MATHEMATICS

Year 8 Track 3

MATHEMATICS DEPARTMENT

Learning Outcomes Framework

SEPTEMBER 2022

Strand 1	
Learning Area Outcome: I understand the structure of the number system and the relationship between numbers. **Subject Focus: Number** – The number system	
11	I can write multiples of numbers using power notation. e.g. $2 \times 2 \times 2 = 2^3$ $3 \times 3 \times 5 \times 5 \times 5 = 3^2 \times 5^3$
12	I can identify common multiples of three numbers.
13	I can identify the least common multiple (LCM) of three numbers.
17	I can deduce that squares and square roots are inverses of each other.
19	I can deduce that cubes and cube roots are inverses of each other.
27	I can recognise that particular fractions have specific recurring decimal patterns, for example $\frac{1}{3} = 0.333 \ldots = 0.\dot{3}$
35	I can recognise the relationship between fractions, decimals and percentages.
36	I can relate fractions which have a denominator which is a factor of 100 to integral percentages.
37	I can state one fraction lying between two given fractions.
Assistive technology, mathematical resources and activities.	
41	I can use assistive technology (e.g. tablets, computers & calculators) and other learning resources (e.g. Cuisenaire rods, Unifix cubes, base 10 blocks) to learn about numbers and their properties.
42	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 2	
Learning Area Outcome: I can calculate using mental methods, pencil and paper methods, and, assistive technology methods. I can check calculations by rounding numbers and making rough approximations. I can calculate to the most appropriate level of accuracy. I can also check the reasonableness of answers. **Subject focus: Number –** Numerical calculations	
Whole Numbers, Decimal Numbers & Fraction Numbers - The Four Operations	
26	 I can work out mentally the square root of squares up to 100 and the cube root of cubes up to 125 without a calculator and use a calculator for other values.
27	I can use primes to write numbers as a product of prime factors in index form.
28	I can work out problems involving least common multiples.
38	I can add, subtract, multiply and divide directed numbers.
39	I can use the BIDMAS rule with both positive and negative numbers.
40	I can round any decimal number up to three decimal places.
45	I can change mixed numbers into decimals and vice versa.
46	 I can read and interpret scales involving decimals.
48	I can add and subtract two fractions (including mixed numbers) with different denominators using equivalent fractions.
49	I can multiply and divide two fractions including mixed numbers.
50	I can work through situations involving the addition, subtraction, multiplication and division of fractions and mixed numbers.
Percentages	
51	I can convert percentages to fractions and vice versa.
52	I can convert percentages to decimals and vice versa.

54	I can express a quantity as a percentage of another.
55	I can find percentage increase and percentage decrease. E.g. A tree is 2.5 m high. After one year the height of the tree increased by 10%. Calculate the new height of the tree.
Money & Consumer Mathematics	
65	I can use published exchange rates to convert from one currency to another.
67	I can work through simple situations involving directed numbers, personal and household finance (e.g. pocket money invested in a bank account, finding out how much it will cost to prepare a meal, calculating which item is the best buy when items come in various sizes e.g. oil in one litre bottles vs oil in two litre bottles.)
Ratio & Proportion	
68	I can write ratios in their simplest form. (Including decimal numbers and numbers with different units)
69	I can find one quantity of a ratio given the other and divide a quantity in a given ratio.
70	I can use ratio to solve problems.
71	I understand and can use simple map ratios.
72	I can use simple proportion (using ratio notation) to solve simple problems. *E.g. What is the value of □ in 1:3 = □:6?*
73	I can work through simple situations that involve direct proportion using the unitary method (including price, distance, time, mass and capacity).
Assistive technology, mathematical resources and activities.	
76	I can use assistive technology (e.g. tablets, computers and calculators) and other resources (e.g. Cuisenaire rods, Unifix cubes, base 10 blocks) appropriate to this level to calculate and to learn about numerical calculations.
77	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 3	
Learning Area Outcome: I can recognise and describe patterns and relationships in various mathematical ways and can use algebraic manipulations. **Subject Focus:** Algebra – Fundamentals of Algebra	
1	I can recognise and extend pictorial patterns and number sequences. I can tabulate the terms corresponding to the first few stages of a pictorial pattern and determine the terms in the next stages.
7	I can derive a formula from a situation involving two or more unknown values with positive and negative inputs.
9	I can simplify algebraic expressions by multiplying linear terms, e.g. $-4 \times 5b$, $-2a \times -3b$ and $x \times (-3x)$ and can multiply a single term over a bracket e.g. $-2(a+3)$; $3(x+4)+2(x-1)$; $2(1-x)-3(x+2)$.
14	I can evaluate linear expressions by substituting directed numbers.
15	I can change the subject of a formula that uses one or two operations.
16	I can write down and solve an equation using the balancing method involving unknown and whole numbers on both sides.
17	I can use and solve simple linear equations involving brackets. *E.g. Solve for* x: $4(x-1)=2x+6$
18	I can work through situations leading to the solution of linear equations in one unknown. E.g. mystery numbers, geometric shapes, etc.
28	I can write the coordinates of a set of points for equations of the form $y = \pm mx \pm c$.
29	I can construct tables of values for linear functions.
30	I can plot the graph of a linear function from a table of values.
31	I can explain what the gradient of a line represents.
32	I know that parallel lines have equal gradients.
33	I can explain what the y-intercept represents.

34	I can indicate that for the equation $y = mx + c$ the value of m determines the gradient of the graph and the value of c, determines the y-intercept.
35	I can write the equation of a straight line given the gradient and the y-intercept.
36	I can verify whether a line passes through a point.
38	I can interpret straight line graphs in real life situations. E.g. conversion graphs and distance-time graphs, etc.
46	I can build and use number machines from real life situations.
Assistive technology, mathematical resources and activities.	
52	I can use assistive technology (e.g. tablets, computers and calculators) and other resources (e.g. algebra blocks) appropriate to this level to learn about the fundamentals of algebra.
53	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 4	
Learning Area Outcome: I understand and can use forms of measurement and can make reasonable estimations. **Subject Focus:** Shape, Space & Measures – Measures	
Length, Area, Volume, Mass & Capacity	
28	I can derive and use a formula to find the area of a parallelogram and use a formula to find the area of a trapezium.
29	I can calculate the area of compound shapes that include squares, rectangles triangles, parallelograms, trapeziums and circles.
30	I can define the notion of π as the ratio of the circumference to the diameter.
31	I can use formulae to find the circumference and area of a circle.

32	I can define the surface area of a solid shape as the total amount of surface of the shape.
33	I can calculate the surface area of cubes and cuboids.
Assistive technology, mathematical resources and activities.	
54	I can use assistive technology (e.g. tablets, computers and calculators) and other resources (e.g. plastic money, cardboard clocks, 2D and 3D plastic shapes, measuring instruments) appropriate to this level to learn about measures.
55	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 5	
Learning Area Outcome: I can recognise and describe the properties of shapes. I can use these properties to construct shapes using appropriate mathematical instruments and to prove given geometric statements. **Subject Focus:** Shape, Space & Measures – Euclidean Geometry	
Triangles	
8	I can prove that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices and use this theorem to find missing angles.
Quadrilaterals	
14	I can use the properties of quadrilaterals (square, rectangle, rhombus, parallelogram, trapezium and kite) in order to solve problems involving missing angles.
3D Shapes	
21	I can identify nets that are possible or not possible for a triangular prism, and a square-based right pyramid.

Circles	
22	I can identify the centre, radius, chord, diameter, and circumference of a circle.
Constructions	
24	I can construct 60° and 90° angles using a straight edge and compasses only and by using a dynamic geometry software package.
25	I can construct triangles (involving 60° and 90° angles) using ruler and compasses only.
26	I can construct regular hexagons using ruler and compasses only.
Coordinate Geometry	
33	I can use simple LOGO commands such as PU, PD, FD, BK, RT, LT and REPEAT.
Assistive technology, mathematical resources and activities.	
34	I can use assistive technology (e.g. tablets, computers, dynamic computer software and LOGO) and other resources (e.g. 2D and 3D plastic shapes) appropriate to this level to learn about properties of shapes.
35	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 6	
Learning Area Outcome: I can describe position and movement of shapes in a plane. **Subject Focus:** Shape, Space & Measures – Transformation Geometry	
Reflections	
7	I can draw and describe reflections in the x and y axis; in $y = \pm c$; $x = \pm c$; $y = \pm x$.

Rotations	
12	I can identify the order of rotational symmetry of a regular polygon.
13	I can state the order of rotational symmetry of unshaded and partly shaded 2D shapes. I can complete the shading of a given 2D shape to obtain a shape of a required order of rotational symmetry
14	I can draw and describe rotations of a simple shape about a vertex or about the origin using angles of 90°and 180°.
Translations	
16	I can draw and describe translations using a column translation vector.
Assistive technology, mathematical resources and activities.	
21	I can use assistive technology (e.g. tablets and computers) and other resources (e.g. 2D and 3D plastic shapes) appropriate to this level to learn about transformation geometry.
22	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 7	
Learning Area Outcome: I can collect, analyse, interpret and communicate statistical information **Subject Focus:** Data Handling & Chance – Statistics	
9	I can interpret pie charts.
10	I can construct pie charts.
15	I can work through problems involving the mean, mode median and range; and decide when best to use each type of average using words like “outlier”.

Assistive technology, mathematical resources and activities.	
23	I can use assistive technology (e.g. tablets, computers and calculators) and other learning resources to learn about statistics.
24	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.

Strand 8	
Learning Area Outcome: I understand ideas of chance and uncertainty **Subject Focus:** Data Handling & Chance – Probability	
9	I can deduce that the probability of all mutually exclusive events adds up to 1.
10	I can construct a possibility space of two independent events and use it to work out the probability of an outcome.
Assistive Technology & Other Resources	
14	I can use assistive technology (e.g. tablets, computers and calculators) and other learning resources to learn about probability.
15	I can work on tasks, investigations and activities including worded problems that are related to mathematical content in this strand at this level.