

Introduction

This unit is made up of four student tasks. The aim is to engage students in a range of tasks that include similar mathematical concepts to help them better understand the key ideas. It is not essential that each task is completed but they have been put together to sequentially develop key ideas related to chance and data and working mathematically and provide varied learning opportunities. A student assessment task has also been included with this unit.

Mathematical literacy: In this unit there is an emphasis on words and phrases used to describe the likelihood of an event occurring. We need to give students the opportunity to use and understand the everyday language of chance.

They need to be given the opportunity to look at and discuss everyday events that arise and that are affected by chance when the opportunity arises. E.g. What is the likelihood of it raining today? What chance do you have of winning the Easter raffle at school? Playing board games provides an opportunity to discuss how the outcome of the game is affected by chance. It is important that we allow students to talk about chance events in their daily lives using their own language and we need to expose them to more appropriate words and expressions. It is important that we don't focus on reporting on probability of events using numbers until students are using appropriate words and expressions to describe chance events.

Classroom display of student learning – What is the chance?

Display student work from the lessons and feature daily events and everyday words and expressions related to chance.

You could include an event on the display board and ask students to record a word or phrase to describe its probability. The event can be changed regularly.

E.g. What chance is there of the principal visiting the class today? Before selecting a chance word/phrase what would you base your choice on?

Assessment strategies

Assess student work samples related to the lessons

Tables, written comments, diagrams

Student reflection

At the conclusion of a learning activity students could be asked to reflect on the learning experience given:

- What have you learned e.g. concepts, ideas?
- What maths skills and knowledge did you need to complete the task given?
- How was the calculator utilised?
- What aspects of the task did you have success with/experience difficulties?
- Describe and justify their mathematical processes and conclusions.

This can be done in written/pictorial form.

The comments written by students provide a valuable insight into each student's mathematical understanding and appropriate use of mathematical language.

E.g. Is the student using appropriate mathematical language to share ideas, observations and findings?

Observe students working on tasks and ask appropriate questions to gain a sense of what students are thinking and how they approach given tasks.

- Do they share their ideas and listen to the ideas of others?
- Do they ask questions about a problem to clarify their understanding of what is required?
- Are they able to discuss successful/unsuccessful mathematical strategies and ideas explored?

Use of the TI-15 calculator

It is important that we promote the sensible use of the calculator. The calculator allows students to work efficiently with real life data and removes the pressure of tedious calculations and allows students to think.

Specific instructions on how to use the featured function keys can be found in the power point section of the unit.

Lessons target the following keys and functions:

- Calculator can be used for general calculations involving whole and decimal numbers beyond the students' ability to mentally calculate
- Memory function keys to work out the average (frequency tables)
▶M Store to memory MR/MC Memory Recall
- Simplifying fractions – the fraction keys can be used to simplify fractions.
n numerator (n) d denominator (d) Simp simp
- Converting a fraction to a % use the ▶% key
The fraction keys n and d are also utilised

Task One: The language of chance



1. Give each child a card with a chance word or phrase (everyday language of chance)
Discuss meaning of the words/phrases. List of words/expressions on the PowerPoint and the origins of some expressions.

Ask students to:

- Group themselves according to what the chance card indicates in terms of probability of occurring e.g. unlikely/likely/certain
- Decide on a chance word/phrase they could use to describe all the words in the group e.g. possible, impossible, likely, unlikely, certain, uncertain
- Re-sort and order the chance cards in their group according to what chance it has of occurring

2. Place a large number line on the floor (use a long rope) and mark 0 and 1.

0

1

Students need to place themselves on the scale to show the probability their word/phrase represents. Justify position on the number line.

Share ideas

What does the 0 and 1 represent? What chance words could we substitute for 0 and 1?

E.g. unlikely – likely/certain or impossible – possible/certain

What would the midpoint on the line indicate?

3. Group task: Students to write an event or situation that would match their chance card. Share and discuss with others.
4. All students to place their events or situation cards on the number line from 0-1.

Note: Between certain to happen and certain not to happen there are events that can be placed along the continuum that might or might not happen.

5. Worksheet: students are to sort the given chance words and phrases into groups and record a chance phrase to represent each group made.
Ask students to look for examples of these words and phrases in magazines and newspapers to add to the groups they made.
6. What is the chance of this happening? – match events to different likelihoods.
Refer to the PowerPoint pg 3 e.g. rain today, lunch time will be extended.
Chance words are given to choose from.



Note: When something is likely to happen it is given a probability of 1 and when it is impossible it is given a probability of 0. All other probabilities lie between 0 and 1.

Task 2: Collect all the swap cards

Worksheet 2

Show students a cereal box with 6 different swap cards inside that are available to collect.

Cereal box swap cards simulation

Investigation

How many boxes of cereal would you need to buy to get one of each of the 6 swap cards if an equal number of each card is in circulation?

Share ideas

How could we find out how many boxes we are likely to have to buy to get one of each card?

Conduct group experiments using different materials to find out:

- Group 1 – 6 sided dice to roll
- Group 2 – 6 different coloured cards in a cereal box
- Group 3 – spinner with 6 sections-coloured
- Group 4 – spinner with 6 numbered sections
- Group 5 – coloured counters in a bag

Example of how each group will conduct the experiment:

6 sided dice – continue to roll the dice and record the numbers rolled until at least one of each number is rolled. Use a table.

Number	Frequency	Total
1	111	3
2	11	2
3	111	3
4	11	2
5	111	3
6	1	1

Identify how many rolls it took to get one of each number e.g. 14

Collate results

Record the results of all the group experiments on the board.

Teachers Explanatory Notes

TI-15 Explorer™: What is the Chance?

T

Share ideas

We all got different results so how can we find out the average number of boxes we would need to buy? *Use the calculator to work out the average number of boxes needed.*

Prediction: What might the result be if we did the experiment lots of times?

Each group is to:

- Conduct the same experiment 20 times and record the results in tables drawn (as shown above)
- Record total and average for all the experiments
- Create a frequency table to show results of the experiments – Identify the most frequent result and the mean number (see below)

PPT

Number of Times	Frequency	Total

Record results of all the experiments on the class spread sheet:

Experiment	Counters	Dice	Spinners	Cards
1				
2				
3				
etc				
total				
average				

Work out the average of the 80 experiments.

Compare to the average of the first series of experiments.

Use store to memory and memory recall keys. Refer to instruction sheet in PowerPoint.

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Group task/Investigation

Cereal box swap cards (details on worksheet 2)

W2

Five popular brands of cereal have a new range of swap cards to collect:

Cereal A – 8 swap cards Allocate one cereal brand to each group.

Cereal B – 9 swap cards

Cereal C – 10 swap cards

Cereal D – 11 swap cards

Cereal E – 12 swap cards

Group asked to:

Design own set of swap cards.

Conduct experiment (20 times) to find out how many boxes of cereal you would need to buy to get one of each card. Place cards in a cereal box and remove one at a time and record the results in a table. Card selected is returned to the box before the next card is removed from the box.

Record results in tables. Represent data in a frequency table to work out the average number boxes of cereal you would need to buy to get one of each card. **Use store to memory and memory recall keys. Refer to student guide – store to memory and memory recall keys in PowerPoint.**

Use data to predict the likely average if the experiment was conducted 80 times. Each group can report findings to class. Compare to data collected for the 6 set of swap cards.

PPT

Record data and predicts on a class spread sheet.

Cereal type	Average – 20 experiments	Average – 80 experiments
6 card set		
A – 8 card set		
B – 9 card set		
etc		

Students are to prepare a group report for the class. They are to show the set of swap cards, outline how they conducted the experiment and recorded the results and report on the findings. Students can compare their results with other groups. Students can be asked to design and make their own cereal box for the swap cards and feature the cards on the front of the box. Refer to PowerPoint for background information about cereal box swap card simulation task.

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Theoretically you would need to buy 15 cereal packets to collect a full set of collector cards. The exact number is 14.7 ($6/1 + 6/2 + 6/3 + 6/4 + 6/5 + 6/6$)
Compare this to your result.
Of course it may only take six packets of cereal packets to get a full set if you are lucky!

Task 3: Lucky number game

Worksheet 3

W3

Discuss what chance card you would choose to describe your chance of winning lotto with 20 numbers. Justify choice.

Pose questions to answer: What is the chance of someone picking 4 numbers? 3 numbers? 2 numbers? 1 number? Which numbers come up more often?

Students are given a lotto card with 20 numbers on and asked to select 4 numbers. There are 10 games on the worksheet.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

Place numbers 1-20 in a container and remove four number cards without putting them back until all four have been selected. Record numbers that came up for the game. Repeat game 10 times.

Discuss: What chance word would you select to describe your chance of winning the lucky numbers game?

Record data in tables: How many students got 1, 2, 3 or 4 numbers in each game?

Game	1 number	2 numbers	3 numbers	4 numbers
1				
2				
3				
total				

Create a frequency table showing the numbers selected over 10 games. What chance does each number have to be selected? 1 in 20 chance 5%

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Compare to the results of the simulation of 10 games of lucky numbers. Record the frequency of each number as a fraction and a % on the table.

Use the fraction keys, an $\frac{\square}{\square}$ to convert the fraction to a percentage.

Refer to student guide – converting a fraction to a % in PowerPoint.

PPT

Number	Tally	Total	Fraction	%
1	III	3	3/40	7.5%
2				
3				

Share ideas

How could you increase your chance of winning lotto? How could you modify the game to give you a better chance of winning? Devise a game where you have a better chance of winning? Play the game with a group of students.

If there isn't a winner after the 10 games continue to play the game each day until there is a winner. Keep a tally of the number of games played before a winner is found.

Further investigation

Look at the numbers that have come up in lotto over a 12 month period. What numbers have come up more often than others?

Task 4: Spin away

W4

Secret spinner

Have one student spin a spinner divided into 4 colours and **unequal** sections 40 times but don't tell the other students the colours the spinner contains. Students to record the colour the spinner lands on each time in a table. After every 10 spins ask students to draw what they think the spinner looks like. Compare students' final spinner to the original.

Colour	Tally	Total	Fraction	%

Students are to record the fraction represented by each colour on the spinner.

To simplify the fractions students can refer to the student guide – simplifying fractions on the PowerPoint.

PPT

Record statements about the probability of landing on each colour compared to the other colours on the spinner e.g. **You have a greater chance of landing on a green than a red. You are less likely to land on a yellow.**

1. **Variation to the above task:** Repeat the above activity but include a spinner that has the same colour in several sections. Let students know that one of the colours appears in two sections on the spinner. Keep a tally of the colours the spinner lands on and then draw the spinner.
2. **Create a spinner:** Read the criteria and draw the spinner.
E.g. Most likely to stop on green. Least likely to stop on purple. Equal chance of landing on blue or brown. Instructions on how to make your own simple spinner using a pencil and paper clip is in the PowerPoint.
3. What colour will you land on?
 - Read report about a group experiment – **It landed on yellow most of the time, green some of the time and landed on red and black once each.**
 - Students to create a spinner using the report as a guide.
 - Conduct a experiment to see if results for your spinner are the same as the one described. Record data on a frequency table.
 - Write a report about data collected.
 - Record if the spinner would need to be altered in any way to get closer results to the original report.



Assessment tasks: All about chance

Activity 1

Colour the bags of smarties to show:
Certain to get red.
Impossible to get a green.
Equally likely to get a red or yellow.

Activity 2

Draw the net to show the coloured dots on the faces of a 6 sided dice. The chance of throwing a red is $\frac{1}{2}$, green is $\frac{1}{6}$, yellow is $\frac{1}{3}$.

Activity 3

Create a spinner. Students need to complete the table to show what fraction and % each colour total represents. They need to show what the spinner would look like and record comments about the probability of landing on each colour.