Year 6 unit overview — Australian Curriculum: Mathematics

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Mathematics for Foundation–10*, <www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10>.

| School name | Unit title | Duration of unit |
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| Our School | The importance of zero | 10 hours |

| Unit outline |
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| Students learn more advanced mathematical ideas by building upon learned knowledge. During Term 1, students had the opportunity to work with positive numbers in the study of number. This knowledge will be built on as students are introduced to negative numbers in the context of real-life situations, including graphing temperatures. Many of the learning experiences are practical, and allow students to discover the location and value of negative numbers on a number line.  The big idea of the unit is the way we use the concept of positive and negative whole numbers in real-life situations.  Inquiry questions for this unit:   * When are negative numbers used in everyday situations? * How are negative numbers represented in data displays? * How are negative and positive numbers used to solve simple addition and subtraction problems? * What information can be gathered when recording two sets of temperatures onto a graph? |

| Identify curriculum | | | |
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| Content descriptions to be taught | | | General capabilities and cross‑curriculum priorities |
| Number and Algebra | Measurement and Geometry | Statistics and Probability |
| Number and place value   * Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers [(ACMNA123)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA123) * Investigate everyday situations that use integers. Locate and represent these numbers on a number line [(ACMNA124)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA124) |  | Data representation and interpretation   * Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables [(ACMSP147)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP147) * Interpret secondary data presented in digital media and elsewhere [(ACMSP148)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP148) | gc_literacy Literacy   * Use appropriate mathematical language specific to the topic   gc_numeracy Numeracy   * Make links to real-life applications including weather representations.   gc_ict **ICT capability**   * Use technologies to assist in developing an understanding of negative numbers and data displays   gc_critical Critical and creative thinking   * Use thinking skills to complete group activities and open-ended tasks, creating and answering questions based upon patterns in data   gc_personal_social **Personal and social capability**   * Work together to participate in maths investigations and learning experiences |

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| Achievement standard | |
| By the end of Year 6, students recognise the properties of prime, composite, square and triangular numbers. They describe the use of integers in everyday contexts. They solve problems involving all four operations with whole numbers. Students connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students make connections between the powers of 10 and the multiplication and division of decimals. They describe rules used in sequences involving whole numbers, fractions and decimals. Students connect decimal representations to the metric system and choose appropriate units of measurement to perform a calculation. They make connections between capacity and volume. They solve problems involving length and area. They interpret timetables. Students describe combinations of transformations. They solve problems using the properties of angles. Students compare observed and expected frequencies. They interpret and compare a variety of data displays including those displays for two categorical variables. They evaluate secondary data displayed in the media.  Students locate fractions and integers on a number line. They calculate a simple fraction of a quantity. They add, subtract and multiply decimals and divide decimals where the result is rational. Students calculate common percentage discounts on sale items. They write correct number sentences using brackets and order of operations. Students locate an ordered pair in any one of the four quadrants on the Cartesian plane. They construct simple prisms and pyramids. Students list and communicate probabilities using simple fractions, decimals and percentages. | |
| Proficiencies | |
| Opportunities to develop proficiencies include:  Understanding   * describing properties of different sets of numbers * making reasonable estimations   Fluency   * representing integers on a number line | Problem Solving   * formulating and solving authentic problems using fractions, decimals, percentages and measurements * interpreting secondary data displays   Reasoning   * explaining mental strategies for performing calculations * describing results for continuing number sequences |

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| Relevant prior curriculum | Curriculum working towards |
| **In the Australian Curriculum: Mathematics at Year 5**  Number and Algebra  Number and place value   * Use efficient mental and written strategies and apply appropriate digital technologies to solve problems.   Statistics and Probability  Data representation and interpretation   * Pose questions and collect categorical or numerical data by observation or survey. * Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies. * Describe and interpret different data sets in context. | **In the Australian Curriculum: Mathematics at Year 7**  Number and Algebra  Number and place value   * Compare, order, add and subtract integers.   Statistics and Probability  Data representation and interpretation   * Identify and investigate issues involving numerical data collected from primary and secondary sources. * Construct and compare a range of data displays including stem-and-leaf plots and dot plots. * Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data. * Describe and interpret data displays using median, mean and range. |
| Bridging content | |
| The concept of negative numbers appears in the Essential Learnings by the end of Year 7 so it is possible that this concept has not been explicitly taught in  Year 6 prior to the introduction of the Australian Curriculum. | |
| Links to other learning areas | |
| Studies of Society and the Environment — climate zones, mapping, altitude (above or below sea level), location | |

| Assessment | | Make judgments |
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| Describe the assessment | Assessment date | Teachers gather evidence to make judgements about the following characteristics of student work:  Understanding   * mathematical modelling and representation   Skills   * application of problem solving strategies to investigate situations * description of results of mathematical investigations * use of mathematical procedures and calculations to find solutions * communication of explanations, solutions and calculations, using mathematical language, conventions and symbols   For further advice and guidelines on constructing guides to making judgments refer to the Learning area standard descriptors: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) |
| Students are given opportunities to demonstrate their knowledge, skills and understanding through both formative and summative assessment. The assessment is collated in student folios and allows for ongoing feedback to students on their learning.  Year 6 teachers make decisions about the length of time required to complete the tasks and the conditions under which the assessment is to be conducted.  The teaching and learning experiences throughout the term provide opportunities for students to develop the understanding and skills required to complete these assessments. As students engage with these learning experiences the teacher can provide feedback on specific skills. | Weeks 8–9 |
| Mathematical investigation (Multimodal)  Students demonstrate their understanding of positive and negative numbers through data collection, representation and interpretation.  Students investigate the temperature of two places: their home town, and a town or city in the world where the temperature is below zero degrees Celsius (they may need to convert from Fahrenheit). If required, the teacher assists students in choosing the second location.  For two weeks, students record the data into a table. Students independently collect data on their home town and their selected second location. At the end of the two weeks, students construct appropriate graphs to show the two data sets, using a spreadsheet program.  Students design questions related to their graph for a peer to interpret.  Students reflect on and explain the meaning of zero in real-life contexts.  (200–300 words)  The assessment package *Goal difference: the importance of zero* in the QSA Assessment Bank could be used in this unit.  In this package students use the results of a sporting competition to calculate the “for and against” goal differences, which will include positive and negative numbers. They may use secondary data or table their own results of a school competition, then analyse the data to make judgments about how the teams are progressing. |

| Teaching and learning | Supportive learning environment | |
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| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| * Discuss with students the smallest and largest numbers they know, and where very large or very small numbers are used * Pose a question to students that will prompt thinking about negative numbers, e.g. the temperature in a town was 5°C on Monday. On Tuesday it was 6 degrees colder than Monday — is this possible? * Encourage paired or small group discussion in which students can predict what the temperature might be on Tuesday and their thinking behind their response * Use a thermometer or an image of a thermometer to discuss the concept of negative numbers being numbers less than zero * Students investigate the thermometer and discuss any findings about the numbers on the thermometer or patterns they observe * Students consider and discuss other everyday situations in which negative numbers may be used or seen. * A range of learning experiences will be used to develop an understanding of negative numbers. These could include: * setting up a giant number line in an outdoor location where students, in small groups, use the number line to move forward and backwards from zero. This activity can be adapted to suit the needs of the students, and the context and can be increased in complexity as understanding develops * solving problems in the context of a building elevator to determine the position on a number line. For example, a building has 10 storeys, where the ground floor is zero. It also has 6 storeys below ground for parking. If I am on Floor 2 and I ride the elevator down 4 floors, which floor will I be on? The teacher encourages students to draw a diagram if required * playing a game with two different coloured dice where the score from one dice is positive and the other is negative (e.g. blue die is positive; red die is negative). The largest positive or negative score after 10 throws is the winner. Students devise a method to record their progress score through the game.  This game can be extended to include an “operations dice’’ that controls the operation to be performed with the two numbers. Use calculators where appropriate. * Introduce vertical and horizontal number lines representing negative and positive numbers * Investigate a range of sequences involving both positive and negative numbers. If required, students may use a number line to assist in continuing sequences of numbers. * Source a range of graphs depicting temperatures. A range of places should be represented in order to show both positive and negative temperatures and the graph should be displayed on an interactive whiteboard, if available. Alternatively, students should be able to view copies of the graphs * Use a spreadsheet program to create a table of data and graph the data given by the teacher onto a line graph. The teacher assists students to use the graphing tool in the program. | Section 6 of the *Disability Standards for Education* (The Standards for Curriculum Development, Accreditation and Delivery) states that education providers, including class teachers, must take reasonable steps to ensure a course/program is designed to allow any student to participate and experience success in learning.  The *Disability Standards for Education 2005* (Cwlth) is available from: <www.ag.gov.au> select Human rights and anti-discrimination > Disability standards for education. | **Equipment**   * thermometers, or images of thermometers, with negative and positive numbers * range of data displays showing temperatures of places where the temperature is above and below zero degrees Celsius * dice * interactive whiteboard with access to mathematics programs and websites/images (optional). |

| Use feedback | |
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| Ways to monitor learning and assessment | Teachers meet to collaboratively plan the teaching, learning and assessment to meet the needs of all learners in each unit.  Teachers create opportunities for discussion about levels of achievement to develop shared understandings; co-mark or cross mark at key points to ensure consistency of judgments; and participate in moderating samples of student work at school or cluster level to reach consensus and consistency. |
| Feedback to students | Teachers strategically plan opportunities and ways to provide ongoing feedback (both written and informal) and encouragement to students on their strengths and areas for improvement.  Students reflect on and discuss with their teachers or peers what they can do well and what they need to improve.  Teachers reflect on and review learning opportunities to incorporate specific learning experiences and provide multiple opportunities for students to experience, practise and improve. |
| Reflection on the unit plan | Identify what worked well during and at the end of the unit, including:   * activities that worked well and why * activities that could be improved and how * assessment that worked well and why * assessment that could be improved and how * common student misconceptions that need, or needed, to be clarified. |