YEAR 7- Mathematics Term 1   (Secondary)

Topic	Learning outcomes
Calculating	• Use knowledge of place value to multiply with decimals • Use knowledge of place value to divide a decimal • Use knowledge of place value to divide by a decimal • Use knowledge of inverse operations when dividing with decimals • Be fluent at multiplying a three-digit or a two-digit number by a two-digit number • Be fluent when using the method of short division • Know the order of operations for the four operations • Use brackets in problem involving the order of operations • Understand and apply the fact that addition and subtraction have equal priority • Understand and apply the fact that multiplication and division have equal priority
Pattern sniffing	• Use a term-to-term rule to generate a linear sequence • Use a term-to-term rule to generate a non-linear sequence • Find the term-to-term rule for a sequence • Describe a number sequence • Solve problems involving the term-to-term rule for a sequence • Solve problems involving the term-to-term rule for a non-numerical sequence
Checking, approximating and estimating	• Approximate by rounding to any number of decimal places • Know how to identify the first significant figure in any number • Approximate by rounding to the first significant figure in any number • Understand estimating as the process of finding a rough value of an answer or calculation • Use estimation to predict the order of magnitude of the solution to a (decimal) calculation • Estimate calculations by rounding numbers to one significant figure • Use cancellation to simplify calculations • Use inverse operations to check solutions to calculations
Investigating angles	• Identify fluently angles at a point, angles at a point on a line and vertically opposite angles • Identify known angle facts in more complex geometrical diagrams • Use knowledge of angles to calculate missing angles in geometrical diagrams • Know that angles in a triangles total 180° • Find missing angles in triangles • Find missing angles in isosceles triangles • Explain reasoning using vocabulary of angles
Presentation of data	• Know the meaning of categorical data • Know the meaning of discrete data • Interpret and construct frequency tables • Construct and interpret pictograms (bar charts, tables) and know their appropriate use • Construct and interpret comparative bar charts • Choose appropriate graphs or charts to represent data • Construct and interpret vertical line charts **Incorporating Global citizenship – Olympics and gold medals ,** Draw and interpret statistical diagrams involving representation Draw scatter graphs of pairs of development indicators such as life expectancy, calorie intake or infant mortality for different countries.
Calculating fractions	• Apply addition to proper fractions, improper fractions and mixed numbers • Apply subtraction to proper fractions, improper fractions and mixed numbers • Multiply proper and improper fractions • Multiply mixed numbers • Divide a proper fraction by a proper fraction • Apply division to improper fractions and mixed numbers
Algebraic proficiency: tinkering	• Know the meaning of expression, term, formula, equation, function • Know basic algebraic notation (the rules of algebra) • Use letters to represent variables • Identify like terms in an expression • Simplify an expression by collecting like terms • Know how to multiply a (positive) single term over a bracket (the distributive law) • Substitute positive numbers into expressions and formulae • Given a function, establish outputs from given inputs • Given a function, establish inputs from given outputs • Use a mapping diagram (function machine) to represent a function • Use an expression to represent a function Use the order of operations correctly in algebraic situations
TERM 1 EXAMINATIONS	

YEAR 7- Mathematics Term II   (Secondary)

Topic	Learning outcomes
Measuring data	- Understand the mode and median as measures of typicality (or location) - Find the mode of set of data - Find the median of a set of data - Find the median of a set of data when there are an even number of numbers in the data set - Use the mean to find a missing number in a set of data - Calculate the mean from a (grouped) frequency table - Find the mode from a frequency table - Find the median from a frequency table - Understand the range as a measure of spread (or consistency) - Calculate the range of a set of data - Analyse and compare sets of data - Appreciate the limitations of different statistics (mean, median, mode, range)
Calculating percentages	- Use calculators to find a percentage of an amount using multiplicative methods - Identify the multiplier for a percentage increase or decrease - Use calculators to increase (decrease) an amount by a percentage using multiplicative methods - Compare two quantities using percentages - Know that percentage change = actual change ÷ original amount - Calculate the percentage change in a given situation, including percentage increase / decrease
Graphs	- Plotting coordinates - Parallel lines - Other straight lines - Write the equation of a line parallel to the x-axis or the y-axis - Draw a line parallel to the x-axis or the y-axis given its equation - Identify the lines y = x and y = -x - Draw the lines y = x and y = -x
Proportional reasoning	- Describe a comparison of measurements or objects using the language 'a to b' - Describe a comparison of measurements or objects using ratio notation a:b - Use ratio notation to describe a comparison of more than two measurements or objects - Convert between different units of measurement - State a ratio of measurements in the same units - Simplify a ratio by cancelling common factors - Identify when a ratio is written in its lowest terms - Find the value of a 'unit' in a division in a ratio problem - Divide a quantity in two parts in a given part:part ratio - Divide a quantity in two parts in a given part:whole ratio Express correctly the solution to a division in a ratio problem
Probability	- The Probability Scale - Equally likely outcomes - Mutually exclusive outcomes - Estimating probability
TERM II Examinations	

YEAR 7- Mathematics Term III   (Secondary)

Topic	Learning outcomes
Calculating space	- Recognise that the value of the perimeter can equal the value of area - Use standard formulae for area and volume - Find missing lengths in 2D shapes when the area is known - Know that the area of a trapezium is given by the formula area = ½ × (a + b) × h = $\left(\frac{a+b}{2}\right)h = \frac{(a+b)h}{2}$ - Calculate the area of a trapezium - Understand the meaning of surface area - Find the surface area of cuboids (including cubes) when lengths are known - Find missing lengths in 3D shapes when the volume or surface area is known
Checking, approximating and estimating	- Approximate by rounding to any number of decimal places - Know how to identify the first significant figure in any number - Approximate by rounding to the first significant figure in any number - Understand estimating as the process of finding a rough value of an answer or calculation - Use estimation to predict the order of magnitude of the solution to a (decimal) calculation - Estimate calculations by rounding numbers to one significant figure - Use cancellation to simplify calculations - Use inverse operations to check solutions to calculations

Numbers and the number system	• Recall prime numbers up to 50 • Know how to test if a number up to 150 is prime • Know the meaning of 'highest common factor' and 'lowest common multiple' • Recognise when a problem involves using the highest common factor of two numbers • Recognise when a problem involves using the lowest common multiple of two numbers • Understand the use of notation for powers • Know the meaning of the square root symbol (√) • Use a scientific calculator to calculate powers and roots • Make the connection between squares and square roots (and cubes and cube roots) • Identify the first 10 triangular numbers • Recall the first 15 square numbers • Recall the first 5 cube numbers • Use linear number patterns to solve problems
Presentation of data	• Know the meaning of categorical data • Know the meaning of discrete data • Interpret and construct frequency tables • Construct and interpret pictograms (bar charts, tables) and know their appropriate use • Construct and interpret comparative bar charts • Interpret pie charts and know their appropriate use • Construct pie charts when the total frequency is not a factor of 360 • Choose appropriate graphs or charts to represent data • Construct and interpret vertical line charts
TERM III EXAMINATIONS	

YEAR 8- Mathematics Term I (Secondary)

Topic	Learning outcomes
Numbers and the number system	• 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 • Use prime factorisations to find the highest common factor of two numbers • Use prime factorisations to find the lowest common multiple of two numbers • Know how to identify any significant figure in any number • Approximate by rounding to any significant figure in any number • Write a large (small) number in standard form • Interpret a large (small) number written in standard form
Calculating	• Add or subtract from a negative number • Add (or subtract) a negative number to (from) a positive number • Add (or subtract) a negative number to (from) a negative number • Multiply with negative numbers • Divide with negative numbers • Know how to square (or cube) a negative number • Substitute negative numbers into expressions • Enter negative numbers into a calculator • Use a scientific calculator to calculate with fractions, both positive and negative • Interpret a calculator display when working with negative numbers • Understand how to use the order of operations including powers • Understand how to use the order of operations including roots
Understanding risk I	• Know that probability is a way of measuring likeliness • Know and use the vocabulary of probability • Understand the use of the 0-1 scale to measure probability • Assess likeliness and place events on a probability scale • List all the outcomes for an experiment • Identify equally likely outcomes • Work out theoretical probabilities for events with equally likely outcomes • Know how to represent a probability • Recognise when it is not possible to work out a theoretical probability for an event • Know that the sum of probabilities for all outcomes is 1 • Apply the fact that the sum of probabilities for all outcomes is 1

Visualising and constructing	- Know the vocabulary of enlargement - Find the centre of enlargement - Find the scale factor of an enlargement - Use the centre and scale factor to carry out an enlargement with positive integer (fractional) scale factor - Know and understand the vocabulary of plans and elevations - Interpret plans and elevations - Use the concept of scaling in diagrams - Measure and state a specified bearing - Construct a scale diagram involving bearings - Use bearings to solve geometrical problems
Algebraic proficiency: tinkering	- Know how to write products algebraically - Use fractions when working in algebraic situations - Identify common factors (numerical and algebraic) of terms in an expression - Factorise an expression by taking out common factors - Simplify an expression involving terms with combinations of variables (e.g. $3a^2b + 4ab^2 + 2a^2 – a^2b$) - Know the multiplication (division, power, zero) law of indices - Understand that negative powers can arise - 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 a two steps are required
TERM I EXAMINATIONS	

YEAR 8- Mathematics Term II (Secondary)

Topic	Learning outcomes
Exploring fractions, decimals and percentages	- Identify if a fraction is terminating or recurring - Recall some decimal and fraction equivalents (e.g. tenths, fifths, eighths) - Write a decimal as a fraction - Write a fraction in its lowest terms by cancelling common factors - Identify when a fraction can be scaled to tenths or hundredths - Convert a fraction to a decimal by scaling (when possible) - Use a calculator to change any fraction to a decimal - Write a decimal as a percentage - Write a fraction as a percentage
Algebraic proficiency: tinkering	- Know how to write products algebraically - Use fractions when working in algebraic situations - Identify common factors (numerical and algebraic) of terms in an expression - Factorise an expression by taking out common factors - Simplify an expression involving terms with combinations of variables (e.g. $3a^2b + 4ab^2 + 2a^2 – a^2b$) - Know the multiplication (division, power, zero) law of indices - Understand that negative powers can arise - 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 a two steps are required
Investigating angles	- Identify alternate angles and know that they are equal - Identify corresponding angles and know that they are equal - Use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams - Establish the fact that angles in a triangle must total 180° - Use the fact that angles in a triangle total 180° to work out the total of the angles in any polygon - Establish the size of an interior angle in a regular polygon - Know the total of the exterior angles in any polygon - Establish the size of an exterior angle in a regular polygon
Pattern sniffing	- Generate a sequence from a term-to-term rule - Understand the meaning of a position-to-term rule - Use a position-to-term rule to generate a sequence - Find the position-to-term rule for a given sequence - Use algebra to describe the position-to-term rule of a linear sequence (the nth term) - Use the nth term of a sequence to deduce if a given number is in a sequence - Generate a sequence using a spreadsheet

Proportional reasoning	• Identify ratio in a real-life context • Write a ratio to describe a situation • Identify proportion in a situation • Find a relevant multiplier in a situation involving proportion • Use fractions fluently in situations involving ratio or proportion • Understand the connections between ratios and fractions • Understand the meaning of a compound unit • Know the connection between speed, distance and time • Solve problems involving speed • Identify when it is necessary to convert quantities in order to use a sensible unit of measure
Calculating fractions, decimals and percentages	• Recognise when a fraction (percentage) should be interpreted as a number • Recognise when a fraction (percentage) should be interpreted as a operator • Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% • Use calculators to increase an amount by a percentage greater than 100% • Solve problems involving percentage change • Solve original value problems when working with percentages • Solve financial problems including simple interest • Understand the meaning of giving an exact solution • Solve problems that require exact calculation with fractions
	TERM II EXAMINATIONS

YEAR 8- Mathematics Term III (Secondary)

Topic	Learning outcomes
Calculating space	• Know the vocabulary of circles • Know that the number π (pi) = 3.1415926535… • Recall π to two decimal places • Know the formula circumference of a circle = $2\pi r = \pi d$ • Calculate the circumference of a circle when radius (diameter) is given • Calculate the radius (diameter) of a circle when the circumference is known • Calculate the perimeter of composite shapes that include sections of a circle • Know the formula area of a circle = πr^2 • Calculate the area of a circle when radius (diameter) is given • Calculate the radius (diameter) of a circle when the area is known • Calculate the area of composite shapes that include sections of a circle • Know the formula for finding the volume of a right prism (cylinder) • Calculate the volume of a right prism (cylinder)
Solving equations and inequalities	• Identify the correct order of undoing the operations in an equation • Solve linear equations with the unknown on one side when the solution is a negative number • Solve linear equations with the unknown on both sides when the solution is a whole number • Solve linear equations with the unknown on both sides when the solution is a fraction • Solve linear equations with the unknown on both sides when the solution is a negative number • Solve linear equations with the unknown on both sides when the equation involves brackets • Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation • Check the solution to an equation by substitution
Understanding risk II	• List all elements in a combination of sets using a Venn diagram • List outcomes of an event systematically • Use a table to list all outcomes of an event • List outcomes of an event using a grid (two-way table) • Use frequency trees to record outcomes of probability experiments • Make conclusions about probabilities based on frequency trees • Construct theoretical possibility spaces for combined experiments with equally likely outcomes • Calculate probabilities using a possibility space • Use theoretical probability to calculate expected outcomes • Use experimental probability to calculate expected outcomes

Topic	Learning outcomes
Algebraic proficiency: visualizing	- Know that graphs of functions of the form $y = mx + c$, $x \pm y = c$ and $ax \pm by = c$ are linear - Plot graphs of functions of the form $y = mx + c$ ($x \pm y = c$, $ax \pm by = c$) - Understand the concept of the gradient of a straight line - Find the gradient of a straight line on a unit grid - Find the y-intercept of a straight line - Sketch a linear graph - Distinguish between a linear and quadratic graph - Plot graphs of quadratic functions of the form $y = x^2 \pm c$ - Sketch a simple quadratic graph - Plot and interpret graphs of piece-wise linear functions in real contexts - Plot and interpret distance-time graphs (speed-time graphs) - Find approximate solutions to kinematic problems involving distance and speed
Measuring data	- Find the modal class of set of grouped data - Find the class containing the median of a set of data - Find the midpoint of a class - Calculate an estimate of the mean from a grouped frequency table - Estimate the range from a grouped frequency table - Analyse and compare sets of data - Appreciate the limitations of different statistics (mean, median, mode, range) - Choose appropriate statistics to describe a set of data - Justify choice of statistics to describe a set of data
Presentation of data	- Know the meaning of continuous data - Interpret a grouped frequency table for continuous data - Construct a grouped frequency table for continuous data - Construct histograms for grouped data with equal class intervals - Interpret histograms for grouped data with equal class intervals - Construct and use the horizontal axis of a histogram correctly - Plot a scatter diagram of bivariate data - Understand the meaning of 'correlation' - Interpret a scatter diagram using understanding of correlation
Global Citizenship Drawing charts	**Collect data online of life expectancy, access to water etc in some third world countries** **Collect data online of life expectancy, access to water etc in some first world countries** **Draw bar graphs comparing the difference between the data in both first world and second world countries**
Global Citizenship Percentages and drawing line graph	**Collect information on population of some third world countries, number of people having access to internet, number of people having mobile phone etc** **Collect information on the population of some first world countries of a similar land size, number having access to internet and mobile phone etc** **Calculate the percentage of people having access to internet, mobile phone in first world and third world countries** **Use these information to draw line graphs comparing the difference between the two countries**
TERM III EXAMINATIONS	

YEAR 9- Mathematics Term I (Secondary)

Topic	Learning outcomes
Calculating	- Calculate with positive indices (roots) using written methods - Calculate with negative indices in the context of standard form - Use a calculator to evaluate numerical expressions involving powers (roots) - Interpret a number written in standard form - Add (subtract) numbers written in standard form - Multiply (divide) numbers written in standard form - Convert a 'near miss' into standard form; e.g. 23×10^7 - Enter a calculation written in standard form into a scientific calculator - Interpret the standard form display of a scientific calculator - Understand the difference between truncating and rounding - Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.) - Use inequalities to describe the range of values for a rounded value - Solve problems involving the maximum and minimum values of an amount that has been rounded

Pattern sniffing	• Generating sequences • Finding the nth term • Substitute numbers into formulae including terms in x^2 • Generate terms of a quadratic sequence from a written rule • Generate terms of a quadratic sequence from its nth term • Identify quadratic sequences • Establish the first and second differences of a quadratic sequence • Find the next three terms in any quadratic sequence
Proportional reasoning	• Know the difference between direct and inverse proportion • Recognise direct (inverse) proportion in a situation • Know the features of a graph that represents a direct (inverse) proportion situation • Know the features of an expression (or formula) that represents a direct (inverse) proportion situation • Understand the connection between the multiplier, the expression and the graph • Know the meaning of congruent (similar) shapes • Identify congruence (similarity) of shapes in a range of situations • Identify the information required to solve a problem involving similar shapes • Finding missing lengths in similar shapes • Understand why speed, density and pressure are known as compound units • Know the definition of density (pressure, population density, speed) • Solve problems involving density (pressure, speed) • Convert between units of density
Presentation of data	• Construct and interpret compound bar charts • Interpret a wider range of non-standard graphs and charts • Understand that correlation does not indicate causation • Interpret a scatter diagram using understanding of correlation • Construct a line of best fit on a scatter diagram • Use a line of best fit to estimate values • Know when it is appropriate to use a line of best fit to estimate values
Calculating fractions	• Apply addition to proper fractions, improper fractions and mixed numbers • Apply subtraction to proper fractions, improper fractions and mixed numbers • Multiply proper and improper fractions • Multiply mixed numbers • Divide a proper fraction by a proper fraction • Apply division to improper fractions and mixed numbers
TERM I EXAMINATIONS	

YEAR 9- Mathematics Term II	
Topic	*Learning outcomes*
Calculating space	• Know the vocabulary of circles • Know how to find arc length • Calculate the arc length of a sector when radius is given • Know how to find the area of a sector • Calculate the area of a sector when radius is given • Calculate the angle of a sector when the arc length and radius are known • Know how to find the surface area of a right prism (cylinder) • Calculate the surface area of a right prism (cylinder) • Calculate exactly with multiples of π • Know Pythagoras' theorem • Identify the hypotenuse in a right-angled triangle • Know when to apply Pythagoras' theorem • Calculate the hypotenuse of a right-angled triangle using Pythagoras' theorem • Calculate one of the shorter sides in a right-angled triangle using Pythagoras' theorem

Algebraic proficiency: tinkering	- Understand the meaning of an identity - Multiply two linear expressions of the form (x + a)(x + b) - Multiply two linear expressions of the form (x ± a)(x ± b) - Expand the expression (x ± a)^2 - Simplify an expression involving 'x^2' by collecting like terms - Identify when it is necessary to remove factors to factorise a quadratic expression - Identify when it is necessary to find two linear expressions to factorise a quadratic expression - Factorise a quadratic expression of the form x^2 + bx + c - Know how to set up an mathematical argument - Work out why two algebraic expressions are equivalent - Create a mathematical argument to show that two algebraic expressions are equivalent - Identify variables in a situation - Distinguish between situations that can be modelled by an expression or a formula - Create an expression or a formula to describe a situation
Measuring data	- Understand the mode and median as measures of typicality (or location) - Find the mode of set of data - Find the median of a set of data - Find the median of a set of data when there are an even number of numbers in the data set - Use the mean to find a missing number in a set of data - Calculate the mean from a (grouped) frequency table - Find the mode from a frequency table - Find the median from a frequency table - Understand the range as a measure of spread (or consistency) - Calculate the range of a set of data - Analyse and compare sets of data - Appreciate the limitations of different statistics (mean, median, mode, range)
Calculating percentages	- Use calculators to find a percentage of an amount using multiplicative methods - Identify the multiplier for a percentage increase or decrease - Use calculators to increase (decrease) an amount by a percentage using multiplicative methods - Compare two quantities using percentages - Know that percentage change = actual change ÷ original amount - Calculate the percentage change in a given situation, including percentage increase / decrease - Incorporate Global citizenship use real life data to explore percentage increase/ decrease in wage , life expectancy, students attending school in different countries
TERM II EXAMINATIONS	

YEAR 9- Mathematics Term III

Topic	Learning outcomes
Solving equations and inequalities II	- Understand that there are an infinite number of solutions to the equation ax + by = c (a ≠ 0, b ≠ 0) - Understand the concept of simultaneous equations - Find approximate solutions to simultaneous equations using a graph - Understand the concept of solving simultaneous equations by elimination* - Target a variable to eliminate - Decide if multiplication of one equation is required - Decide whether addition or subtraction of equations is required - Add or subtract pairs of equations to eliminate a variable - Find the value of one variable in a pair of simple simultaneous equations - Find the value of the second variable in a pair of simple simultaneous equations - Solve two linear simultaneous equations in two variables in very simple cases (no multiplication required) - Solve two linear simultaneous equations in two variables in simple cases (multiplication of one equation only required) - Derive and solve two simultaneous equations - Interpret the solution to a pair of simultaneous equations
Calculating probability	- List outcomes of combined events using a tree diagram - Label a tree diagram with probabilities - Label a tree diagram with probabilities when events are dependent - Know when to add two or more probabilities - Know when to multiply two or more probabilities - Use a tree diagram to calculate probabilities of independent combined events - Use a tree diagram to calculate probabilities of dependent combined events - Understand that relative frequency tends towards theoretical probability as sample size increases

Presentation of data	- Construct and interpret compound bar charts - Interpret a wider range of non-standard graphs and charts - Understand that correlation does not indicate causation - Interpret a scatter diagram using understanding of correlation - Construct a line of best fit on a scatter diagram - Use a line of best fit to estimate values - Know when it is appropriate to use a line of best fit to estimate values
<u>Algebraic proficiency: visualising</u>	- Use the form y = mx + c to identify parallel lines - Rearrange an equation into the form y = mx + c - Find the equation of a line through one point with a given gradient - Find the equation of a line through two given points - Interpret the gradient of a straight line graph as a rate of change - Plot graphs of quadratic (cubic, reciprocal) functions - Recognise and interpret the graphs of quadratic (cubic, reciprocal) functions - Sketch graphs of quadratic (cubic, reciprocal) functions - Plot and interpret graphs of non-standard functions in real contexts - Find approximate solutions to kinematic problems involving distance, speed and acceleration
REVISION AND TERM III EXAMINATIONS	