

Maths Mate 9 & 10 to VELS level 6

VELS Mathematics Standards	Maths Mate 9 and 10 Skill references	Maths Mate 9 Questions	Maths Mate 10 Questions
Number Level 6			
At level 6 students:			
<ul style="list-style-type: none"> Comprehend the set of real numbers as the collection that contains natural, integer, rational and irrational numbers, and give examples of each of these 	N/A	N/A	N/A
<ul style="list-style-type: none"> Represent natural numbers as products of powers of primes 	- Express whole numbers as products of powers of prime numbers	#6: T4 - wks 1,2,3,4	#6: T3 - wks 1,2,3,4
<ul style="list-style-type: none"> Represent rational numbers in both fractional and decimal (terminating and infinite recurring) forms 	- Express rational numbers as fractions and decimals	#6: T1 - wks 3,4 T2 - wks 5,6,7,8	#6: T1 - wks 1,2,3,4 T2 - wks 5,6,8
<ul style="list-style-type: none"> Express ratios of natural numbers and proportions of these ratios in equivalent fractional, decimal and percentage forms 	<ul style="list-style-type: none"> Express a number out of another number as a percentage Express rational numbers in equivalent fractional, decimal and percentage form Find the whole amount when a percentage is given 	<ul style="list-style-type: none"> #5: T3 - wks 1,2,3,4 #6: T1 - wks 5,6,7,8 T2 - wks 1,2,4,5,6,7,8 T3 - wks 1,2,3,4,6,7,8 	<ul style="list-style-type: none"> #5: T1 - wks 5,6,7,8 T4 - wks 1,2,3,4,5 #6: T1 - all wks T2 - wks 5,6,7,8 #5: T3 - wks 5,6,7,8 T4 - wks 6,7,8
<ul style="list-style-type: none"> Use the Euclidean division algorithm to find the greatest common divisor of two natural numbers 	N/A	N/A	N/A
<ul style="list-style-type: none"> Define and give examples of simple irrational real numbers such as square roots of prime numbers and rational numbers that are not perfect squares 	N/A	N/A	N/A
<ul style="list-style-type: none"> Define and give examples of simple irrational real numbers such as square roots of prime numbers and rational numbers that are not perfect squares, the golden ratio, ϕ (Φ), π (π) and simple multiples and fractions of π (π) that correspond to a fraction of a turn around a unit circle 	N/A	N/A	N/A
<ul style="list-style-type: none"> Comprehend that irrational numbers have infinite non-terminating decimal forms and specify rational approximations for these correct to a required decimal place accuracy 	N/A	N/A	N/A

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<ul style="list-style-type: none"> Express very small and very large decimal numbers using scientific notation 	- Express very small and very large numbers in scientific notation	#15: T4 - wks 5,6,7,8	#15: T3 - wks 5,6,7,8 T4 - wks 6,7,8
<ul style="list-style-type: none"> Carry out arithmetic computations involving integers using mental and/or written algorithms 	- Add and subtract integers - Multiply and divide integers	#7: all terms #8: all terms	#7: all terms #8: all terms
<ul style="list-style-type: none"> Carry out arithmetic computations involving finite decimals using mental and/or written algorithms 	- Add and subtract decimals - Multiply and divide decimals	#1: all terms #2: all terms	#1: all terms #2: all terms #10: T4 - all wks
<ul style="list-style-type: none"> Use calculators for arithmetic computations involving several operations on natural or rational numbers, and for rational approximations of irrational numbers of any size, including numbers expressed in scientific notation 	N/A	N/A	N/A
<ul style="list-style-type: none"> Carry out exact arithmetic computations involving fractions 	- Add and subtract fractions - Multiply and divide fractions	#3: all terms #4: all terms	#3: all terms #4: all terms #6: T3 - wks 5,6,7,8 T4 - wks 5,8
<ul style="list-style-type: none"> Carry out exact arithmetic computations involving square roots of prime numbers and rational numbers that are not perfect squares 	- Compute square roots of prime numbers and rational numbers that are not perfect squares	N/A	#14: T3 - all wks T4 - wks 5,6,7,8
<ul style="list-style-type: none"> Carry out exact arithmetic computations involving multiples and fractions of π that correspond to simple fractional amounts of turn in a unit circle 	- Calculate the circumference of a circle - Calculate the area of a circle - Calculate the volume of a cylinder, cone and sphere - Calculate the surface area of a cylinder, cone and sphere	#27: T3 - wks 1,2,3,4 T4 - wks 7,8 #28 T3 - wks 5,6,7,8 #29: T3 - wks 1,2,3,4 #30 T3 - wks 5,6,7,8 T4 - wks 5,6,7,8	#27: T2 - wks 1,2,3,4 T3 - wks 1,2,3,4 #28 T1 - wks 5,7,8 T2 - wks 5,6,7,8 #29: T2 - wks 1,2,3,4 T3 - wks 5,6,7,8 T4 - wks 5,6,7,8 #30 T2 - wks 1,3,4,5,6,7,8 T3 - wks 5,6,7,8 T4 - wk 5
<ul style="list-style-type: none"> Use appropriate estimates to evaluate the reasonableness of the results of calculations involving rational and irrational real numbers and the decimal approximations for them 	- Estimate the value of irrational real numbers	#14: T3 - wks 5,6,7,8	#14: T1 - wks 5,6,7,8
<ul style="list-style-type: none"> Carry out computations to a required accuracy in terms of decimal places and/or significant figures 	- Round decimal numbers to a given place value - Find the number of significant figures in a number	#15: T1 - all wks T2 - wks 5,6,7,8 T3 - wks 5,6,7,8 N/A	#6: T4 - wks 1,2,3,4 #15 T1 - wks 1,2,3,4 #15 T3 - wks 1,2,3,4

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Space Level 6			
At level 6 students: <ul style="list-style-type: none"> Represent space enclosed in two- and three- dimensional shapes using lines, curves, polygons and circles in perspective, and isometric drawings, nets and computer-generated images 	<ul style="list-style-type: none"> Recognise and draw lines and polygons Draw a two-dimensional view of a solid Identify nets of three-dimensional shapes Identify and draw lines of symmetry for two-dimensional shapes Identify and draw cross-sections of a cube 	#24: T1 - wks 1,2,3,4,5,6 #24: T2 - wks 5,6,7,8 #24: T2 - wks 1,2,3,4 #24: T4 - wks 5,6,7,8 N/A	#24: T2 - wks 1,2,3,4 T3 – wks 6,8 #24: T4 - wks 1,2,3,4 #24: T2 - wks 5,6,7,8 #24: T3 - wks 1,2,3,4
<ul style="list-style-type: none"> Describe and compare common and distinctive features of boundaries, surfaces and interiors of common plane and three-dimensional shapes, including cylinders, spheres, cones, prisms and polyhedra 	<ul style="list-style-type: none"> Describe properties of three-dimensional shapes Describe properties of two-dimensional shapes 	#24: T3 - wks 5,6,7,8 #24: T4 - wks 1,2,3,4	#24: T3 - wks 5,7 #24: T1 - wks 1,2,3,4
<ul style="list-style-type: none"> Define, identify and use parallel, perpendicular and angle properties of straight lines and properties of circles, relating centre, radius, diameter, chord, arc, semi-circle, circumference, segment, sector and tangent to geometric facts and relationships between these aspects of shapes 	<ul style="list-style-type: none"> Calculate angles that are supplementary, complementary, corresponding, allied and alternate 	#25: all terms	#25: all terms
<ul style="list-style-type: none"> Comprehend and use the conditions for shapes to be congruent or similar and apply isometric and similarity transformations of geometric shapes in the plane 	<ul style="list-style-type: none"> Draw a two-dimensional shape to scale, showing similarity of two shapes Comprehend and use the conditions for shapes to be congruent 	#24: T1 - wks 7,8	#24: T3 - wks 6,8 #24: T4 - wks 5,6,7,8
<ul style="list-style-type: none"> Determine the effect of changing the scale of one characteristic of two- and three-dimensional shapes; for example, side length, area, volume and angle measure, on related characteristics 	N/A	N/A	N/A
<ul style="list-style-type: none"> Identify points that are invariant under a given transformation 	N/A	N/A	N/A
<ul style="list-style-type: none"> Characterise the paths (loci) formed by points, lines and shapes as they move in space according to various rules, conditions and/or constraints involving transformation (reflection, rotation and/or translation), distance, latitudes and longitudes, and great circles 	N/A	N/A	N/A
<ul style="list-style-type: none"> Describe the connection between objects/location/events according to defined relationships (networks) 	N/A	N/A	N/A

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Measurement Level 6			
<p>At level 6 students:</p> <ul style="list-style-type: none"> Estimate and measure characteristics such as length, area, volume, capacity, angle, time, temperature, probability, and constant rate of change where one variable is compared to another as a proportion such as the density of substances (mass in relation to volume), concentration of fluids, average speed and measures such as pollution levels in the atmosphere 	<ul style="list-style-type: none"> Read length scales Read temperature scales Select appropriate units of measurement Read and interpret timetables Convert units of measurement for length Convert units of measurement for mass Convert units of measurement for capacity Converting units of measurement for time Convert units of measurement for area Convert units of measurement for speed 	<p>#26: T1 - wks 1,2,4 #26: T1 - wk 3 #26: T2 - wks 1,2,3,4 #26: T3 - wks 5,6,7,8 #26: T1 - wks 7,8 T2 - wks 5,6 T4 - wks 3,4 #26: T1 - wks 5,6 T4 - wks 1,2 #26: T2 - wks 7,8 #26: T3 - wks 1,2,3,4 #26: T4 - wks 5,6,7,8</p>	<p>#26: T1 - wks 1,2,3,4 #26: T2 - wks 3,4,6,7,8 #26: T1 - wks 6,8 T3 - wks 6,8 #26: T3 - wks 5,7 #26: T1 - wks 5,7 #26: T2 - wks 1,2 #26: T3 - wks 1,2,3,4 #26: T4 - wks 5,6,7,8</p>
<ul style="list-style-type: none"> Choose real numbers in appropriate form to describe the size of measurements, in particular those of very large or small quantities, using scientific notation 	<ul style="list-style-type: none"> Describe the size of measurement using scientific notation 	#15: T1 - all wks	
<ul style="list-style-type: none"> Use degrees and radians as units of measurement for angles and convert between units of measurement as appropriate 	N/A	N/A	N/A
<ul style="list-style-type: none"> Comprehend the nature of errors of measurement - that error can be compounded by repetition and calculation – and decide on acceptable/tolerable levels of error in a given situation 	N/A	N/A	N/A
<ul style="list-style-type: none"> Interpret and use mensuration formulas for calculating the boundary, surface area and volume of two and three-dimensional shapes and simple composites of these shapes 	<ul style="list-style-type: none"> Calculate the perimeter of two-dimensional shapes Calculate the area of two-dimensional shapes Calculate the surface area of three-dimensional shapes Calculate the volume of three-dimensional shapes 	<p>#27: all terms #28: all terms #30: all terms #29: all terms</p>	<p>#27: all terms #28: all terms #30: all terms #29: all terms</p>
<ul style="list-style-type: none"> Use Pythagoras' Theorem and trigonometric ratios (sine, cosine and tangent) to obtain lengths of sides, angles and the area of right-angled triangles 	<ul style="list-style-type: none"> Use Pythagoras theorem to calculate lengths of sides Use trigonometric ratios to calculate lengths of sides 	#31: all terms	<p>#31: T1 - wks 1,2,3,4 T2 - wks 1,2,3,4 T3 - wks 1,2,3,4 T4 - wks 1,2,3,4 #31: T1 - wks 5,6,7,8 T2 - wks 5,6,7,8 T3 - wks 5,6,7,8 T4 - wks 5,6,7,8</p>

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<ul style="list-style-type: none"> Generate data using surveys, experiments, simulations and sampling procedures 	N/A	N/A	N/A
<ul style="list-style-type: none"> Comprehend the difference between a population and a sample and collect, display and compare uni-variate and bivariate data sets as samples drawn from populations 	- Recognise discrete and continuous data	#22: T3 - wks 5,6,7,8	
<ul style="list-style-type: none"> Use appropriate summary statistics, obtained by hand (small data sets only) and with technology, to calculate and represent centrality (mode, median and mean), spread (box-and-whisker plot, interquartile range, outliers) and association (by-eye estimation from a scatter plot) 	<ul style="list-style-type: none"> - Calculate and represent centrality (mean, median and mode) and measures of spread (lower and upper quartiles, interquartile range) - Interpret bar graphs, stem-and-leaf plots, dot plots, pie charts, box-and-whisker plots, histograms 	#22: T1 - wks 1,2,3,4 T2 - wks 1,2,3,4 T3 - wks 1,2,3,4 T4 - wks 5,6,7,8 #22: T1 - wks 5,6,7,8 T2 - wks 5,6,7,8 T4 - wks 1,2,3,4	#22: T1 - wks 5,6,7,8 T4 - all wks #22: T1 - wks 1,2,3,4 T2 - all wks T3 - all wks
<ul style="list-style-type: none"> Distinguish informally between association and causal relationship in bivariate data, and make predictions based on a by-eye line of best fit for scatter-plot data with strong association between two variables 	N/A	N/A	N/A
<ul style="list-style-type: none"> Estimate probabilities based on published data (experiments, surveys, samples) and assign and justify subjective probabilities, including odds, in familiar situations 	- Calculate the probability of a simple event	#23: T2 - all wks T3 - wks 1,2,3,4 T4 - wks 1,2	#23: T1 - wks 1,4,5,6,7,8 T4 - all wks
<ul style="list-style-type: none"> Classify events as likely to be dependent or independent 			
<ul style="list-style-type: none"> List event spaces (for combinations of up to three events) by lists, grids, tree diagrams, Venn diagrams and Karnaugh maps and use these tools to calculate probabilities for complementary, mutually exclusive and compound events (defined using <i>and</i>, <i>or</i> and <i>not</i>) 	<ul style="list-style-type: none"> - Calculate the probability of an event using Venn diagrams and Karnaugh maps - Recognise and calculate the probability of complementary events - Calculate the probability of compound events using tree diagrams 	#23 T3 - wks 5,6,7,8 #23: T1 - wks 5,6,7,8 #23: T4 - wks 5,6,7,8	#23: T2 - wks 1,2,3,4 T3 - wks 1,2,3,4 #23: T1 - wks 2,3 #23: T2 - wks 5,6,7,8 T3 - wks 5,6,7,8
Structure Level 6			
At level 6 students:			
<ul style="list-style-type: none"> Provide examples of natural numbers, integers, rational numbers and irrational numbers and their properties as subsets of the real-number system 	N/A	N/A	N/A
<ul style="list-style-type: none"> Classify these subsets as discrete or continuous, and finite or infinite, and place any two or more elements of these sets in relative order according to their magnitudes 	N/A	N/A	N/A

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<ul style="list-style-type: none"> Apply the algebraic properties (closure, associative, commutative, identity, inverse and distributive) to computation with number, to rearrange formulas, rearrange and simplify algebraic expressions 	N/A	N/A	N/A
<ul style="list-style-type: none"> Recognise and apply simple compositions of geometric transformations to objects in the plane 	N/A	N/A	N/A
<ul style="list-style-type: none"> Express relations between sets using membership, \in; complement, $'$; intersection, \cap; union, \cup; and subset; for up to three sets 	N/A	N/A	N/A
<ul style="list-style-type: none"> Represent a universal set as the disjoint union of intersections of up to three sets and their complements and illustrate this using a tree diagram, Venn diagram or Karnaugh map 	- Use tree diagrams, Venn diagrams and Karnaugh maps in representing sets	#23 T3 - wks 5,6,7,8 T4 - wks 5,6,7,8	#23: T2 - wks 1,2,3,4 T3 - all wks
<ul style="list-style-type: none"> Identify and represent linear, quadratic and exponential functions by table, rule and graph (all four quadrants of the Cartesian coordinate system) with consideration of independent and dependant variables for a given relationship, domain and range 	- Represent linear and quadratic functions by lists of ordered pairs in tables of values - Represent linear and quadratic functions by plots of points on a set of Cartesian axes	#21: T1 - wks 5,6,7,8 T2 - wks 5,6,7,8 #21: T2 - wks 1,2,3,4 T3 - all wks T4 - wks 5,6,7,8	#21: T1 - wks 1,2,3,4 T4 - wks 1,2,3,4 #21: T1 - wks 5,6,7,8 T4 - wks 5,6,7,8
<ul style="list-style-type: none"> Distinguish between these types of functions (constants first difference, second difference and ratio between consecutive terms of the dependant variable in a table of values; shape of their graphs) and their use and interpretation as models for data where a functional relationship is anticipated 	- Find the equation of a line joining two points using their coordinates		#21: T3 - wks 1,2,3,4
<ul style="list-style-type: none"> Recognise and explain the roles of the relevant constants in the relationships $f(x) = ax + c$, $f(x) = a(x + b)^2 + c$ and $f(x) = ca^x$ 	- Find the X- and Y-intercepts of a linear graph - Find the gradient of a linear function	#21: T4 - all wks	#21: T1 - wks 6,8 T2 - wks 5,6,7,8 #21: T2 - all wks
<ul style="list-style-type: none"> Solve equations of the form $f(x) = k$, where k is a real constant, and simultaneous linear equations in two variables algebraically, numerically (bisection) and graphically 	- Solve linear equations - Solve quadratic equations - Solve simultaneous linear equations in two variables graphically - Solve simultaneous linear equations in two variables algebraically	#20: T1 - all wks T2 - all wks T3 - wks 1,2,3,4,6,8 #20: T3 - wks 5,7 T4 - wks 5,6,7,8	#20: T1 - wks 1,2,3,4 T2 - wks 1,2,3,4,7 #20: T2 - wks 5,6,8 T3 - wks 1,2,3,4 T4 - wks 5,6,7,8 #21: T3 - wks 5,6,7,8 #20: T4 - wks 1,2,3,4