Year 5 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 | Playing fair | 15 hours |

| Unit outline |
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| Games that incorporate an element of chance are commonplace in our society and are common across many cultures. Most games give players an equal chance of winning. However, some games are biased in favour of one player. What is it that makes a game fair? This unit will give students the opportunity to investigate chance and probability and their relationship to fractions.The big idea of the unit is that chance and probability can be used to determine the likelihood of events.Inquiry questions for the unit:* What are some games of chance?
* Are games of chance always fair?
* In any game of chance, how can players be sure there is a fair chance of winning?
* How can the probability of an event be calculated and recorded?
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| 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* Use efficient mental and written strategies and apply appropriate digital technologies to solve problems [(ACMNA291)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA291)

Fractions and decimals* Compare and order common unit fractions and locate and represent them on a number line [(ACMNA102)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA102)
* Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator

 [(ACMNA103)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA103)Patterns and algebra* Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction [(ACMNA107)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA107)
 |  | Chance* List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions  [(ACMSP116)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP116)
* Recognise that probabilities range from 0 to 1 [(ACMSP117)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP117)

Data representation and interpretation* Pose questions and collect categorical or numerical data by observation or survey [(ACMSP118)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP118)
* Describe and interpret different  data sets in context [(ACMSP120)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP120)
 | gc_literacy Literacy* Use the language of probability (chance) and symbolic recording (fractions)

gc_numeracy Numeracy* Apply probability in real-world contexts, identifying patterns in chance situations, recording, interpreting and using data to make judgments

gc_critical Critical and creative thinking* Recognise fair and unfair situations, hypothesising about changes to an unfair game, and justifying decisions

gc_personal_social **Personal and social capability*** Work together to participate in mathematical investigations and learning experiences
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| Achievement standard |
| By the end of Year 5, students solve simple problems involving the four operations using a range of strategies. They check the reasonableness of answers using estimation and rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. Students compare and interpret different data sets.Students order decimals and unit fractions and locate them on number lines. They add and subtract fractions with the same denominator. Students continue patterns by adding and subtracting fractions and decimals. They find unknown quantities in number sentences. They use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles. They convert between 12 and 24 hour time. Students use a grid reference system to locate landmarks. They measure and construct different angles. Students list outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1. Students pose questions to gather data, and construct data displays appropriate for the data. |
| Proficiencies |
| Opportunities to develop proficiencies include:**Understanding** * making connections between representations of numbers
* using fractions to represent probabilities
* comparing and ordering fractions

**Fluency** * using estimation to check the reasonableness of answers to calculations
 | **Problem Solving** * formulating and solving authentic problems using whole numbers

**Reasoning** * investigating strategies to perform calculations efficiently
* interpreting results of chance experiments
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| Relevant prior curriculum | Curriculum working towards |
| **In the Australian Curriculum: Mathematics at Year 4**Number and AlgebraFractions and decimals* Investigate equivalent fractions used in contexts.
* Count by quarters, halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line.

Statistics and ProbabilityChance* Describe possible everyday events and order their chances of occurring.
* Identify everyday events where one cannot happen if the other happens.
* Identify events where the chance of one will not be affected by the occurrence of the other.
 | **In the Australian Curriculum: Mathematics at Year 6**Number and AlgebraFractions and decimals* Compare fractions with related denominators and locate and represent them on a number line.
* Solve problems involving addition and subtraction of fractions with the same or related denominators.
* Make connections between equivalent fractions, decimals and percentages.

Patterns and algebra * Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence.

Statistics and ProbabilityChance* Describe probabilities using fractions, decimals and percentages.
* Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies.
* Compare observed frequencies across experiments with expected frequencies.
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| Bridging content |
| The content description related to investigating strategies to solve problems involving addition and subtraction of fractions with the same denominator is a concept not previously in the Essential Learnings to the end of Year 5. |
| Links to other learning areas |
| This unit provides opportunities to connect to other learning areas in discussing probabilities and likelihood of events.  |

| 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* application of mathematical knowledge to solve problems and to describe and identify concepts
* description of choices made, strategies used and conclusions reached, and checks of the reasonableness of solutions
* modelling and representation

Skills* application of problem-solving strategies to investigate situations
* description of the 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 5 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 6–8 |
| Modelling and problem-solving task (Multimodal)Design a game, *Playing fair*:* Use patterns and fractions
* Explain probability involving coin tosses and a die

Students play each of the two games of chance explained below. One game is fair for all players. The other game favours certain players. Students identify the fair game and the unfair game. Students make a prediction about which game they think will be fair and which game they think will be unfair. They gather evidence to explain why the fair game is fair and the unfair game unfair by playing each game (running a trial) and recording experimental data for each player. They explain how this data supports or contradicts their prediction about each game’s fairness.* Game 1: *2 coin toss* (a game for 3 players)

Materials: 2 coinsEach player selects one of the following outcomes for tossing two coins: 2 heads,2 tails, 1 head and 1 tail. Flip the coins ten times. Players receive one point each time their selected outcome is tossed. The player with the highest number of points at the end of the ten tosses wins the game. |
| * Game 2: *Odd vs Even* (a game for 2 players)

Materials: 2 regular 6-sided diceTake turns to toss the two dice and add the numbers showing on the dice. Player 1 receives one point for each odd total. Player 2 receives one point for each even total rolled. Play continues until the first player reaches ten points. He/she wins the game.Students consider the unfair game and discuss how the game can be changed in some way to make the game fair for all players. They describe the change they would make to the game and justify how it would make the game fair.Students create their own board game, with instructions for playing. They explain whether the game is fair or unfair for all players and justify their reasoning.(200–300 words) |

| Teaching and learning | Supportive learning environment |
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| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| * Discuss various commercially marketed games and the chances of winning and losing. Discuss if there is any time that one player is more likely to win.
* Students bring in games to play. They sort these games into those that involve chance and others that may involve skill, strategy or speed, with or without an element of chance.
* Introduce students to the game *Take your chance* (a game where the children predict when the number 2 will be rolled). Teacher:

revises or introduces the terminology of likely, unlikely, possible, impossible, equal chance models the process and thinking skills of analysing situations and explaining the chances of an event occurring.* Introduce some simple unfair games e.g. a game using a die:
* Teacher rolls a regular 6-sided die. Rolls of 1,2,3,4 result in a point for the teacher. Rolls of 5 or 6 result in a point for the students
* Teacher and students play the game and record the results. They discuss the fairness of the game.
* From a review of collated data, introduce the concept of “sample space”, i.e. all possible outcomes of an event.
* Explore the idea that not all games are inherently fair. Teacher:

asks What makes a fair game? What makes a game unfair? discusses possible reasons with students and has them justify their reasons.* Play *Scissors, paper, rock* in pairs and discuss answers to questions including:
* Is this a fair game? Students record their results and use the data to justify a position.
* Is it possible to make *Scissors, paper, rock* unfair?
* Discuss the methods used for recording results: how easy is it to compare results or predict outcomes?
* Investigate tossing one coin (heads and tails) with the goal of tossing a head.
* Determine theoretical probability, represented as a common fraction, using the formula:
* number of favourable outcomes
* number of possible outcomes.
* Investigate tossing two coins (two-stage experiment).
* Record data in a table. Identify the sample space (4 possible outcomes) and record the theoretical probabilities of different target outcomes, e.g. two heads, one head and one tail, two tails.
* Add and subtract common fractions using chance results.
* Investigate rolling dice. Students:

roll a 6-sided diemodel the method in calculating theoretical probability for rolling a six (one in six chance)discuss the results — was the outcome for rolling a six near to the expected theoretical probability?* Roll a die (at least thirty trials) and record the outcomes.
* Add and subtract common fractions using chance results, e.g. when rolling a 6-sided die, the chance of a 1 being rolled is 1/6. Therefore the chance of rolling any of 2,3,4,5 and 6 is 5/6, because 1/6 + 5/6 = 6/6 (1 whole).
* Introduce other multi-sided dice, e.g. 8- and 10-sided dice. Roll the new die with the aim of rolling a six and ask: How does the theoretical probability change for each die?
 | 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*** various games
* dice
* coins
* spinners
* recording tools: tables, graphic organisers, graphs
* graphic organiser with the following headings:
* prediction
* experiment
* comparison
* discussion
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| 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.
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