

CONTENTS

Forward	iii
How to use Maths Mate Skill Builders	iv
Letter to Parents (sample)	vi
Skill Builders	1
Glossary	385
Maths Facts	451
Symbols Number Facts Algebra Facts Measurement Facts Trigonometry Facts Geometry Facts	
Answers	461

MM	SB	[Maths Mate - Mathematical strand]	
Question	Skill No.	Skill Builder - Skill description	
1.		[Long \times, \div]	1
	1.1	Multiplying a large number by a multiple of 10.	
	1.2	Multiplying a large number by a two-digit number.	
	1.3	Multiplying a large number by a large multiple of 10.	
	1.4	Dividing a large number by a single digit.	
	1.5	Dividing a large number by a power of 10.	
	1.6	Dividing a large number by a multiple of 10.	
	1.7	Dividing a whole number by a two-digit number.	
	1.8	Dividing whole numbers - remainder.	
	1.9	Dividing whole numbers - recurring remainder.	
2.		[Decimal $+, -$]	13
	2.1	Adding decimal numbers.	
	2.2	Subtracting decimal numbers.	
	2.3	Subtracting a decimal number from a whole number.	
	2.4	Adding and subtracting decimal numbers.	
3.		[Decimal \times, \div]	21
	3.1	Multiplying a decimal number by a whole number.	
	3.2	Multiplying a decimal number by powers and multiples of 10.	
	3.3	Multiplying a decimal number by a negative power of 10 (e.g. 0.1)	
	3.4	Multiplying a decimal number by a decimal number.	
	3.5	Dividing a decimal number by a whole number.	
	3.6	Dividing a decimal number by a power of 10.	
	3.7	Dividing a decimal number by a negative power of 10 (e.g. 0.1)	
	3.8	Dividing a decimal number by a decimal number.	
	3.9	Dividing a whole number by a decimal number.	

4.		[Fraction +,-] 31
	4.1	Adding fractions with the same denominator.
	4.2	Subtracting fractions with the same denominator.
	4.3	Adding mixed numbers with the same denominator.
	4.4	Subtracting mixed numbers with the same denominator.
	4.5	Subtracting a mixed number from a whole number.
	4.6	Adding fractions with different denominators - one denominator divides evenly into the other denominator.
	4.7	Adding fractions with different denominators - the HCF of the denominators is 1 (e.g. 2 and 3, 5 and 6).
	4.8	Adding fractions with different denominators - the denominators have common factors $\neq 1$.
	4.9	Subtracting fractions with different denominators - one denominator divides evenly into the other denominator.
	4.10	Subtracting fractions with different denominators - the HCF of the denominators is 1 (e.g. 2 and 3, 5 and 6).
	4.11	Subtracting fractions with different denominators - the denominators have common factors $\neq 1$.
	4.12	Adding and subtracting fractions with different denominators.
	4.13	Adding or subtracting mixed numbers with different denominators.
5.		[Fraction \times, \div] 49
	5.1	Multiplying a fraction by a whole number.
	5.2	Multiplying two fractions.
	5.3	Multiplying a mixed number by a fraction or by another mixed number.
	5.4	Multiplying three fractions.
	5.5	Dividing two fractions.
	5.6	Dividing a whole number by a fraction.
	5.7	Dividing a fraction by a whole number.
	5.8	Dividing a mixed number by a fraction or by another mixed number.
6.		[Percentages] 59
	6.1	Estimating a percentage.
	6.2	Finding the remaining percentage.
	6.3	Finding a percentage of a multiple of 100.
	6.4	Finding a percentage of any number.
	6.5	Calculating percentages from word problems.
	6.6	Working with more than 100%.
	6.7	Increasing an amount by a percentage.
	6.8	Decreasing an amount by a percentage.
	6.9	Calculating an amount given a percentage of that amount.
	6.10	Finding a percentage change.
	6.11	Finding a number knowing a percentage of that number.
7.		[Decimals / Fractions / Percentages] 71
	7.1	Ordering decimal numbers.
	7.2	Ordering fractions.
	7.3	Finding equivalent fractions.
	7.4	Writing a decimal number as a percentage.
	7.5	Writing a percentage as a decimal number.
	7.6	Writing a decimal number as a fraction in simplest form.
	7.7	Writing a fraction as a terminating decimal.
	7.8	Writing a percentage as a fraction in simplest form.
	7.9	Writing a fraction as a percentage.
	7.10	Converting between decimals, fractions and percentages.
	7.11	Finding a fraction of a whole number.
	7.12	Comparing and ordering decimals, fractions and percentages.
	7.13	Recognising expanded form for recurring decimals.
	7.14	Writing a fraction as a recurring decimal.
	7.15	Writing a recurring decimal as a fraction.
8.		[Integer +,-] 87
	8.1	Adding integers.
	8.2	Subtracting integers.
	8.3	Adding and subtracting integers.
	8.4	Adding and subtracting integers using order of operations.
	8.5	Finding missing integers using addition and subtraction.

MM	SB	[Maths Mate - Mathematical strand]
Question	Skill No.	Skill Builder - Skill description
9.		[Integer \times, \div] 93
	9.1	Multiplying integers.
	9.2	Dividing integers.
	9.3	Multiplying integers involving powers of 10.
	9.4	Multiplying and dividing integers.
	9.5	Multiplying and dividing integers using order of operations.
	9.6	Finding missing integers using multiplication and division.
10.		[Rates / Ratios] 99
	10.1	Finding the unit rate and the unit price.
	10.2	Simplifying ratios.
	10.3	Finding the ratio of two or more quantities as a set : set comparison.
	10.4	Finding the ratio of two quantities as a subset : set comparison.
	10.5	Finding the average speed.
	10.6	Finding the distance travelled.
	10.7	Finding the time taken to travel a distance.
	10.8	Deciding if two ratios are in proportion.
	10.9	Finding the missing term in a proportion.
	10.10	Dividing a quantity into a given ratio.
	10.11	Solving proportions.
	10.12	Finding other rates.
	10.13	Completing equivalent rates.
	10.14	Identifying direct proportion in real life situations.
	10.15	Converting units of speed.
	10.16	Working with ratio scales.
	10.17	Comparing rates.
11.		[Indices] 117
	11.1	Evaluating whole numbers in index form.
	11.2	Evaluating powers with fraction bases.
	11.3	Multiplying powers with the same base.
	11.4	Dividing powers with the same base.
	11.5	Multiplying powers with coefficients and with the same base.
	11.6	Dividing powers with coefficients and with the same base.
	11.7	Raising a product to a power.
	11.8	Raising a power to another power.
	11.9	Raising a negative number to a power.
	11.10	Raising a number to a negative power.
12.		[Square Roots] 127
	12.1	Calculating square roots of perfect squares.
	12.2	Calculating square roots of perfect squares in fraction form.
	12.3	Calculating square roots of perfect squares in decimal form.
	12.4	Calculating multiples of square roots.
	12.5	Multiplying square roots of perfect squares.
	12.6	Dividing square roots of perfect squares.
	12.7	Adding and subtracting square roots of perfect squares.
	12.8	Estimating square roots.
13.		[Exploring Number] 135
	13.1	Using 'order of operations' involving a mix of (), \times , \div , + or -
	13.2	Using 'order of operations' involving powers and (), \times , \div , + or -
	13.3	Rounding decimal numbers to a given place.
	13.4	Writing rational approximations of simple irrational numbers.
	13.5	Writing very large and very small numbers in scientific notation.
	13.6	Writing a number in scientific notation as a basic numeral.
	13.7	Using 'order of operations' involving negative numbers.
	13.8	Recognising whole numbers and integers.
	13.9	Recognising rational and irrational numbers.
	13.10	Recognising classes of numbers.
	13.11	Comparing and ordering rational and irrational numbers.

MM	SB	[Maths Mate - Mathematical strand]	
Question	Skill No.	Skill Builder - Skill description	
14.		[Financial Mathematics]	147
	14.1	Minimising expenses - saving.	
	14.2	Estimating outcomes	
	14.3	Calculating percentages including GST and lay-bys.	
	14.4	Calculating percentages including commissions, profit and loss.	
	14.5	Calculating wages.	
	14.6	Calculating net and gross income and tax payable on income.	
	14.7	Calculating simple interest.	
	14.8	Calculating discount prices and depreciation.	
	14.9	Calculating compound interest.	
	14.10	Calculating compound growth and depreciation.	
15.		[Number Patterns]	157
	15.1	Completing number patterns in table format by adding, subtracting or multiplying by the same number.	
	15.2	Completing number patterns by using changing values in the rule.	
	15.3	Completing number patterns by adding or subtracting the same positive number to integers.	
	15.4	Completing number patterns by multiplying by the same integer.	
	15.5	Completing number patterns by dividing by the same integer.	
	15.6	Finding a random term in a number pattern.	
	15.7	Finding a particular term of a sequence given its general rule.	
	15.8	Finding the general rule of a pattern given a table of values for the pattern.	
	15.9	Completing number patterns involving decimals and fractions.	
16.		[Expressions]	167
	16.1	Writing expressions to represent word problems.	
	16.2	Simplifying expressions.	
	16.3	Finding like terms.	
	16.4	Simplifying expressions by adding and subtracting like terms.	
	16.5	Simplifying expressions by multiplying terms.	
	16.6	Simplifying expressions by dividing terms.	
17.		[Substitution]	173
	17.1	Substituting value 0 into simple expressions.	
	17.2	Substituting one value into expressions involving +, -, × and ÷	
	17.3	Substituting two values into expressions involving +, -, × and ÷	
	17.4	Substituting into rules.	
	17.5	Substituting into formulae.	
	17.6	Substituting into rules, expressions and formulae with brackets.	
	17.7	Substituting negative values into rules and expressions.	
	17.8	Substituting into more complex rules and expressions.	
	17.9	Substituting into quadratic rules.	
18.		[Expansion]	183
	18.1	Expanding brackets in expressions like $2(a + 1)$	
	18.2	Expanding brackets in expressions like $a(a + 1)$	
	18.3	Expanding brackets in expressions like $2a(b + 1)$	
	18.4	Expanding brackets in expressions like $-2a(b + 1)$	
	18.5	Expanding and evaluating expressions.	
	18.6	Expanding and evaluating more complex expressions.	
	18.7	Expanding brackets in expressions like $(a + 1)(a + 2)$	
	18.8	Expanding brackets in binomial squares like $(a + b)^2$	
	18.9	Expanding brackets in binomial squares like $(a - b)^2$	
19.		[Factorisation]	193
	19.1	Factorising by finding the HCF of the coefficients.	
	19.2	Factorising by finding the HCF of coefficients and variables.	
	19.3	Factorising to simplify expressions involving large numbers.	
	19.4	Factorising involving squared terms.	
	19.5	Factorising negative terms.	
	19.6	Factorising by finding binomial factors.	
	19.7	Factorising four terms by grouping 2 and 2.	
	19.8	Factorising using the difference of perfect squares.	
	19.9	Factorising quadratic trinomials.	

20.		[Equations] 203
	20.1	Solving one-step equations by using the inverse operations of + and –
	20.2	Solving one-step equations by using the inverse operations of \times and \div
	20.3	Solving two-step equations by using the inverse operations of +, –, \times and \div
	20.4	Solving equations by first expanding the brackets.
	20.5	Solving equations with variables in more than one place.
	20.6	Solving equations involving algebraic fractions.
	20.7	Solving inequations.
	20.8	Solving quadratic equations.
	20.9	Solving simultaneous equations.
	20.10	Solving equations by factorising.
21.		[Coordinate Geometry] 223
	21.1	Completing a table of values for a linear rule.
	21.2	Graphing lines of equations $x = \text{constant}$ and $y = \text{constant}$ on a Cartesian plane (e.g. $x = 1$, $y = 2$).
	21.3	Graphing lines of equation $y = mx + c$ on a Cartesian plane (e.g. $y = 3x + 2$).
	21.4	Completing the missing coordinate of a point on a given line.
	21.5	Deciding if a point is on a line of a given rule.
	21.6	Finding the x-intercept and the y-intercept of a linear graph.
	21.7	Sketching a linear graph by finding the x-intercept and the y-intercept.
	21.8	Finding the gradient of a line by using the rise/run formula.
	21.9	Finding the coordinates of the midpoint of an interval.
	21.10	Rewriting a linear equation in the gradient-intercept form.
	21.11	Finding the gradient, the x-intercept and the y-intercept of an equation written in the gradient-intercept form $y = mx + c$.
	21.12	Finding the gradient of a line when two points are given.
	21.13	Writing the equation of a line when two points are given.
	21.14	Completing a table of values for a non-linear rule.
	21.15	Sketching non-linear rules by completing a table of values.
	21.16	Solving simultaneous equations by graphing their lines on a Cartesian plane.
	21.17	Calculating the distance between two points.
22.		[Units of Measurement / Time] 249
	22.1	Reading scales.
	22.2	Choosing appropriate units and measurements.
	22.3	Working with measurement prefixes.
	22.4	Measuring with precision and tolerating error.
	22.5	Calculating elapsed time and reading timetables.
	22.6	Converting units of measurement for length.
	22.7	Converting units of measurement for mass.
	22.8	Converting units of measurement for capacity and cubic volume.
	22.9	Converting units of measurement for area.
	22.10	Converting between units of measurement for capacity and cubic volume.
23.		[Perimeter / Area] 259
	23.1	Calculating the perimeter of polygons.
	23.2	Calculating the perimeter of composite shapes.
	23.3	Calculating the circumference of circles.
	23.4	Calculating the perimeter of composite circular shapes.
	23.5	Calculating the area of squares and rectangles.
	23.6	Calculating the area of triangles.
	23.7	Calculating the area of parallelograms.
	23.8	Calculating the area of rhombi and kites.
	23.9	Calculating the area of trapeziums.
	23.10	Calculating the area of composite shapes.
	23.11	Calculating the area of circles.
	23.12	Calculating the area of composite circular shapes.

24.	[Surface Area]	277
24.1	Calculating the total surface area (TSA) of rectangular prisms and cubes using nets.	
24.2	Calculating the total surface area (TSA) of rectangular prisms.	
24.3	Calculating the total surface area (TSA) of rectangular composite solids.	
24.4	Calculating the total surface area (TSA) of triangular prisms.	
24.5	Calculating the total surface area (TSA) of pyramids.	
24.6	Calculating the total surface area (TSA) of composite solids.	
24.7	Calculating the total surface area (TSA) of basic 3-dimensional round shapes.	
24.8	Calculating the total surface area (TSA) of more complex 3-dimensional round shapes.	
24.9	Expressing the total surface area (TSA) of 3-dimensional shapes in algebraic form.	
25.	[Volume]	293
25.1	Calculating the volume of square and rectangular prisms.	
25.2	Calculating the volume of other prisms.	
25.3	Calculating the volume of pyramids.	
25.4	Calculating the volume of basic 3-dimensional round shapes.	
25.5	Expressing the volume of 3-dimensional shapes in algebraic form.	
25.6	Calculating volume in relation to capacity.	
25.7	Calculating volume in relation to length and area.	
25.8	Calculating the volume of composite solids.	
26.	[Pythagoras / Trigonometry]	303
26.1	Solving simple quadratic equations.	
26.2	Recognising Pythagoras' theorem.	
26.3	Solving more complex quadratic equations.	
26.4	Finding the hypotenuse when the other sides of a right-angled triangle are given.	
26.5	Finding a perpendicular side when the other perpendicular side and the hypotenuse of a right-angled triangle are given.	
26.6	Applying Pythagoras' theorem.	
26.7	Applying Pythagoras' theorem to find the perimeter of 2-dimensional shapes.	
26.8	Applying Pythagoras' theorem in a variety of 2-dimensional shapes.	
26.9	Finding a side length in isosceles right-angled triangles.	
26.10	Applying Pythagoras' theorem to find the distance between two points located on a Cartesian plane.	
26.11	Applying Pythagoras' theorem to find the area of 2-dimensional shapes.	
26.12	Recognising trigonometric functions (sine, cosine, tangent).	
26.13	Calculating the value of basic trigonometric ratios in right-angled triangles.	
26.14	Finding an unknown side of a right-angled triangle when a trigonometric ratio of an angle and another side of the triangle are given.	
26.15	Calculating the value of trigonometric ratios in right-angled triangles by first applying Pythagoras' theorem.	
27.	[Angles]	323
27.1	Choosing the correct terms related to angles.	
27.2	Finding the complement and the supplement of a given angle.	
27.3	Working with vertically opposite angles.	
27.4	Working with angles in a triangle.	
27.5	Finding the exterior angle of a triangle.	
27.6	Working with angles in a quadrilateral.	
27.7	Working with pairs of alternate, co-interior and corresponding angles.	
27.8	Finding the value of an angle in a variety of diagrams.	
27.9	Finding the value of an angle in a circle.	
28.	[Geometric Reasoning]	333
28.1	Recognising polygons, quadrilaterals and triangles.	
28.2	Classifying triangles.	
28.3	Describing the properties of quadrilaterals.	
28.4	Recognising rotational symmetry in 2-dimensional shapes.	
28.5	Describing the properties of 3-dimensional shapes.	
28.6	Using Euler's formula for polyhedra.	
28.7	Recognising nets of 3-dimensional shapes.	
28.8	Drawing translations, reflections and rotations on a Cartesian plane.	
28.9	Recognising and drawing enlargements and reductions on a Cartesian plane.	
28.10	Recognising congruence tests for triangles.	
28.11	Recognising similarity of 2-dimensional shapes.	
28.12	Identifying equal sides and angles to prove that two triangles are congruent.	
28.13	Using congruent triangles to find unknown sides and angles.	
28.14	Drawing 2-dimensional shapes to scale.	
28.15	Recognising elements of circle geometry.	

29. [Statistics]..... 349

- 29.1 Interpreting data in column or bar graphs.
- 29.2 Interpreting data in stack graphs.
- 29.3 Interpreting data in line graphs.
- 29.4 Interpreting data in pie charts.
- 29.5 Calculating the median of sets of data.
- 29.6 Calculating the mode and range of sets of data.
- 29.7 Calculating the mean of sets of data.
- 29.8 Calculating the mean, median and mode of sets of data.
- 29.9 Interpreting histograms.
- 29.10 Interpreting stem-and-leaf plots.
- 29.11 Interpreting dot plots.
- 29.12 Interpreting frequency tables.
- 29.13 Calculating the median, range, upper quartile (UQ), lower quartile (LQ) and interquartile range (IQR) for box-and-whisker plots.
- 29.14 Interpreting scatter plots.
- 29.15 Interpreting frequency histograms.
- 29.16 Drawing box-and-whisker plots.
- 29.17 Calculating the median, upper quartile (UQ), lower quartile (LQ) and interquartile range (IQR) for frequency tables and stem-and-leaf plots.

30. [Probability]..... 369

- 30.1 Describing the probability of an event using probability scales.
- 30.2 Calculating the probability of a simple event.
- 30.3 Recognising the probability of complementary events.
- 30.4 Finding the possible outcomes (sample spaces) of an event by completing tree diagrams.
- 30.5 Calculating the probability of multiple events by using tree diagrams or two-way tables to represent the sample spaces.
- 30.6 Calculating the probability of mutually exclusive events by using the Addition Law of Probability.
- 30.7 Calculating the probability of non-exclusive events.
- 30.8 Finding the number of expected successful events.
- 30.9 Calculating the probability of independent events by using the Multiplication Law of Probability.
- 30.10 Completing a probability tree diagram.
- 30.11 Calculating the probability of an event represented by Venn diagrams.
- 30.12 Calculating the probability of an event represented by two-way tables.

