YuMi Deadly Maths

Year 5 Teacher Resource:

SP – Chances are!

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

YuMi Deadly Maths Year 5 Teacher Resource: **SP – Chances are!**

QUT

YuMiDeadly
Growing community through education

ACKNOWLEDGEMENT

We acknowledge the traditional owners and custodians of the lands
in which the mathematics ideas for this resource were developed,
refined and presented in professional development sessions.

TERMS AND CONDITIONS OF YOUR USE OF THE WORK AND RESTRICTED WAIVER OF COPYRIGHT

Prepared by the YuMi Deadly Centre
Queensland University of Technology
Kelvin Grove, Queensland, 4059

ydc.qut.edu.au

Year 5 Statistics and Probability

Chances are!

Learning goal Students will calculate the sum of probabilities for a chance experiment and compare frequency predictions with actual data.

Content description Statistics and Probability – Chance

- List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions (ACMSP116)
- Recognise that probabilities range from 0 to 1 (ACMSP117)

Big idea Probability – frequentist vs theoretical

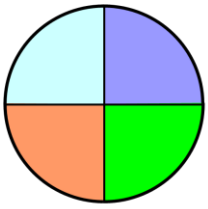
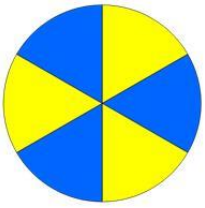
Resources Masking tape, small probability word cards, 0 and 1 cards, spinners, coloured streamers, small coloured cards, felt pens, clock faces, elastics or velour strips, coins, pen, tally sheet, counters

Reality

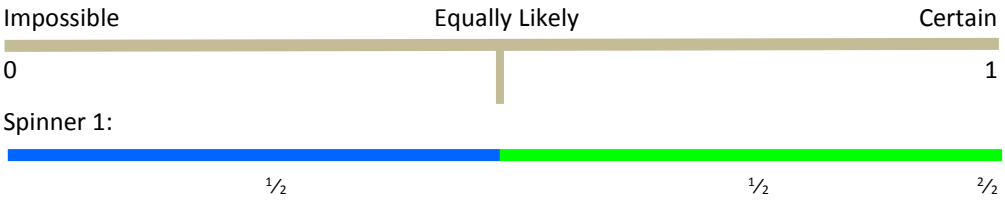
Local knowledge Students describe where they see chance in their world, e.g. card games, board games, computer games; sport; lottery or casket tickets; weather.

Prior experience Check that students can correctly classify an event as impossible, possible or certain. Have students place the words: Impossible, Certain, Equally Likely, and 0–1 cards along a line of masking tape that has been taped to the floor or concrete.

Kinaesthetic Place spinners of various types on the ground to explore whole to part:

			
Spinner 1	Spinner 2	Spinner 3	Spinner 4

Distribute small colour cards and coloured streamers representing the colours in each spinner to students, who go and stand in the corresponding colour sector of the spinners. When students are in position, a count is taken of the total number of sectors in each spinner. Students then calculate the fraction of the spinner for each colour and mark the fractions on their colour cards. They then cut the colour streamers into equal fraction parts and lay them in a line with the appropriate fraction cards under the masking tape line showing in each spinner that all colours had an equal unit fraction chance. (*Note:* The length of the fraction lines may differ but each unit fraction must be equal.) For example:



Repeat process for other spinners. The whole is the sum of its parts and for these spinners each colour has an equal chance.

Abstraction

Body

Reverse – part to whole: Start with clock faces and students make sectors using elastics or velour strips so that spinners are made with equal parts, e.g. twelfths, sixths, quarters, thirds, halves. Have students also create their own fraction parts, building from the parts to make the whole. Reinforce that the parts combine to make the whole. A whole of anything (apple, car) is always 1, sometimes written as one of its equivalent fractions: $^{1}/_{1}$, $^{2}/_{2}$, $^{3}/_{3}$, $^{4}/_{4}$, …, $^{6}/_{6}$, …, $^{12}/_{12}$, and so on.

Hand

Give a coin and a tally sheet to each person to conduct the following experiment.

Directions:

1. Answer these questions:
   (a) *If you toss a coin, what outcomes are likely?*
   (b) *Are these outcomes equally likely?*
   (c) *What is the probability of a tail?*
2. Set up an experiment:
   (a) *Toss a coin 50 times. Keep a tally sheet with two columns – Heads, Tails.*
   (b) *Record the results of the tosses and write the fraction for both Heads and Tails (Count the number for Heads and write it as a fraction out of 50. Repeat the process for Tails.)*
   (c) *Did you get what you expected?*

Mind

Close your eyes and see a bag of lollies where there is an equal chance of drawing a mint lolly, a chocolate or a jelly snake. Reverse: *Arrange 8 balls into 2 colours so that there is an equal chance of drawing either colour out of the box.*

Creativity

Students create spinners where there is an equal chance of spinning any colour.

Mathematics

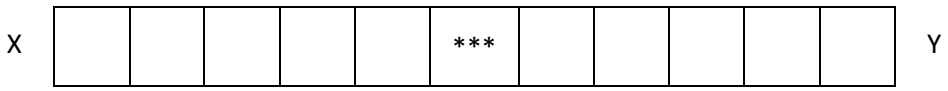
Language/ symbols

possible outcomes, favourable outcomes, numerical probability, trial, biased, fair, unfair, chance, predict

Practice

1. **Tug of war**

   Materials: one coin, two counters, board as below, two players.



   Rules: Each player chooses an end (X or Y). The counter is placed in position ***. Players in turn toss the coin and move the counter forward one space towards their end if the toss is Heads and backwards one space (or stay at start) if the toss is Tails. The first player to reach his/her end wins.

   Questions (after many games):

   (a) *Does it take a long time to get a winner? Why?*
   (b) *Which player is more likely to win? Is there an advantage in going first?*
   (c) *If the board was 100 squares long, would there ever be a winner?*

2. **Planetfall**

   Materials: one coin, counters, board as below, 2–6 players.

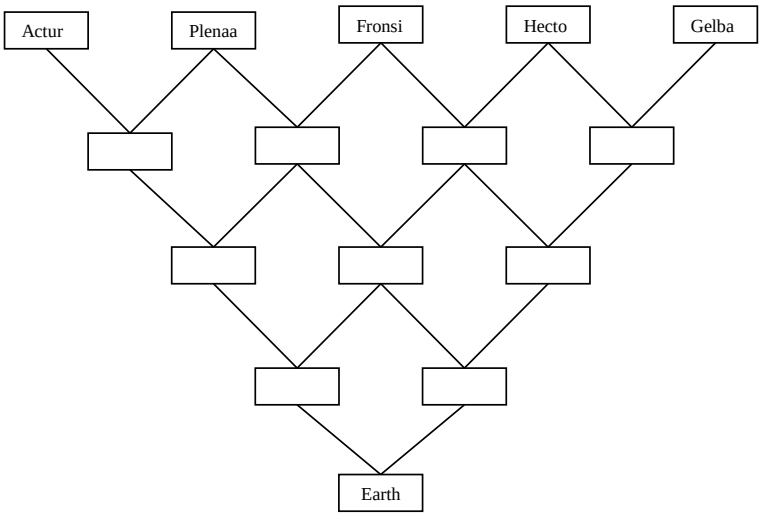
   Rules: Players place counters (spaceships) at start (Earth).

   Players in turn toss the coin and move left if Heads and right if Tails.

Players score one point for reaching Fronsi, two points for reaching Plenaa or Hecto and three points for reaching Actur or Gelba.

The first player to make 10 points wins.

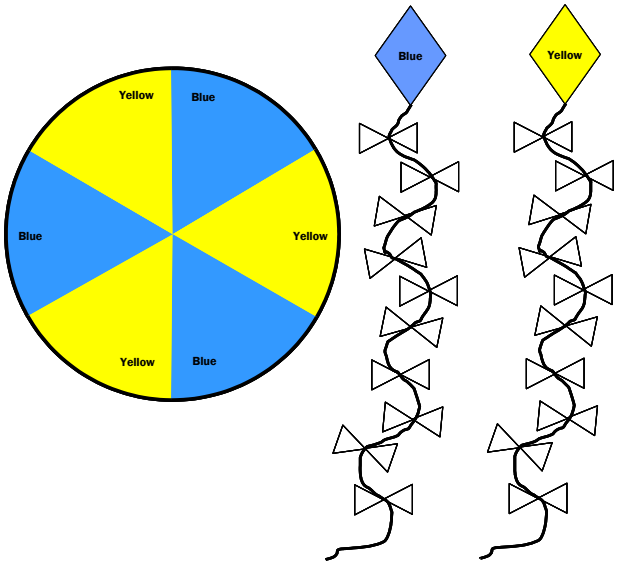
Question (after many games): *What is the most likely planet to reach? Why?*



3. **Flying kites**

This is a game for two players. The player who colours the most bows on the kite's tail is the winner. Decide who will be Yellow and who will be Blue.

Each player takes turns in spinning the spinner (10 spins per player). Each player must spin his or her own colour to colour a bow on his or her kite. For example, if the Blue player spins yellow then he or she cannot colour a bow on his/her kite's tail. *Do you think the spinner is fair? Explain your thinking.*



Connections Relate to percentage and measures of central tendency.

Reflection

Validation Students check where chance is found in their world, e.g. games of sport between two teams, weather alternatives (hot or cold, sunny or overcast, fine or raining).

Application/ problems Provide applications and problems for students to apply to different real-world contexts independently; e.g. *Design a board game that uses a fair spinner but has other hazards to determine the chance of winning*.

Extension

Flexibility. Students are able to use a variety of tools in chance experiments to determine the probability of outcomes and write this as a common fraction.

Reversing. Students are able to move between describing probability ↔ event ↔ experiment, starting from and moving between any given point.

Generalising. *When calculating probability, fractions range from zero to one. Probability of desired outcome is equal to the number of desired outcomes divided by the total number of outcomes.*

Changing parameters. Increase the complexity of the sample space by having two or more stages, e.g. throw two dice, draw three cards, or throw a die and spin a spinner.

Teacher's notes

- Stages/questions that can be asked: identify the whole (i.e. the sample space); examine the parts for equality; name the parts (establish the total number of chances, that is, the denominator); determine the parts to be considered (the outcome preferred, that is, the numerator); associate the two parts with the fraction name (the probability).
- Students need to be taught the skill of visualising: closing their eyes and seeing pictures in their minds, making mental images; e.g. show a picture of a kookaburra, students look at it, remove the picture, students then close their eyes and see the picture in their mind; then make a mental picture of a different bird.
- Suggestions in Local Knowledge are only a guide. It is very important that examples in Reality are taken from the local environment that have significance to the local culture and come from the students' experience of their local environment.
- Useful websites for resources: www.rrr.edu.au; https://www.qcaa.qld.edu.au/3035.html
- Explicit teaching that **aligns with students' understanding** is part of every section of the RAMR cycle and has particular emphasis in the Mathematics section. The RAMR cycle is not always linear but may necessitate revisiting the previous stage/s at any given point.
- Reflection on the concept may happen at any stage of the RAMR cycle to reinforce the concept being taught. Validation, Application, and the last two parts of Extension should not be undertaken until students have mastered the mathematical concept as students need the foundation in order to be able to validate, apply, generalise and change parameters.

