Mathematics Sample Program: Year 5



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Abbreviations

ABS Australian Bureau of Statistics

AMSI Australian Mathematical Sciences Institute

CIMT Centre for Innovation in Mathematical Teaching (Plymouth, United Kingdom)

DET Department of Education and Training

ESA Educational Services Australia

NCTM National Council Teachers of Mathematics

NLVM National Library of Virtual Manipulatives

MAV Mathematical Association of Victoria

Hyperlinks

At the time of publication the URLs (website addresses) cited were checked for accuracy and appropriateness of content. However, due to the transient nature of material placed on the web, their continuing accuracy cannot be verified. Teachers are strongly advised to prepare their own indexes of sites that are suitable and applicable to the courses they teach, and to check these addresses prior to allowing student access.

Overview

This Mathematics Sample Program: Year 5 is an example of how the Mathematics curriculum could be organised into a teaching and learning program.

This sample program provides comprehensive coverage of content descriptions from the three strands of the mathematics curriculum and is sequenced to develop knowledge and skills; however, there are many other ways that the curriculum content can be arranged to suit the learning needs of students.

Topics, suggested time allocations and sequencing

|  |  |  |
| --- | --- | --- |
| **Week\*** | **Semester 1** | **Semester 2** |
| **1** | *5.1.1 Place Value to Hundreds of Thousands* Strand: Number and Algebra Sub-strand: Number and Place Value | *5.2.1 Comparing and Ordering Fractions and Decimals* Strand: Number and Algebra Sub-strand: Fractions and Decimals |
| **2** |
| **3** | *5.1.2 Developing a Place Value Understanding of Decimal Numbers*  Strand: Number and Algebra Sub-strand: Fractions and Decimals |
| **4** | *5.2.2 Operations - Multi-Digit Multiplication and Division*  Strand: Number and Algebra Sub-strand: Number and Place Value |
| **5** | *5.1.3 Operations with Whole Numebrs and Decimal Numbers*  Strand: Number and Algebra Sub-strand: Number and Place Value |
| **6** |
| **7** | *5.2.3 Pattern and Algebra - Equality and Equivalence*  Strand: Number and Algebra  Sub-strand: Patterns and Algebra |
| **8** |
| **9** | *5.1.4 Shape - 2D and 3D Shape, Properties and Angles* Strand: Measurement and Geometry  Sub-strand: Shape; Geometric Reasoning | *5.2.4 Shape - Location and Transformation*  Strand: Measurement and Geometry Sub-strand: Location and Transformation |
| **10** |
| **11** | *5.1.5 Measurement - Time, Length, Area and Perimeter* Strand: Measurement and Geometry Sub-strand: Using Units of Measurement | *5.2.5 Measurement - Volume and Capacity and Mass* Strand: Measurement and Geometry  Sub-strand: Using Units of Measurement |
| **12** |
| **13** |
| **14** | *5.2.6 Quantifying Chance as a Fraction* Strand: Statistics and Probability  Sub-strand: Chance |
| **15** | *5.1.6 Representing and Interpreting Data* Strand: Statistics and Probability  Sub-strand: Data Representation and Interpretation |
| **16** |
| **17** | *5.1.7 Describing, Creating and Continuing Patterns* Strand: Number and Algebra Sub-strand: Patterns and Algebra | *5.2.7 Financial Plans and Budgets* Strand: Number and Algebra Sub-strand: Money and Financial Mathematics |
| **18** |

\* Based on 3 hours teaching time per week

Content descriptions coverage within each topic

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| --- | --- |
| **Level 5 content descriptions** | **Topic/s** |
| **Strand: Number and Algebra** | |
| **Sub-strand: Number and Place Value** | |
| Identify and describe factors and multiples of whole numbers and use them to solve problems [(VCMNA181)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA181) | 5.1.3 |
| Use estimation and rounding to check the reasonableness of answers to calculations [(VCMNA182)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA182) | 5.1.3 |
| Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies [(VCMNA183)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA183) | 5.2.2 |
| Solve problems involving division by a one digit number, including those that result in a remainder [(VCMNA184)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA184) | 5.2.2 |
| Use efficient mental and written strategies and apply appropriate digital technologies to solve problems [(VCMNA185)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA185) | 5.1.3 |
| Recognise, represent and order numbers to at least tens of thousands [(VCMNA186)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA186) | 5.1.1 |
| **Sub-strand: Fractions and Decimals** | |
| Compare and order common unit fractions and locate and represent them on a number line [(VCMNA187)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA187) | 5.2.1 |
| Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator [(VCMNA188)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA188) | 5.2.1 |
| Recognise that the place value system can be extended beyond hundredths [(VCMNA189)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA189) | 5.1.2 |
| Compare, order and represent decimals [(VCMNA190)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA190) | 5.1.2 |
| **Sub-strand: Money and Financial Mathematics** | |
| Create simple financial plans [(VCMNA191)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA191) | 5.2.7 |
| **Sub-strand: Patterns and Algebra** | |
| Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction [(VCMNA192)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA192) | 5.1.7 |
| Use equivalent number sentences involving multiplication and division to find unknown quantities [(VCMNA193)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA193) | 5.2.3 |
| Follow a mathematical algorithm involving branching and repetition (iteration) [(VCMNA194)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA194) | 5.1.7 |
| **Strand: Measurement and Geometry** | |
| **Sub-strand: Using Units of Measurement** | |
| Choose appropriate units of measurement for length, area, volume, capacity and mass [(VCMMG195)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG195) | 5.1.5  5.2.5 |
| Calculate the perimeter and area of rectangles and the volume and capacity of prisms using familiar metric units [(VCMMG196)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG196) | 5.1.5 |
| Compare 12- and 24-hour time systems and convert between them [(VCMMG197)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG197) | 5.1.5 |

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| **Sub-strand: Shape** | |
| Connect three-dimensional objects with their nets and other two-dimensional representations [(VCMMG198)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG198) | 5.1.4 |
| **Sub-strand: Location and Transformation** | |
| Use a grid reference system to describe locations. Describe routes using landmarks and directional language [(VCMMG199)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG199) | 5.2.4 |
| Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries [(VCMMG200)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG200) | 5.2.4 |
| Apply the enlargement transformation to familiar two dimensional shapes and explore the properties of the resulting image compared with the original [(VCMMG201)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG201) | 5.2.4 |
| **Sub-strand: Geometric Reasoning** | |
| Estimate, measure and compare angles using degrees. Construct angles using a protractor [(VCMMG202)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG202) | 5.1.4 |
| **Strand: Statistics and Probability** | |
| **Sub-strand: Chance** |  |
| List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions [(VCMSP203)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP203) | 5.2.6 |
| Recognise that probabilities range from 0 to 1 [(VCMSP204)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP204) | 5.2.6 |
| **Sub-strand: Data Representation and Interpretation** | |
| Pose questions and collect categorical or numerical data by observation or survey [(VCMSP205)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP205) | 5.1.6 |
| Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies [(VCMSP206)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP206) | 5.1.6 |
| Describe and interpret different data sets in context [(VCMSP207)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP207) | 5.1.6 |

Achievement standards (for three levels to support planning for a continuum of learning)

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| Level 4 | Level 5 | Level 6 |
| **Number and algebra**  Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | **Number and algebra**  Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | **Number and algebra**  Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |
| **Measurement and geometry**  Students compare areas of regular and irregular shapes, using informal units. They solve problems involving time duration. Students use scaled instruments to measure length, angle, area, mass, capacity and temperature of shapes and objects. They convert between units of time. Students create symmetrical simple and composite shapes and patterns, with and without the use of digital technology. They classify angles in relation to a right angle. Students interpret information contained in maps. | **Measurement and geometry**  Students use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles and volume, and capacity of rectangular prisms. They convert between 12 and 24-hour time. Students use a grid reference system to locate landmarks. They estimate angles, and use protractors and digital technology to construct and measure angles. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. | **Measurement and geometry**  Students relate decimals to the metric system and choose appropriate units of measurement to perform a calculation. They solve problems involving time, length and area, and make connections between capacity and volume. Students interpret a variety of everyday timetables. They solve problems using the properties of angles and investigate simple combinations of transformations in the plane, with and without the use of digital technology. Students construct simple prisms and pyramids. |
| **Statistics and probability**  Students describe different methods for data collection and representation, and evaluate their effectiveness. They construct data displays from given or collected data, with and without the use of digital technology. Students list the probabilities of everyday events. They identify dependent and independent events. | **Statistics and probability**  Students pose questions to gather data and construct various displays appropriate for the data, with and without the use of digital technology. They compare and interpret different data sets. Students list outcomes of chance experiments with equally likely outcomes and assign probabilities as a number from 0 to 1. | **Statistics and probability**  Students interpret and compare a variety of data displays, including displays for two categorical variables. They analyse and evaluate data from secondary sources. Students compare observed and expected frequencies of events, including those where outcomes of trials are generated with the use of digital technology. They specify, list and communicate probabilities of events using simple ratios, fractions, decimals and percentages. |

Learning in Mathematics

The proficiencies of Understanding, Fluency, Problem Solving and Reasoning are fundamental to learning mathematics and working mathematically, and are applied across all three strands Number and Algebra, Measurement and Geometry, and Statistics and Probability.

Understanding refers to students building a robust knowledge of adaptable and transferable mathematical concepts and structures. Students make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the ‘why’ and the ‘how’ of mathematics. Students build understanding when they:

* Connect related ideas
* Represent concepts in different ways
* Identify commonalities and differences between aspects of content
* Describe their thinking mathematically
* Interpret mathematical information.

Fluency describes students developing skills in choosing appropriate procedures, carrying out procedures flexibly, accurately, efficiently and appropriately, and recalling factual knowledge and concepts readily. Students are fluent when they:

* Make reasonable estimates
* Calculate answers efficiently
* Recognise robust ways of answering questions
* Choose appropriate methods and approximations
* Recall definitions and regularly use facts,
* Can manipulate expressions and equations to find solutions.

Problem solving is the ability of students to make choices, interpret, formulate, model and investigate problem situations, select and use technological functions and communicate solutions effectively. Students pose and solve problems when they:

* Use mathematics to represent unfamiliar or meaningful situations
* Design investigations and plan their approaches
* Apply their existing strategies to seek solutions
* Verify that their answers are reasonable.

Reasoning refers to students developing an increasingly sophisticated capacity for logical, statistical and probabilistic thinking and actions, such as conjecturing, hypothesising, analysing, proving, evaluating, explaining, inferring, justifying, refuting, abstracting and generalising. Students are reasoning mathematically when they:

* Explain their thinking
* Deduce and justify strategies used and conclusions reached
* Adapt the known to the unknown
* Transfer learning from one context to another
* Prove that something is true or false
* Make inferences about data or the likelihood of events
* Compare and contrast related ideas and explain their choices.

Year 5 Semester 1



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| Topic 5.1.1 Place Value to Hundreds of Thousands | | |
| Strand:  Number and Algebra | Sub-strand:  Number and Place Value | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Recognise, represent and order numbers to at least tens of thousands [(VCMNA186)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA186) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | **Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding.** Students identify and describe factors and multiples. They explain plans for simple budgets. Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities** | **Proficiencies** |
| * How our place value number system operates including increasing and decreasing by powers of ten, the importance of zero as a place holder, the value of the digit is determined by its place (tens, hundreds etc) and additive for example 214 is 200 + 10 + 4 * Reading, ordering, and modelling numbers to at least hundreds of thousands using both proportional and non-proportional materials as well as visual representations and electronic representations * Interpreting numbers to at least hundreds of thousands by stating numbers 100 more and 100 less or 1000 more or 1000 less for example. * Rounding numbers off to the nearest 100 or 1000 and state approximately how far the original number is from the rounded number. | * **Fluency** in reading, writing and saying whole numbers to at least hundreds of thousands * **Understanding** the principles on which our number system operates including powers of ten, a place value system, the importance of zero and the additive nature of our numbers * **Problem solving** by using place value knowledge of numbers * **Reasoning** about rounding and re-naming numbers using place value understanding |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Recognise, represent and order numbers to at least tens of thousands.   Level 6  Students who are working at this level could:   * Reproducing seven- and eight-digit numbers in words using their numerical representations, and vice versa; recognise, represent and order these numbers. |

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| **Assessment ideas** |
| * Students read, write, order and represent numbers to at least hundreds of thousands; they identify numbers 100 more and 100 less, 1000 more and 1000 less and bridge over to the next or the last 100 or 1000; they round off numbers to the nearest 100, 1000 or 10 000. |

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| **Resources** |
| **AMSI**  [Using Place Value to Write Numbers](http://www.amsi.org.au/teacher_modules/pdfs/Using_place_value4-7.pdf) (also available in [FUSE](http://fuse.education.vic.gov.au/?TSNWL2))  **NLVM**  [Number & Operations](http://nlvm.usu.edu/en/nav/category_g_2_t_1.html)  **Illuminations**  [Expand That Number! Composing and Decomposing Numbers Using Standard and Expanded Form](http://illuminations.nctm.org/Lesson.aspx?id=3691) |

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| **Notes** | | |
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| Topic 5.1.2 Developing a Place Value Understanding of Decimal Numbers | | |
| Strand:  Number and Algebra | Sub-strand:  Fractions and Decimals | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Recognise that the place value system can be extended beyond hundredths [(VCMNA189)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA189) * Compare, order and represent decimals [(VCMNA190)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA190) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. **Students order decimals and unit fractions and locate them on a number line.** Students add and subtract fractions with the same denominator. They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities (continued on next page)** | **Proficiencies** |
| * How our place value number system extends to decimal numbers by repeatedly dividing by ten and extending the place value chart to tenths and hundredths * Reading, writing, ordering and representing decimal numbers to tenths and hundredths where the numbers are not all the same length for example, 0.1, 0.01, 0.001 and 1.0 | * **Fluency** includes reading decimal numbers using fractional language, e.g., tenths, hundredths, thousandths * **Understanding** includes making connections between representations of numbers |

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| **Activities (continued)** | **Proficiencies (continued)** |
| * Using representations which illustrates the relative size of decimal numbers for example that one tenth is ten times larger than one hundredth, and that one hundredth is ten times larger than one thousandth * Interpreting decimal numbers by attending to the place value of each digit * Recognise different decimal representations of whole numbers such as 3 = 3.0 = 3.00 = 3.000. | * **Problem solving** includes formulating and solving authentic problems using decimal numbers * **Reasoning** about the relative size and relationship between decimal parts such as ten tenths is one, ten hundredths is one tenth, ten thousandths is one hundredth |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Use knowledge of fractions to establish equivalences between fractions and decimal notation.   Level 6  Students who are working at this level could:   * Multiply and divide decimals by powers of 10. |

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| **Assessment ideas** |
| Students:   * Write down 15 numbers between 3.1 and 3.4 * Read, write, order and represent decimal numbers to tenths and hundredths where the numbers are not all the same length for example, 0.1, 0.01 and 1.0 * Generate number sequences involving decimals such as 0, 0.20, 0.40, 0.60, 0.80, 1.00, 1.20 … |

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| **Resources** |
| **FUSE**  [Wishball Challenge: Hundredths](http://fuse.education.vic.gov.au/?2QXSQB)  [Fraction Wall](http://fuse.education.vic.gov.au/?D9JMDJ)  **Department of Education and Training (Victoria)**  [Comparing Decimal Numbers](http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/continuum/pages/compdecnum40.aspx)  [Mathematics Online Interview Classroom Activities](https://www.eduweb.vic.gov.au/edulibrary/public/teachlearn/student/mathscontinuum/fracdecactivities.pdf) |

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| **Notes** |
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| Topic 5.1.3 Operations with Whole Numbers and Decimal Numbers | | | | |
| Strand:  Number and Algebra | | Sub-strand:  Number and Place Value | | Recommended teaching time:  4 weeks |
| **Mapping to F–10 curriculum in Victoria** | | | | | |
| **Content descriptions** | | | | | |
| * Identify and describe factors and multiples of whole numbers and use them to solve problems [(VCMNA181)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA181) * Use estimation and rounding to check the reasonableness of answers to calculations [(VCMNA182)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA182) * Use efficient mental and written strategies and apply appropriate digital technologies to solve problems [(VCMNA185)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA185) | | | | | |
| **Achievement standard (excerpt in bold)** | | | | | |
| Level 4 | **Level 5** | | Level 6 | | |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | **Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples.** They explain plans for simple budgets. Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. | | |

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| **Activities (continued on next page)** | **Proficiencies** |
| * Multiplication facts, multiples and factors * Multiplication linked to division * Strategies for multi-digit addition and subtraction * Estimate and round to check reasonableness of answers * Explore factors and multiples using number sequences | * **Fluency** in recall of multiplication facts and related facts such as multiplying by powers of ten * **Understanding** using estimation strategies to check the reasonableness of answers to problems using the four operations |

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| **Activities (continued)** | **Proficiencies (continued)** |
| * Use simple divisibility tests * Recognise the usefulness of estimation to check calculations * Apply mental strategies to estimate the result of calculations * Use technology to solve problems and check the reasonableness of answers * Choose between mental, written and a technology-based computation depending on the nature of the problems and the purpose for computation   *Note: The term ‘whole number’ is used informally to distinguish between a fraction such as and a number such as* 2. *The term ‘the set of whole numbers’ is sometimes used to refer to the infinite set* {1, 2, 3 …}; *sometimes it is used to refer to the infinite set* {0, 1, 2, 3 …} *and sometimes it is used to refer to the set of integers* { …-3, -2, -2, 0, 1, 2, 3 …}. *Integers are introduced at Level 6.*  *Whole numbers such as* 2 *also have fraction representations, such as*   *and decimal representations such as* 2 = 2.0 = 2.00 = 2.000. | * **Problem solving** through using the appropriate operation and strategies to solve real world investigations or worded problems * **Reasoning** through explaining and justifying their computational and estimation strategies |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Recall multiplication facts up to 10 × 10 and related division facts.   Level 6  Students who are working at this level could:   * Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers and make estimates for these computations. |

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| **Assessment ideas** |
| Students   * Complete various [diagnostic tasks](http://www.det.wa.edu.au/stepsresources/detcms/navigation/first-steps-mathematics/?oid=MultiPartArticle-id-13603817) for number. |

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| **Resources** | | | |
| **FUSE**  Various FUSE [activities and resources](http://fuse.education.vic.gov.au/VCAA/VCMNA181)  **AMSI**  [Multiplication of Whole Numbers](http://www.amsi.org.au/teacher_modules/multiplication_of_whole_numbers.html#Content)  **Illuminations**  [Factorise](http://illuminations.nctm.org/Activity.aspx?id=3511) | | | |
| **Notes** | | | |
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| Topic 5.1.4 Shape – 2D and 3D Shape, Properties and Angles | | |
| Strand:  Measurement and Geometry | Sub-strand:  Shape; Geometric Reasoning | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Connect three-dimensional objects with their nets and other two-dimensional representations [(VCMMG198)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG198) * Estimate, measure and compare angles using degrees. Construct angles using a protractor [(VCMMG202)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG202) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students compare areas of regular and irregular shapes, using informal units. They solve problems involving time duration. Students use scaled instruments to measure length, angle, area, mass, capacity and temperature of shapes and objects. They convert between units of time. Students create symmetrical simple and composite shapes and patterns, with and without the use of digital technology. They classify angles in relation to a right angle. Students interpret information contained in maps. | Students use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles and volume, and capacity of rectangular prisms. They convert between 12 and 24-hour time. Students use a grid reference system to locate landmarks. **They estimate angles, and use protractors and digital technology to construct and measure angles.** **Students connect three-dimensional objects with their two-dimensional representations.** They describe transformations of two-dimensional shapes and identify line and rotational symmetry. | Students relate decimals to the metric system and choose appropriate units of measurement to perform a calculation. They solve problems involving time, length and area, and make connections between capacity and volume. Students interpret a variety of everyday timetables. They solve problems using the properties of angles and investigate simple combinations of transformations in the plane, with and without the use of digital technology. Students construct simple prisms and pyramids. |

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| **Activities** | **Proficiencies** |
| * Properties of 2D and 3D shape including terms such as sides, corners, sum of angles (2D) and edges, corners and faces (3D) * Properties of shapes identifies the shape * Shapes can be categorised into classes of shape such as quadrilaterals or prisms * Visualising, creating and testing examples and non-examples of 2D nets for 3D shapes * Identifying and classifying angles such as right angles, acute angles and obtuse angles * Measuring and creating angles using tools such as a protractor * Finding the interior angles of 2D shapes and generalising about the sum of angles and particular shapes (for example all the angles in a triangle add to 180 degrees, in quadrilateral angles add to 360 degrees) | * **Fluency** in language to describe the properties of 2D and 3D shapes and types of angles * **Understanding** that the sum of the interior angles of 2D shapes can help classify these shapes * **Problem solving** by estimating the size of angles using benchmarks such as 90 degrees, or 180 degrees * **Reasoning** about if a net matches or does not match a 3D shape and why |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Explain and compare the geometric properties of two-dimensional shapes and three-dimensional objects.   Level 6  Students who are working at this level could:   * Construct simple prisms and pyramids. |

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| **Assessment ideas** |
| Students:   * Classify a variety of shapes (2D and 3D) according to their properties and link 2D nets to the 3D shapes they can create * Identify and construct a variety of angles using a protractor or digital technology * Complete various [diagnostic tasks](http://det.wa.edu.au/stepsresources/redirect/?oid=com.arsdigita.cms.contenttypes.FileStorageItem-id-14418052&stream_asset=true) |

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| **Resources** |
| **FUSE**  Various FUSE activities and resources for [VCMMG198](http://fuse.education.vic.gov.au/VCAA/VCMMG198) and [VCMMG202](http://fuse.education.vic.gov.au/VCAA/VCMMG202)  **Illuminations**  [Geometric Solids](http://illuminations.nctm.org/Activity.aspx?id=3521) |

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| Topic 5.1.5 Measurement – Time, Length, Area and Perimeter | | |
| Strand:  Measurement and Geometry | Sub-strand:  Using Units of Measurement | Recommended teaching time:  4 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Choose appropriate units of measurement for length, area, volume, capacity and mass [(VCMMG195)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG195) * Calculate the perimeter and area of rectangles and the volume and capacity of prisms using familiar metric units [(VCMMG196)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG196) * Compare 12- and 24-hour time systems and convert between them [(VCMMG197)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG197) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students compare areas of regular and irregular shapes, using informal units. They solve problems involving time duration. Students use scaled instruments to measure length, angle, area, mass, capacity and temperature of shapes and objects. They convert between units of time. Students create symmetrical simple and composite shapes and patterns, with and without the use of digital technology. They classify angles in relation to a right angle. Students interpret information contained in maps. | **Students use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles and volume, and capacity of rectangular prisms. They convert between 12 and 24-hour time.** Students use a grid reference system to locate landmarks. They estimate angles, and use protractors and digital technology to construct and measure angles. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. | Students relate decimals to the metric system and choose appropriate units of measurement to perform a calculation. They solve problems involving time, length and area, and make connections between capacity and volume. Students interpret a variety of everyday timetables. They solve problems using the properties of angles and investigate simple combinations of transformations in the plane, with and without the use of digital technology. Students construct simple prisms and pyramids. |

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| **Activities** | **Proficiencies** |
| * Using standard metric units and standard tools to measure time, length, area and perimeter accurately * Estimating time, length, area and perimeter in metric units by using personal benchmarks such as strides for one metre, finger width for one centimetre, claps for one second etc. * Converting between metric units such as metres to centimetres and kilometres to metres for example * Explore the relationship between perimeter and area where the perimeter can remain the same but the area can differ * Explore strategies for calculating the perimeter and area of rectangles | * **Fluency** in using appropriate tools and units to measure various attributes such as length, time, area or perimeter. * **Understanding** the relationships between metric units * **Problem solving** by finding the perimeter or area of irregular shapes * **Reasoning** by estimating time, length, area and perimeter using personal benchmarks. |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Compare objects using familiar metric units of area.   Level 6  Students who are working at this level could:   * Solve problems involving the comparison of lengths and areas using appropriate units. |

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| **Assessment ideas** |
| Students:   * Complete various [diagnostic tasks](http://det.wa.edu.au/stepsresources/redirect/?oid=com.arsdigita.cms.contenttypes.FileStorageItem-id-14417096&stream_asset=true) * Produce a schedule of events or an itinerary using 12 and 24 hour time. |

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| **Resources** |
| **FUSE**  [Late Again!](http://fuse.education.vic.gov.au/?8NQZ48)  [24 hour](http://fuse.education.vic.gov.au/Search/Results?AssociatedPackageId=&QueryText=24+hour+time&SearchScope=All)  **Illuminations**  [Finding Perimeter and Area](http://illuminations.nctm.org/Lesson.aspx?id=2176) |

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| Topic 5.1.6 Representing and Interpreting Data | | |
| Strand:  Statistics and Probability | Sub-strands:  Data Representation and Interpretation | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Pose questions and collect categorical or numerical data by observation or survey [(VCMSP205)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP205) * Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies [(VCMSP206)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP206) * Describe and interpret different data sets in context [(VCMSP207)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP207) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students describe different methods for data collection and representation, and evaluate their effectiveness. They construct data displays from given or collected data, with and without the use of digital technology. Students list the probabilities of everyday events. They identify dependent and independent events. | **Students pose questions to gather data and construct various displays appropriate for the data, with and without the use of digital technology. They compare and interpret different data sets.** Students list outcomes of chance experiments with equally likely outcomes and assign probabilities as a number from 0 to 1. | Students interpret and compare a variety of data displays, including displays for two categorical variables. They analyse and evaluate data from secondary sources. Students compare observed and expected frequencies of events, including those where outcomes of trials are generated with the use of digital technology. They specify, list and communicate probabilities of events using simple ratios, fractions, decimals and percentages. |

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| **Activities** | **Proficiencies** |
| * The data investigation process from initial questions to be answered via data collection to the various ways of representing and analysing that data. * Constructing ways of representing data including column graphs, dot plots and tables including using technology * Comparing ways of representing data and matching the most appropriate graph to types of data * Interpreting and analysing data from a variety of sources | * **Fluency** in constructing data representations including all important features * **Understanding** through interpreting data and comparing data sets * **Problem solving** efficient and effective ways to collect, represent and analyse data * **Reasoning** in connecting appropriate data representations to data sets and comparing the effectiveness of different data representations |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Select and trial methods for data collection, including survey questions and recording sheets.   Level 6  Students who are working at this level could:   * Construct, interpret and compare a range of data displays, including side-by-side column graphs for two categorical variable. |

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| **Assessment ideas** |
| Students:   * Complete a data investigation by posing a question, devising a way to collect data, collecting data, representing data in at least three different ways and then compare these ways of showing the data identifying the most accurate and clear representation. |

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| **Resources** |
| **FUSE** ['Choose Your Own Statistics'](http://fuse.education.vic.gov.au/?FKY5S5)  **AMSI**  [Data Investigation and Interpretation](http://www.amsi.org.au/teacher_modules/pdfs/Data_Investigation_and_interpretation5.pdf)  **Australian Bureau of Statistics**  [Census at School](http://abs.gov.au/websitedbs/CaSHome.nsf/Home/CasMa02+DOES+YOUR+ROCK+AND+ROLL+STILL+ROCK) |

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| Topic 5.1.7 Describing, Creating and Continuing Patterns | | |
| Strand:  Number and Algebra | Sub-strand:  Patterns and Algebra | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction [(VCMNA192)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA192) * Follow a mathematical algorithm involving branching and repetition (iteration) [(VCMNA194)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA194) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. **They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals.** | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities** | **Proficiencies** |
| * Describing, continuing and creating increasing and decreasing patterns with fractions, decimals and whole numbers * Forming generalisations or ‘rules’ to describe patterns * Finding the unknown term in a pattern or equation * Exploring the relationships between addition and subtraction * Manipulating sets of numbers using a given rule, for example, if a number is even halve it; if a number is odd, subtract 1 then halve it | * **Fluency** through recognising the repeated nature of pattern * **Understanding** the relationships between the four operations * **Problem solving** to find the unknown term in a pattern or equation using strategies such as inverse operations * **Reasoning** through forming generalisations about patterns |

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| **Considering different levels of student ability** |
| Level 4  Students who are working at this level could:   * Explore and describe number patterns resulting from performing multiplication.   Level 6  Students who are working at this level could:   * Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence. |

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| **Assessment ideas** |
| Students:   * Continue and create patterns and explain the ‘rule’ for the pattern * Simulate a simple random walk. |

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| **Resources** |
| **FUSE**  [Bridge builder: Triangles 1](http://fuse.education.vic.gov.au/?XVB8FD)  [Circus Towers: Square Stacks](http://fuse.education.vic.gov.au/?NNM3SW) |

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Year 5 Semester 2



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| Topic 5.2.1 Comparing and Ordering Fractions and Decimals | | |
| Strand:  Number and Algebra | Sub-strand:  Fractions and Decimals | Recommended teaching time:  3 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Compare and order common unit fractions and locate and represent them on a number line [(VCMNA187)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA187) * Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator [(VCMNA188)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA188) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. **Students order decimals and unit fractions and locate them on a number line.** **Students add and subtract fractions with the same denominator.** They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities** | **Proficiencies** |
| * Model and solve addition and subtraction problems involving fractions by using jumps on a number line, or making diagrams of fractions as parts of shapes * Recognise the connection between the order of unit fractions and their denominators * Recognise that fractions are equal parts of a whole * Recognise that the denominator in a fraction names the piece or the size of the piece (3/4 – we are talking about quarters) while the numerator tell us how many of these pieces (three quarters) * Recognise that fractions are numbers that can be counted, placed on number lines and added and subtracted * Recognise that fractions are the expression of a division situation for example, 3 children shared 2 cookies so they get 2/3 each. * Recognise that fractions can be operators and parts of a group for example 1/3 of 12 * Recognise that the same quantity can be expressed as a fraction or a decimal * Explore the relationship between decimal numbers and fractions through visual representations such as paper folding to show that 0.5 is equivalent to one half for example | * **Fluency** in reading, writing and showing representations of fraction and decimal quantities * **Understanding** by comparing and ordering fractions and decimals and representing them in various ways * **Problem solving** by using fractions and decimal numbers to solve problems * **Reasoning** through using strategies such as benchmarking and equivalence to solve problems. |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Count by quarters, halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line.   Level 6  Students who are working at this level could:   * Compare fractions with related denominators and locate and represent them on a number line. |

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| **Assessment ideas** |
| Students:   * Complete a [fraction comparison test](https://www.eduweb.vic.gov.au/edulibrary/public/teachlearn/student/mathscontinuum/fractionsdiagtest.pdf) |

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| **Resources** |
| **Department of Education and Training (Victoria)**  [Teacher Fraction Classification Sheet](https://www.eduweb.vic.gov.au/edulibrary/public/teachlearn/student/mathscontinuum/fractionclassificationsheet.pdf)  **Fraction Monkeys (UK)**  [Matching Equivalent Fractions](http://www.fractionmonkeys.co.uk/activity/)  **FUSE**  A range of FUSE [activities and resources](http://fuse.education.vic.gov.au/VCAA/VCMNA187)  **rRich**  [More Fractions](http://nrich.maths.org/10358)  **Illuminations**  [Fractional Clothesline](http://illuminations.nctm.org/Lesson.aspx?id=2867) |

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| Topic 5.2.2 Operations – Multi-Digit Multiplication and Division | | |
| Strand:  Number and Algebra | Sub-strands:  Number and Place Value | Recommended teaching time:  3 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies [(VCMNA183)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA183) | | |
| Solve problems involving division by a one digit number, including those that result in a remainder [(VCMNA184)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA184) | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | **Students solve simple problems involving the four operations using a range of strategies including digital technology.** They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities** | **Proficiencies** |
| * Multiplication of larger numbers involving distributive law * Division of large numbers by single digit numbers * Development of efficient mental and written strategies for multiplying and dividing with larger numbers * Using the fact that equivalent division calculations result if both numbers are divided by the same factor * Interpreting and representing the remainder in division calculations sensibly for the context | * **Fluency** in multiplication facts and the related facts using powers to ten (E.g. 2 x 3 = 6 therefore 20 x 3 = 60) * **Understanding** the distributive law for multiplication by partitioning numbers into their place value parts * **Problem solving** by estimating reasonable ranges for answers before calculating * **Reasoning** about efficient mental and written strategies for multiplying and dividing. |

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| **Considering different levels of student ability** |
| Level 4  Students who are working at this level could:   * Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder.   Level 6  Students who are working at this level could:   * Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers and make estimates for these computations. |

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| **Assessment ideas** |
| Students:   * Write worded problems or situations to match multi digit multiplication or division equations. |

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| **Resources** |
| **FUSE**  [Divide it Up: Puppies](http://fuse.education.vic.gov.au/?BWJQ77)  **Illuminations**  [Multiply and Conquer](http://illuminations.nctm.org/Lesson.aspx?id=3210)  [How Many Each? How Many Left? Conceptualizing Division with Large Numbers](http://illuminations.nctm.org/Lesson.aspx?id=3807) |

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| Topic 5.2.3 Pattern and Algebra – Equality and Equivalence | | |
| Strand:  Number and Algebra | Sub-strand:  Patterns and Algebra | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Use equivalent number sentences involving multiplication and division to find unknown quantities [(VCMNA193)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA193) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | **Students solve simple problems involving the four operations using a range of strategies including digital technology.** They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. **They find unknown quantities in number sentences** and continue patterns by adding or subtracting fractions and decimals. | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities** | **Proficiencies** |
| * Explore equivalent number expressions * Explore the meaning of the equals sign * Explore the relationship between operations, for example, division as the inverse of multiplication * Use equivalent number sentences involving multiplication and division to find unknown quantities * Use relevant problems to develop number sentences | * **Fluency** in the language of equality * **Understanding** the inverse relationship between multiplication and division * **Problem solving** to find the unknown quantity in a number sentence * **Reasoning** about why number sentences using multiplication and division are equivalent using words and/or diagrams |

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| **Considering different levels of student ability** |
| Level 4  Students who are working at this level could:   * Use equivalent number sentences involving addition and subtraction to find unknown quantities.   Level 6  Students who are working at this level could:   * Explore the use of brackets and order of operations to write number sentences. |

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| **Assessment ideas** |
| Students:   * Find unknown terms for equivalent number expressions to ‘balance’ the expressions on each side of the equals sign. |

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| **Resources** |
| **FUSE**  [Balance the Blobs: Find the Rule 2](http://fuse.education.vic.gov.au/?AE9CH5)  **Illuminations**  [Pan Balance – Numbers](http://illuminations.nctm.org/Activity.aspx?id=3530)  **NLVM**  [Number & Operations](http://nlvm.usu.edu/en/nav/category_g_2_t_1.html) |

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| Topic 5.2.4 Shape – Location and Transformation | | |
| Strand:  Measurement and Geometry | Sub-strand:  Location and Transformation | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Use a grid reference system to describe locations. Describe routes using landmarks and directional language [(VCMMG199)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG199) * Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries [(VCMMG200)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG200) * Apply the enlargement transformation to familiar two dimensional shapes and explore the properties of the resulting image compared with the original [(VCMMG201)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG201) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students compare areas of regular and irregular shapes, using informal units. They solve problems involving time duration. Students use scaled instruments to measure length, angle, area, mass, capacity and temperature of shapes and objects. They convert between units of time. Students create symmetrical simple and composite shapes and patterns, with and without the use of digital technology. They classify angles in relation to a right angle. Students interpret information contained in maps. | Students use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles and volume, and capacity of rectangular prisms. They convert between 12 and 24-hour time. **Students use a grid reference system to locate landmarks.** They estimate angles, and use protractors and digital technology to construct and measure angles. Students connect three-dimensional objects with their two-dimensional representations. **They describe transformations of two-dimensional shapes and identify line and rotational symmetry.** | Students relate decimals to the metric system and choose appropriate units of measurement to perform a calculation. They solve problems involving time, length and area, and make connections between capacity and volume. Students interpret a variety of everyday timetables. They solve problems using the properties of angles and investigate simple combinations of transformations in the plane, with and without the use of digital technology. Students construct simple prisms and pyramids. |

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| **Activities** | **Proficiencies** |
| * Interpret and create maps with grid references * Use the language of direction including compass points * Use the language of transformation – translations (slides), reflections (flips) and rotations (turns) * Visualise changes in 2D shapes because of these types of transformations * Recognise lines of symmetry and rotational symmetry * Explore enlarging and scale | * **Fluency** in using the features of maps such as grid references and compass points * **Understanding** by describing transformations and identifying line and rotational symmetry * **Problem solving** to find lines of symmetry and rotational symmetry * **Reasoning** about the relationship between a 2D shape before and after enlargement |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Use simple scales, legends and directions to interpret information contained in basic maps.   Level 6  Students who are working at this level could:   * Explore the Cartesian coordinate system using all four quadrants. |

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| **Assessment ideas** |
| Students:   * Identify how shapes will look after types of transformations take place though visualising * Use digital technologies to enlarge shapes * Use a grid system to enlarge a favourite image or cartoon * Identify and describe the line and rotational symmetry of a range of two-dimensional shapes, by manually cutting, folding and turning shapes and by using digital technologies * Compare aerial views of Country, desert paintings and maps with grid references * Create a grid reference system for the classroom and using it to locate objects and describe routes from one object to another. |

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| **Resources** |
| **FUSE**  [Shape Sorter: Modify Tool](http://fuse.education.vic.gov.au/?DF83DH)  Various FUSE resources and activities for [VCMMG199](http://fuse.education.vic.gov.au/VCAA/VCMMG199)  **Illuminations**  [Analyzing Designs](http://illuminations.nctm.org/Lesson.aspx?id=1246)  [Finding Lines of Symmetry](http://illuminations.nctm.org/Lesson.aspx?id=1800) |

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| Topic 5.2.5 Measurement – Volume, Capacity and Mass | | |
| Strand:  Measurement and Geometry | Sub-strand:  Using Units of Measurement | Recommended teaching time:  3 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Choose appropriate units of measurement for length, area, volume, capacity and mass [(VCMMG195)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMMG195) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students compare areas of regular and irregular shapes, using informal units. They solve problems involving time duration. Students use scaled instruments to measure length, angle, area, mass, capacity and temperature of shapes and objects. They convert between units of time. Students create symmetrical simple and composite shapes and patterns, with and without the use of digital technology. They classify angles in relation to a right angle. Students interpret information contained in maps. | **Students use appropriate units of measurement for length, area, volume, capacity and mass,** and calculate perimeter and area of rectangles and **volume, and capacity of rectangular prisms.** They convert between 12 and 24-hour time. Students use a grid reference system to locate landmarks. They estimate angles, and use protractors and digital technology to construct and measure angles. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. | Students relate decimals to the metric system and choose appropriate units of measurement to perform a calculation. They solve problems involving time, length and area, and make connections between capacity and volume. Students interpret a variety of everyday timetables. They solve problems using the properties of angles and investigate simple combinations of transformations in the plane, with and without the use of digital technology. Students construct simple prisms and pyramids. |

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| **Activities** | **Proficiencies** |
| * Use appropriate units and tools for measuring volume, capacity and mass * Read and understanding the scale on standard tools such as kitchen scales, or measuring jugs * Estimate volume, capacity and mass by exploring benchmarks such as a cubic centimetre, a litre and a kilogram * Measure volume, capacity and mass with accuracy * Recognise that volume, capacity and mass can take different shapes but remain the same * Recognise that some units of measurement are better suited for some tasks than others, for example kilometres rather than metres to measure the distance between two towns | * **Fluency** in naming appropriate units for measuring volume, capacity and mass * **Understanding** the base ten relationship between metric units of measure * **Problem solving** about the measurement of volume, capacity and mass by using knowledge of the relationship between metric units * **Reasoning** about the approximate volume, capacity or mass of objects by estimating |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Use scaled instruments to measure and compare masses and capacities.   Level 6  Students who are working at this level could:   * Convert between common metric units of mass and capacity. |

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| **Assessment ideas** |
| Students:   * Create a container with a given volume and capacity to hold a given mass, e.g. one kilogram. |

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| **Resources** |
| **FUSE**  [Monumental Measurement Mess Ups](http://fuse.education.vic.gov.au/?S2LH4H)  **Illuminations**  [Estimating Volume by Counting on Frank](http://illuminations.nctm.org/Lesson.aspx?id=837)  **nRich**  [Making Boxes](http://nrich.maths.org/89) |

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| Topic 5.2.6 Quantifying Chance as a Fraction | | |
| Strand:  Statistics and Probability | Sub-strand:  Chance | Recommended teaching time:  3 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions [(VCMSP203)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP203) * Recognise that probabilities range from 0 to 1 [(VCMSP204)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP204) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students describe different methods for data collection and representation, and evaluate their effectiveness. They construct data displays from given or collected data, with and without the use of digital technology. Students list the probabilities of everyday events. They identify dependent and independent events. | Students pose questions to gather data and construct various displays appropriate for the data, with and without the use of digital technology. They compare and interpret different data sets. **Students list outcomes of chance experiments with equally likely outcomes and assign probabilities as a number from 0 to 1.** | Students interpret and compare a variety of data displays, including displays for two categorical variables. They analyse and evaluate data from secondary sources. Students compare observed and expected frequencies of events, including those where outcomes of trials are generated with the use of digital technology. They specify, list and communicate probabilities of events using simple ratios, fractions, decimals and percentages. |

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| **Activities** | **Proficiencies** |
| * Quantify the chance of an event occurring * Investigate all the possible outcomes of an event and describing the chance of each outcome occurring * Conduct fair tests or experiments including adequate sample sizes and controlling variables * Link chance to fractions and using the language of probability such as “blue has a one in three chance of being selected” * Investigate the probabilities of all outcomes for a simple chance experiment and verifying that their sum equals 1 | * **Fluency** in listing possible outcomes from a chance experiment as fractions * **Understanding** through using fractions to represent probabilities * **Problem solving** by investigating chance through experiments * **Reasoning** through interpreting results of chance experiments |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Describe possible everyday events and order their chances of occurring.   Level 6  Students who are working at this level could:   * Compare observed frequencies across experiments with expected frequencies (e.g. coin tosses). |

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| **Assessment ideas** |
| Students:   * Are given a bag of coloured lollies or counters and asked to write the fraction expressing the chance of each colour being drawn out; students are then asked to make a coloured spinner that simulates this same chance. |

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| **Resources** |
| **FUSE**  [Maths Goodies – Introduction to Probability](http://fuse.education.vic.gov.au/?L9HWW7)  **Illuminations**  [Adjustable Spinner](http://illuminations.nctm.org/adjustablespinner/)  **AMSI**  [Year 5 Chance Module (Teacher Guide)](http://www.amsi.org.au/teacher_modules/Chance_year_5.html#contents) |

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| Topic 5.2.7 Financial Plans and Budgets | | |
| Strand:  Number and Algebra | Sub-strand:  Money and Financial Mathematics | Recommended teaching time:  2 weeks |

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| **Mapping to F–10 curriculum in Victoria** | | |
| **Content descriptions** | | |
| * Create simple financial plans [(VCMNA191)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA191) | | |
| **Achievement standard (excerpt in bold)** | | |
| Level 4 | **Level 5** | Level 6 |
| Students recall multiplication facts to 10 x 10 and related division facts. They choose appropriate strategies for calculations involving multiplication and division, with and without the use of digital technology, and estimate answers accurately enough for the context. Students solve simple purchasing problems with and without the use of digital technology. They locate familiar fractions on a number line, recognise common equivalent fractions in familiar contexts and make connections between fractions and decimal notations up to two decimal places. Students identify unknown quantities in number sentences. They use the properties of odd and even numbers and describe number patterns resulting from multiplication. Students continue number sequences involving multiples of single-digit numbers and unit fractions, and locate them on a number line. | Students solve simple problems involving the four operations using a range of strategies including digital technology. They estimate to check the reasonableness of answers and approximate answers by rounding. Students identify and describe factors and multiples. **They explain plans for simple budgets.** Students order decimals and unit fractions and locate them on a number line. Students add and subtract fractions with the same denominator. They find unknown quantities in number sentences and continue patterns by adding or subtracting fractions and decimals. | Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers. They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts. Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology. They make connections between the powers of 10 and the multiplication and division of decimals. Students add, subtract and multiply decimals and divide decimals where the result is rational. Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals. They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane. |

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| **Activities** | **Proficiencies** |
| * Calculate with money including rounding and estimating * Create budgets and calculate costs * Reason about expenditure and cost for familiar events or products * Compare products to find the best value to money given particular needs * Identify the GST component of invoices and receipts | * **Fluency** through using estimation to check the reasonableness of answers to calculations involving money * **Understanding** by explaining and justifying budgets * **Problem solving** by creating financial plans * **Reasoning** includes investigating strategies to perform calculations with money efficiently |

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| **Considering different levels** |
| Level 4  Students who are working at this level could:   * Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies.   Level 6  Students who are working at this level could:   * Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies. |

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| **Assessment ideas** |
| Students:   * Create a budget for the event (e.g. school fair, school camp, excursion or party) by calculate costs and rounding and estimating; they justify their decisions. |

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| **Resources** |
| **FUSE**  Various FUSE [activities and resources](http://fuse.education.vic.gov.au/VCAA/VCMNA191)  **Illuminations**  [Building a Business](http://illuminations.nctm.org/Lesson.aspx?id=3247) |

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