Level 8

Mathematics

Mathematics Level Description

In Level 8, students consolidate their proficiency with the four arithmetic operations, and combinations of these, for general computation involving natural numbers, integers and rational numbers, with and without the use of technology. They represent these numbers on the real number line. They extend the use of indices and develop the index laws using number examples. Students investigate the relationship between decimal and fraction representations of rational numbers (terminating and recurring decimals) and work with some irrational real numbers such as square roots and multiples and fractions of π *(pi)*. They solve a range of problems involving ratios, proportions, percentages and rates, with and without the use of digital technologies.

Students generalise from number to algebra, and expand, factorise, simplify and substitute into simple algebraic expressions. They plot linear relations on the Cartesian plane, with and without the use of digital technology, solve linear equations and apply linear models.

Students convert between units for area and for volume, and solve problems involving duration using 12-hour and 24-hour time, within a given time zone. They develop and use formulas for calculating perimeters and areas of quadrilaterals and circles, and volumes of prisms, and solve related measurement problems.

Students use congruence and transformations to establish properties of plane shapes related to sides, angles and symmetry, and solve related problems.

Students use the logical connectives ‘not’, ‘and’, ‘or’ and ‘either … or’ to relate events to probabilities, and use Venn diagrams and two-way tables to calculate probabilities. They develop an understanding that probabilities range from 0 to 1 and that the sum of probabilities for events in a sample space is 1.

Students investigate and use various techniques for collecting data, including random sampling. They use digital technology to explore the variability of proportions and means in random samples drawn from a given population, and investigate the effect of individual data values, including outliers, on the measure of centre (average).

Mathematics Content Descriptions

Number and Algebra

Number and place value

Use index notation with numbers to establish the index laws with positive integral indices and the zero index (VCMNA272)

Carry out the four operations with rational numbers and integers, using efficient mental and written strategies

Measurement and Geometry

Using units of measurement

Choose appropriate units of measurement for area and volume and convert from one unit to another (VCMMG286)

Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites

Statistics and Probability

Chance

Identify complementary events and use the sum of probabilities to solve problems (VCMSP294)

Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and' (VCMSP295)

mental and written strategies and appropriate digital technologies and make estimates for these computations (VCMNA273)

Real numbers

Investigate terminating and recurring decimals (VCMNA274)

Investigate the concept of irrational numbers, including π (VCMNA275)

Solve problems involving the use of percentages, including percentage increases and decreases and percentage error, with and without digital technologies (VCMNA276)

Solve a range of problems involving rates and ratios, including distance-time problems for travel at a constant speed, with and without digital technologies (VCMNA277)

Money and financial mathematics

Solve problems involving profit and loss, with and without digital technologies (VCMNA278)

Patterns and algebra

Extend and apply the distributive law to the expansion of algebraic expressions (VCMNA279)

Factorise algebraic expressions by identifying numerical factors (VCMNA280)

Simplify algebraic expressions involving the four operations (VCMNA281)

Use algorithms and related testing procedures to identify and correct errors (VCMNA282)

(VCMMG287)

Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving determining radius, diameter, circumference and area from each other (VCMMG288)

Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (VCMMG289)

Solve problems involving duration, including using 12- and 24-hour time within a single time zone (VCMMG290)

Geometric reasoning

Define congruence of plane shapes using transformations and use transformations of congruent shapes to produce regular patterns in the plane including tessellations with and without the use of digital technology (VCMMG291)

Develop the conditions for congruence of triangles (VCMMG292)

Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (VCMMG293)

both) and 'and' (VCMSP295)

Represent events in two-way tables and Venn diagrams and solve related problems (VCMSP296)

Data representation and interpretation

Distinguish between a population and a sample and investigate techniques for collecting data, including census, sampling and observation (VCMSP297)

Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (VCMSP298)

Explore the variation of means and proportions of random samples drawn from the same population (VCMSP299)

Investigate the effect of individual data values

including outliers, on the range, mean and median (VCMSP300)

(VCMNA282)

Linear and non-linear relationships

Plot linear relationships on the Cartesian plane with and without the use of digital technologies (VCMNA283)

Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution (VCMNA284)

Plot graphs of non-linear real life data with and without the

use of digital technologies, and interpret and analyse these graphs (VCMNA285)

Mathematics Achievement Standard

Number and Algebra

Students use efficient mental and written strategies to make estimates and carry out the four operations with integers, and apply the index laws to whole numbers. They identify and describe rational and irrational numbers in context. Students estimate answers and solve everyday problems involving profit and loss rates, ratios and percentages, with and without the use of digital technology. They simplify a variety of algebraic expressions and connect expansion and factorisation of linear expressions. Students solve linear equations and graph linear relationships on the Cartesian plane.

Measurement and Geometry

Students convert between units of measurement for area and for volume. They find the perimeter and area of parallelograms, rhombuses and kites. Students name the features of circles, calculate circumference and area, and solve problems relating to the volume of prisms. They make sense of time duration in real applications, including the use of 24-hour time. Students identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. They use tools, including digital technology, to construct congruent shapes.

Statistics and Probability

Students explain issues related to the collection of sample data and discuss the effect of outliers on means and medians of the data. They use various approaches, including the use of digital technology, to generate simple random samples from a population. Students model situations with Venn diagrams and two-way tables and explain the use of 'not', 'and' and 'or'. Students choose appropriate language to describe events and experiments. They determine complementary events and calculate the sum of probabilities.