="list-style-type: none"> • Set up equations to describe a problem situation • Analyze and interpret equations that describe a given situation • Solve equations by: <ul style="list-style-type: none"> ❖ Inspection ❖ Using additive and multiplicative inverses ❖ Using laws of exponents • Determine the numerical value of an expression by substitution • Use substitution in equations to 	<p>3.5.7.3 3.8.1.10 4.2.1.3 4.2.1.4 4.2.1.5 4.2.2.1 4.2.2.2 4.2.3.1 4.2.5.1</p>



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	<p>generate tables of ordered pairs</p> <ul style="list-style-type: none"> • Extend solving equations to include: <ul style="list-style-type: none"> ❖ Using factorization ❖ Equations of the form: a product of factors = 0 	<p>4.2.5.2 4.2.5.3 4.2.5.4 4.6.1.1 4.6.2.1 4.9.1.1 4.9.2.1</p>
TERM 2		
<p>3.5 Construction of geometric figures</p>	<p>Constructions</p> <ul style="list-style-type: none"> • Accurately construct geometric figures appropriately using a compass, ruler and protractor, including bisecting angles of a triangle • Construct angles of 45°, 30°, 60 0176 and their multiples without using a protractor. <p>Investigate properties of geometric figures</p> <ul style="list-style-type: none"> • By construction, investigate angles in a triangle, focusing on the relationship between the exterior angle of a triangle and its interior angles • By construction, explore the minimum conditions for two triangles to be congruent • By construction, investigate sides, angles and diagonals in quadrilaterals, focusing on the diagonals of rectangles, squares, parallelograms, rhombi and kites • By construction explore the sum of the interior angles of polygons 	<p>8.1.6.1 8.1.6.2 8.1.6.3 8.1.6.4</p>
<p>3.1 Geometry of 2D shapes</p>	<p>Classify 2D shapes</p> <p>Revise properties and definitions of triangles in terms of their sides and angles, distinguishing between:</p> <ul style="list-style-type: none"> • Equilateral triangles • Isosceles triangles • Right-angled triangles 	<p>8.3.1.1 8.3.1.2 8.3.1.3 8.3.2.1 8.3.2.2 8.3.3.1</p>



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	<p>Revise and write clear definitions of quadrilaterals in terms of their sides, angles and diagonals, distinguishing between:</p> <ul style="list-style-type: none"> • Parallelogram • Rectangle • Square • Rhombus • Trapezium • Kite <p>Similar and congruent triangles</p> <ul style="list-style-type: none"> • Through investigation, establish the minimum conditions for congruent triangles • Through investigations, establish the minimum conditions for similar triangles <p>Solving problems Solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent and similar triangles.</p>	<p>8.3.3.2 8.3.4.1 8.3.4.2 8.4.1.1 8.4.1.2 8.4.2.1 8.4.3.1 8.4.4.1 8.4.4.2 8.4.5.1 8.4.5.2 8.4.6 8.4.7 8.3.6.1 8.3.6.2 8.3.7.1 8.3.7.2 8.3.8</p>
<p>3.3 Geometry of straight lines</p>	<p>Angle relationships Revise and write clear descriptions of the relationship between angles formed by:</p> <ul style="list-style-type: none"> • Perpendicular lines • Intersecting lines • Parallel lines cut by a transversal <p>Solving problems Solve geometric problems using the relationships between pairs of angles described above.</p>	<p>8.1.5.1 8.1.5.2 8.2.1.1 8.2.1.2 8.2.2.1 8.2.2.2 8.2.3.1 8.2.3.2 8.2.4.1 8.2.4.2 8.2.5.1 8.2.5.2</p>
<p>4.3 The Theorem</p>	<p>Solve problems using the Theorem of Pythagoras</p>	<p>7.1.1.1</p>



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<p>of Pythagoras</p>	<p>Use the Theorem of Pythagoras to solve problems involving unknown lengths in geometric figures that contain right-angled triangles.</p>	<p>7.1.1.2 7.1.1.3 7.1.1.4 7.1.1.5 7.1.1.6</p>
<p>4.1 Area and perimeter of 2D shapes</p>	<p>Area and perimeter</p> <ul style="list-style-type: none"> • Use appropriate formulae and conversions between SI units, to solve problems and calculate perimeter and area of: <ul style="list-style-type: none"> ❖ Polygons ❖ Circles • Investigate how doubling any or all of the dimensions of a 2D figure affects its perimeter and its area 	<p>3.8.6.7 3.8.6.6 9.3.3.5 9.3.3.6 9.3.3.7 9.3.4.1 9.3.4.2 9.3.4.3 9.3.4.4 9.3.4.5 9.3.4.6 9.3.6.1 9.3.6.2 9.3.6.3 9.3.6.4 9.3.6.5 9.3.7.2</p>
<p>TERM 3</p>		
<p>2.2 Functions and relationships</p>	<p>Input and output values</p> <ul style="list-style-type: none"> • determine input values, output values and rules for patterns and relationships using: <ul style="list-style-type: none"> ❖ Flow diagrams ❖ Tables ❖ Formulae ❖ Equations <p>Equivalent forms</p> <ul style="list-style-type: none"> • Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: <ul style="list-style-type: none"> ❖ Verbally ❖ In flow diagrams ❖ In tables 	<p>3.2.6.4 3.2.6.5 3.2.6.6 4.1.3.7 4.1.3.6</p>



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	<ul style="list-style-type: none"> ❖ By formulae ❖ By equations ❖ By graphs on a Cartesian plane 	
<p>2.3 Algebraic expressions</p>	<p>Algebraic language</p> <ul style="list-style-type: none"> • Revise the following done in Grade 8: ❖ Recognize and identify conversions for writing algebraic expressions ❖ Identify and classify like and unlike terms in algebraic expressions ❖ Recognize and identify coefficients and exponents in algebraic expressions <p>Recognize and differentiate between monomials, binomials and trinomials.</p> <p>Expand and simplify algebraic expressions</p> <ul style="list-style-type: none"> • Revise the following done in Grade 8, using the commutative, associative and distributive laws for rational numbers and laws of exponents to: ❖ Add and subtract like terms in algebraic expressions ❖ Multiply integers and monomials by: <ul style="list-style-type: none"> - Monomials - Binomials - Trinomials ❖ Divide the following by integers or monomials: <ul style="list-style-type: none"> - Monomials - Binomials - Trinomials ❖ Simplify algebraic expressions involving the above operations ❖ Determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms ❖ Determine the numerical value of algebraic expressions by substitution • Extend the above algebraic manipulations to include: ❖ Multiply integers and monomials by 	<p>4.1.2.4</p> <p>3.2.7.1</p> <p>3.2.7.2</p> <p>3.2.7.3</p> <p>3.2.7.4</p> <p>4.1.10.5</p> <p>4.1.10.3</p> <p>4.1.8.2</p> <p>4.1.8.10</p> <p>4.1.8.3</p> <p>4.1.8.4</p> <p>4.1.8.5</p> <p>4.1.8.6</p> <p>4.1.8.8</p> <p>4.1.8.9</p> <p>4.1.9.3</p> <p>4.1.9.4</p> <p>4.1.9.5</p> <p>4.4.3.1</p> <p>4.4.3.2</p> <p>4.4.3.3</p> <p>4.4.3.4</p> <p>4.4.3.5</p> <p>4.4.4.1</p> <p>4.4.4.2</p> <p>4.4.4.3</p> <p>4.4.4.4</p> <p>4.4.4.5</p> <p>4.4.5.1</p> <p>4.4.5.2</p> <p>4.4.5.3</p> <p>4.4.6.1</p> <p>4.4.6.2</p> <p>4.4.6.3</p>



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<p>2.5 Graphs</p>	<p>Interpreting graphs Revise the following done in Grade 8:</p> <ul style="list-style-type: none"> • Analyze and interpret global graphs of problem situations, with a special focus on the following trends and features: <ul style="list-style-type: none"> ❖ Linear and non-linear ❖ Constant, increasing or decreasing ❖ Maximum and minimum ❖ Discrete or continuous • Extend the above with special focus on the following features of linear graphs: <ul style="list-style-type: none"> ❖ X-intercept and y-intercept ❖ Gradient <p>Drawing graphs Revise the following done in Grade 8:</p> <ul style="list-style-type: none"> • Draw global graphs from given descriptions of a problem situation, identifying features listed above • Use tables of ordered pairs to plot points and draw graphs on the Cartesian plane <p>extend the above with a special focus on:</p> <ul style="list-style-type: none"> • Drawing linear graphs from given equations • Determine equations from given linear graphs 	<p>6.1.1 6.1.2.3 6.1.3 6.1.4 6.1.5 6.1.6</p> <p>6.3.1.1 6.3.1.2</p> <p>6.2.1 6.2.2 6.2.3 6.2.4 6.2.5 6.2.6</p>
<p>4.2 surface area and volume of 3D objects</p>	<p>Surface area and volume Use appropriate formulae and conversions between SI units to solve problems and calculate the surface area, volume and capacity of:</p> <ul style="list-style-type: none"> • cubes • rectangular prisms • cylinders <p>Investigate how doubling any or all the dimensions of right prisms and cylinders affects the volume</p>	<p>9.4.1 9.5.2.1 9.5.2.2 9.5.2.3 9.5.3.1 9.5.3.2 9.5.6.1</p>



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TERM 4		
<p>3.4 Transformation geometry</p>	<p>Transformations</p> <ul style="list-style-type: none">• Recognize, describe and perform transformations with points, line segments and simple geometric figures on a co-ordinate plane, focusing on:<ul style="list-style-type: none">❖ Reflection in the Y-axis❖ Translation within and across quadrilaterals❖ Reflection in the line $y = x$• Identify what the transformation of a point is, if given the co-ordinates of its image <p>Enlargements and reductions</p> <ul style="list-style-type: none">• Use proportion to describe the effect of enlargement or reduction on area and perimeter of geometric figures• Investigate the co-ordinates of the vertices of figures that have been enlarged or reduced by a given scale factor	<p>8.10.2.4 8.10.2.6 8.10.2.5 8.10.3.3 8.10.3.4</p>
<p>3.2 Geometry of 3D objects</p>	<p>Classifying 3D objects</p> <ul style="list-style-type: none">• Revise properties and definitions of the 5 Platonic solids in terms of the shape and number of faces, the number of vertices and the number of edges• Recognize and describe the properties of:<ul style="list-style-type: none">❖ Spheres❖ Cylinders <p>Building 3D models</p> <ul style="list-style-type: none">• Use nets to create models of geometric solids, including:<ul style="list-style-type: none">❖ Cubes❖ Prisms❖ Pyramids❖ Cylinders	<p>Class activity</p> <p>8.1.2.5</p>



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<p>5.1 Collect, organize and summarize data</p>	<p>Collect data</p> <ul style="list-style-type: none">• Pose questions relating to social, economic and environmental issues• Select and justify appropriate sources for the collection of data• Distinguish between samples and populations, and suggest appropriate samples for investigation• Select and justify appropriate methods for collecting data <p>Organize and summarize data</p> <ul style="list-style-type: none">• Organize numerical data in different ways in order to summarize by determining:<ul style="list-style-type: none">❖ Measures of central tendency❖ Measures of dispersion including extremes and outliers• Organize data according to more than one criteria	
<p>5.2 Represent data</p>	<p>Represent data</p> <ul style="list-style-type: none">• Draw a variety of graphs by hand / technology to display and interpret data including:<ul style="list-style-type: none">❖ Bar graphs and double bar graphs❖ Histograms with given and own intervals❖ Pie charts❖ Broken-line graphs❖ Scatter plots	<p>10.1.2.6</p>
<p>5.3 Interpret, analyze and report data</p>	<p>Interpret data</p> <ul style="list-style-type: none">• Critically read and interpret data represented in a variety of ways• Critically compare two sets of data related to the same issue <p>Analyze data</p> <ul style="list-style-type: none">• Critically analyze data by answering	



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	<p>questions related to:</p> <ul style="list-style-type: none">❖ Data collection methods❖ Summary statistics of data❖ Sources of error and bias in the data <p>Report data Summarize data in short paragraphs that include:</p> <ul style="list-style-type: none">• Drawing conclusions about the data• Making predictions based on the data• Making comparisons between two sets of data• Identifying sources of error and bias in the data• Choosing appropriate summary statistics for the data (mean, median, mode and range)• The role of extremes and outliers in the data	
<p>5.4 Probability</p>	<p>Probability Consider situations with equally probable outcomes, and:</p> <ul style="list-style-type: none">• Determine probabilities of compound events using two-way tables and tree diagrams• Determine the probabilities of outcomes of events and predict their relative frequency in simple experiments• Compare relative frequency with probability and explain possible differences	<p>10.2.7 10.1.6</p>