Y4 Last One Standing

NEW September 2025

Year level: 4

Approximate number of lessons: 2

Learning goals

- Engage in chance-based investigations with equally likely outcomes by:
  - posing an investigative question
  - anticipate and then identify possible outcomes for the investigative question
  - generating all possible ways to get each outcome (a theoretical approach), or undertaking a probability experiment and recording the occurrences of each outcome
  - creating data visualisations for possible outcomes
  - describe what these data visualisations show
  - finding probabilities as fractions
  - answering the investigative question
  - reflecting on anticipated outcomes
- Agree or disagree with others' conclusions about chance based investigations

Resources

- Year 4 Probability **Glossary**
- **Last One Standing gameboards**, enough for your class to play in 2's or 4's.
- Paper clips to use as spinners, two for each gameboard
- Coloured counters
- Post It notes
- **Last One Standing MM1 | Listing all possible outcomes chart**
- **Last One Standing MM2 | Frequency table**
- **Last One Standing MM3 | Theoretical probability table**
- **Last One Standing MM4 | Experimental probability table**
- Optional - Digital spinner tool such as **https://toytheater.com/spinner/**

Lesson One

Activity

Introduction

Last One Standing is a board game created to support ākonga to learn their one to six times tables. The following activity takes a theoretical approach to exploring the probability behind winning the game, before carrying out a probability experiment to test the theoretical probabilities. Throughout this activity ākonga will be supported to find a strategy to increase their chances of winning.

? PROBLEM:

- Introduce the game to ākonga, ensuring they understand how the game is played, what strike numbers are, and what constitutes a win. **See Last One Standing game board and instructions**.
- Spend time playing the game. Play in both pairs and groups of four.
- As ākonga are playing the game pose the following questions:
    - Why are there only certain numbers on the gameboard?
    - Which numbers do you think are more likely to be strike numbers?
    - Which numbers do you think are least likely to be strike numbers?
- Support ākonga to pose the investigative question, '**as a player with four counters, which four numbers are the best ones to choose so that I have the best chance of winning the game?**'

PLAN:

- Support ākonga to anticipate which numbers they think are most likely and least likely to be strike numbers. Ask them to record their ideas on a post-it note to refer to later.
    - Invite ākonga to share their reasoning behind the numbers that they have chosen.
- Explain to ākonga that as a group they are going to investigate the probability of each number being chosen as a strike number. In order for this to happen they need to list all of the possible outcomes of a single spin of both spinners.
    - Support ākonga to systematically list the possible outcomes. Ākonga may appreciate making use of a chart (e.g., **Last One Standing MM1 | Listing all possible outcomes chart**).

		Spinner One					
	x	1	2	3	4	5	6
	1						
	2						
Spinner Two	3						
	4						
	5						
	6						

- You may find that ākonga make the connection between possible outcomes in the chart and this times table chart.

x	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

- Guide ākonga discussion around the numbers on this chart.
  - What do you notice?
  - Are all of the numbers from 1-36 on this chart?
  - Which numbers between 1-36 are on the chart?
  - Which numbers between 1-36 are not on the chart? (prime numbers and numbers that are multiples of numbers greater than 6, e.g., 14, 21, 22, 26, 27, 28, 32, 33, 34, 35))
  - Do some numbers appear more often than others? Why?

- Support ākonga to make use of the table (**Last One Standing MM2 | Frequency Table**) to find out how often each Strike Number appears on the chart of possible outcomes.

Strike Number	Tally	Frequency
1	I	1
2	II	2
3	II	2
4	III	3
5	II	2
6	IIII	4
8	II	2
9	I	1
10	II	2
12	IIII	4
15	II	2
16	I	1
18	II	2
20	II	2
24	II	2
25	I	1
30	II	2
36	I	1

- Guide discussion with ākonga to identify:
  - The least occurring numbers. (1,9,16,25,36)
  - The most occurring numbers. (6, 12)

- Winning the game involves choosing the numbers **least likely to be Strike Numbers**.
  - If you had four counters to place and you wanted to win, where would you place your counters? There are multiple answers here.
  - If you had four counters to place and you wanted to lose, where would you place your counters? There are multiple answers here.
  - If you had eight counters to place and you wanted to win, where would you place your counters? There are multiple answers here.
  - If you had eight counters to place and you wanted to lose, where would you place your counters? There are multiple answers here.

- Refer back to ākonga Post it notes displaying the anticipated outcomes.
  - Have ākonga changed their minds or do they still think that they would choose the same numbers to win the game?

- Discuss with ākonga the advantages of using a theoretical approach to make decisions about winning the game.

Lesson Two

? PROBLEM:

- Restate the investigative question, '**as a player with four counters, which numbers are the best ones to choose so that I have the best chance of winning the game?**'

PLAN:

- Remind ākonga that previously you have explored possible outcomes of a double spin by finding all the possible outcomes using the chart and then summarising the frequency of each outcome using the frequency table. You may wish to review the chart and the frequency table.
- Discuss that each of the 36 outcomes in the chart have the same chance of occurring., This means that each of the 36 outcomes has a $\frac{1}{36}$ chance of occurring.
- Guide ākonga to understand that the Strike Number 1 has a $\frac{1}{36}$ chance of occurring as it occurs in the chart once, however Strike Number 2 occurs twice so it has a $\frac{2}{36}$ chance of occurring. Support ākonga to express theoretical probabilities for each Strike Number. The theoretical probability is the fraction made by the number of occurrences (or frequency) of the Strike Number out of 36.
- **Last One Standing MM3 | Theoretical probability table** is a copy of this table. You may wish each ākonga to have a copy close by.
- Discuss with ākonga that in this lesson they will undertake a probability experiment to explore the experimental probability of the Strike Numbers occurring, and then compare this experimental probability to the theoretical probability. We want to see how close the frequencies of the Strike Numbers are when we play the game to the theoretical probability we have found. Then we can decide which four numbers we would pick, using the theoretical probabilities and the information from our probability experiment, to have our best chance of winning the game.
- Support ākonga to make a plan to do a probability experiment where they will generate 36 Strike Numbers, recording which numbers they generate on a frequency table (**Last One Standing MM4 | Experimental probability table**).

Strike Number	Theoretical Probability
1	$\frac{1}{36}$
2	$\frac{2}{36}$
3	$\frac{2}{36}$
4	$\frac{3}{36}$
5	$\frac{2}{36}$
6	$\frac{4}{36}$
8	$\frac{2}{36}$
9	$\frac{1}{36}$
10	$\frac{2}{36}$
12	$\frac{4}{36}$
15	$\frac{2}{36}$
16	$\frac{2}{36}$
18	$\frac{1}{36}$
20	$\frac{2}{36}$
24	$\frac{2}{36}$
25	$\frac{1}{36}$
30	$\frac{2}{36}$
36	$\frac{1}{36}$

𝍸 DATA:

- Support ākonga to generate 36 Strike Numbers, recording which numbers they generate on a frequency table. In this data phase they can do the tally marks for each trial, then complete the frequency column by counting the tally marks.

Experimental probability table			
Strike Number	**Tally**	**Frequency (f)**	**Experimental probability ($\frac{f}{36}$)**
1			
2			
3			
4			
5			
6			
8			
9			
10			
12			
15			
16			
18			
20			
24			
25			
30			
36			

ANALYSIS:

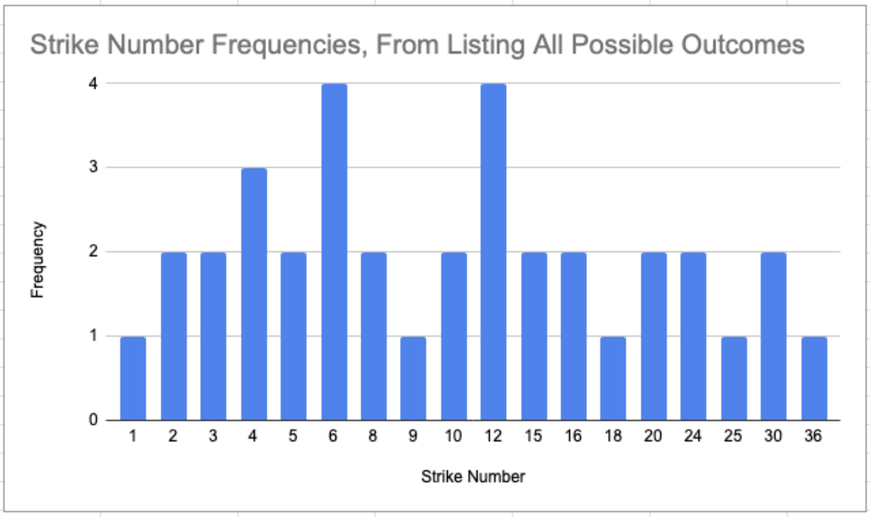
- Find the experimental probability for each Strike Number on the table by creating a fraction where the frequency is the numerator, and 36 (36 trials) is the denominator. This is the experimental probability.
- Engage ākonga in a data discussion comparing their two tables, the theoretical probability and the experimental probability. Look at the different probabilities by comparing the fractions for each.
  - What did the theoretical probability anticipate would happen in the probability experiment?
  - What happened in reality?
  - Did you have data that was expected or unexpected?

- Support ākonga to create two bar graphs. One to display the frequencies from listing all possible outcomes and one to display their own frequencies from their probability experiment. You might use a bar graph generator such as google sheets or excel, or ākonga may draw their own.

- Note: we can compare frequencies directly as the total number of trials was 36, the same number as the number of all possible outcomes. If the number of trials was different we would need to compare the probabilities, this is beyond this level.
- Note, when entering the data enter the frequency value, not the fraction. See the tables below.

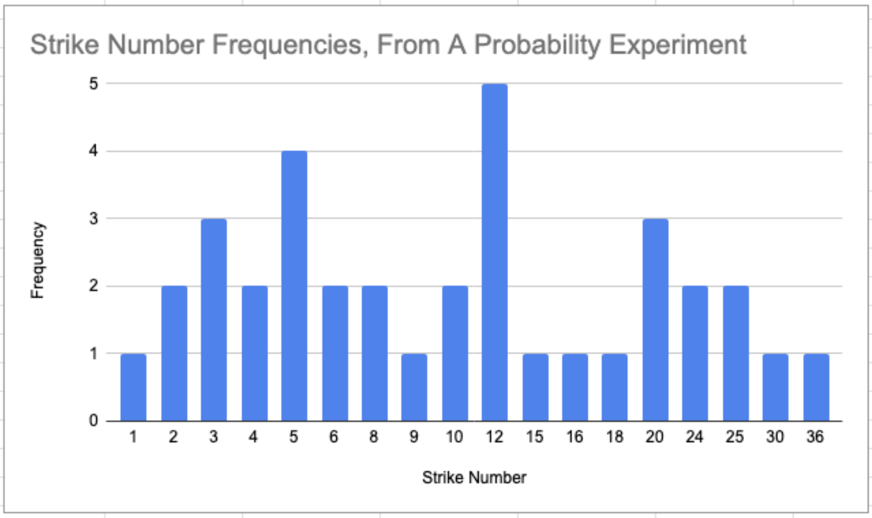
Strike Number Frequencies From Listing All Possible Outcomes.

Strike Number	Frequency (all possible outcomes)
1	1
2	2
3	2
4	3
5	2
6	4
8	2
9	1
10	2
12	4
15	2
16	2
18	1
20	2
24	2
25	1
30	2
36	1



Strike Number Frequencies, From A Probability Experiment.

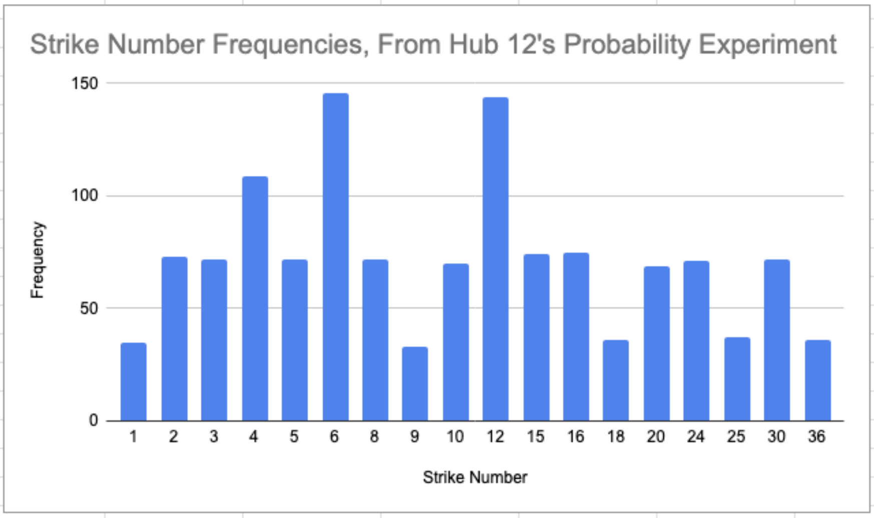
Strike Number	Frequency (from probability experiment)
1	1
2	2
3	3
4	2
5	4
6	2
8	2
9	1
10	2
12	5
15	1
16	1
18	1
20	3
24	2
25	2
30	1
36	1



- Support ākonga to compare and contrast their findings, and to discuss this with other ākonga.
  - How are the two bar graphs similar? How are they different?
  - Do all ākonga have the same results?

- Use a bar graph generator such as google sheets or excel to generate a combined graph that represents the experimental frequency data from the whole class.

Strike Number Frequencies, From Hub 12's Probability Experiment.	
Strike Number	Frequency (from Hub 12's probability experiment)
1	35
2	73
3	72
4	109
5	72
6	146
8	72
9	33
10	70
12	144
15	74
16	75
18	36
20	69
24	71
25	37
30	72
36	36



- Ask ākonga to compare their own probability experiment bar graph with the whole class probability experiment graph.
    - What do ākonga notice?
        - How are the graphs the same?
        - How are the graphs different?
    - What do ākonga wonder?
- Support ākonga to answer the investigative question, '**as a player with four counters, which numbers are the best ones to choose so that I have the best chance of winning the game?**'
    - There are multiple answers to this question. Hopefully answers will include reference to their theoretical modelling and their own or collective probability experiment results.
    - Ask ākonga to re-play the game to test their new predictions.

CONCLUSION:

- Guide ākonga to make statements about the theoretical probability of a particular strike number occurring in the game Last One Standing.
    - Remind ākonga to use the theoretical probability table to guide their statements.
- Re-visit post-it notes from Lesson 1. Ask ākonga if they would still choose the same numbers? Or why they may choose different numbers?
- Guide ākonga to look once more at their own dataset, where the experimental probability was calculated.
- Guide ākonga to look once more at the whole class dataset. Compare the shapes of the graphs.
- Discuss the differences observed.

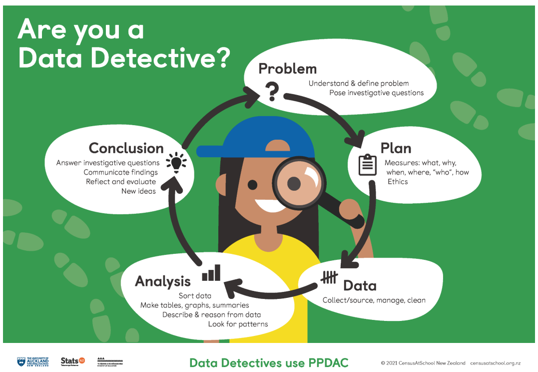
  - Which graph shows a similar pattern of occurrences to the theoretical outcome (all possible outcomes)?
  - Anticipate what a bar graph might look like if 1000 people generated 36 strike numbers each?.
    - Do ākonga think the experimental probability will look more similar to the theoretical probability? Why?
    - Support ākonga to make a link between the number of trials (e.g., their 36, and the class 720-1080 depending on the size of the class), the pattern of occurrences (e.g., most common, least common) to see which one best matches the pattern generated by the theoretical outcomes. Noting (hopefully) that the higher the number of trials , the better the pattern of occurrences matches the pattern of theoretical outcomes.

Notes for teachers

- To verify this learning it is important that ākonga get to play the game again after the lesson. This provides them with an opportunity to test their new strategies based on the theoretical probability. It would be better to play against other ākonga that have not been a part of this lesson, or provide gameboards for playing at home with whānau.
- This activity would be a great activity to make use of during parent evenings, where ākonga can explain their strategies and talk about their learning.

Year 4 Probability Glossary

The purpose of this glossary is to support kaiako to understand the probability vocabulary that they will be using throughout their teaching. It can act as a discussion tool for staff hui prior to probability being taught.



Data Detective Poster - CensusAtSchool New Zealand

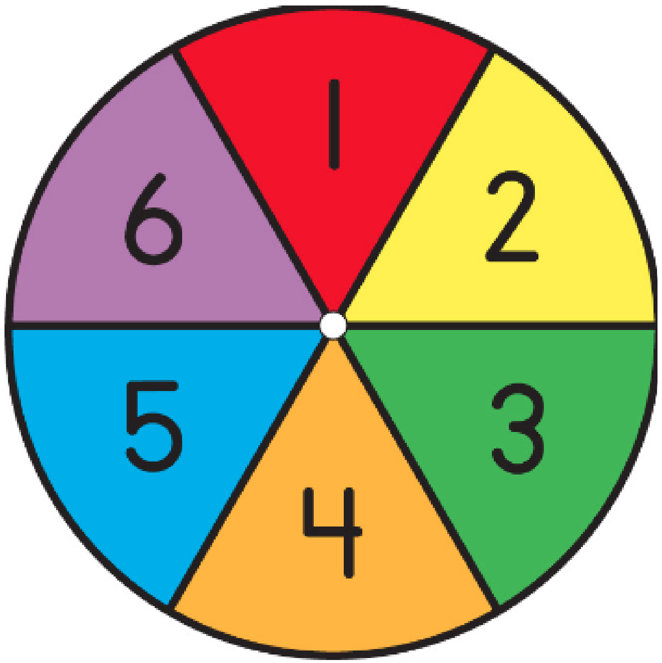
Last one standing student materials

Resource list with preparation

Resource	Preparation required	Approx numbers
Last one standing game board	Copy backed onto card to make them a bit more robust, though paper will work. Don't laminate them as this makes it slippery for the pencil or pen that is placed to make the spinner.	Enough for one between two players.
Last One Standing MM1 | Listing all possible outcomes chart	Copy onto paper, one copy per student.	Two charts per page. Print half the class size and cut it into two.
Last One Standing MM2 | Frequency table	Copy onto paper, one copy per student.	Enough for one per student.
Last One Standing MM3 | Theoretical probability table	Copy onto paper, one copy per student.	Two charts per page. Print half the class size and cut it into two.
Last One Standing MM4 | Experimental probability table	Copy onto paper, one copy per student.	Enough for one per student.

LAST ONE STANDING

1	2	3	4	5	6	8	9	10	12	15	16	18	20	24	25	30	36



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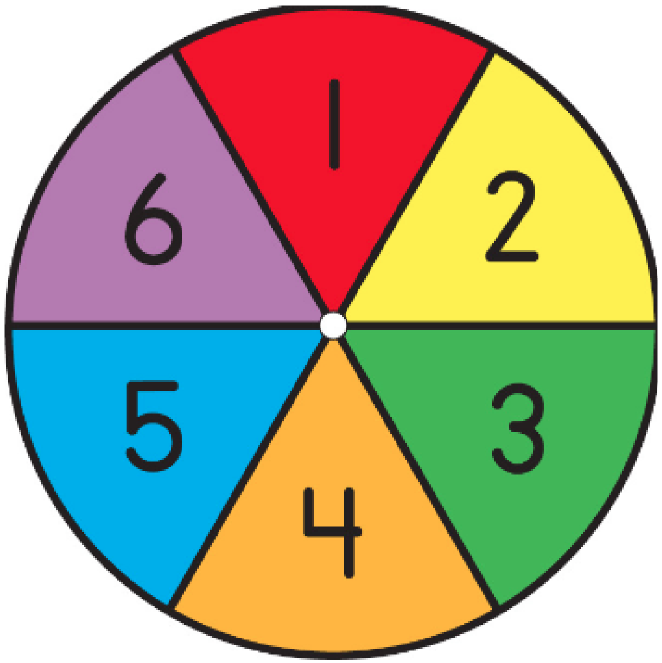

You might like to use a paper clip and a pencil to spin or you could use the online spinner at **https://toytheater.com/spinner/**
This game is designed for two players with eight counters each. Alternatively you could also play it with four players with four counters each.

1. Players take turns to place a counter of their own colour on a chosen number. All numbers need to be covered.
2. Players take a turn to spin both spinners.
3. When the spinners stop the numbers chosen are multiplied to form the strike number, and then this corresponding counter is removed from the board.
4. The winner is the player with the final counter remaining on the board.

Note: If a strike number is repeated nothing happens and the next player has their turn. Count this as a lucky escape.

Use this timetables chart to help you.

x	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

Last One Standing MM1 | Listing all possible outcomes chart

		Spinner One					
Spinner Two	x	1	2	3	4	5	6
	1						
	2						
	3						
	4						
	5						
	6						

		Spinner One					
Spinner Two	x	1	2	3	4	5	6
	1						
	2						
	3						
	4						
	5						
	6						

Last One Standing MM2 | Frequency table

Strike Number	Tally	Frequency
1		
2		
3		
4		
5		
6		
8		
9		
10		
12		
15		
16		
18		
20		
24		
25		
30		
36		

Last One Standing MM3 | Theoretical probability table

Strike Number	Theoretical Probability
1	$\frac{1}{36}$
2	$\frac{2}{36}$
3	$\frac{2}{36}$
4	$\frac{3}{36}$
5	$\frac{2}{36}$
6	$\frac{4}{36}$
8	$\frac{2}{36}$
9	$\frac{1}{36}$
10	$\frac{2}{36}$
12	$\frac{4}{36}$
15	$\frac{2}{36}$
16	$\frac{2}{36}$
18	$\frac{1}{36}$
20	$\frac{2}{36}$
24	$\frac{2}{36}$
25	$\frac{1}{36}$
30	$\frac{2}{36}$
36	$\frac{1}{36}$

Strike Number	Theoretical Probability
1	$\frac{1}{36}$
2	$\frac{2}{36}$
3	$\frac{2}{36}$
4	$\frac{3}{36}$
5	$\frac{2}{36}$
6	$\frac{4}{36}$
8	$\frac{2}{36}$
9	$\frac{1}{36}$
10	$\frac{2}{36}$
12	$\frac{4}{36}$
15	$\frac{2}{36}$
16	$\frac{2}{36}$
18	$\frac{1}{36}$
20	$\frac{2}{36}$
24	$\frac{2}{36}$
25	$\frac{1}{36}$
30	$\frac{2}{36}$
36	$\frac{1}{36}$

Last One Standing MM4 | Experimental probability table

Experimental probability table			
Strike Number	**Tally**	**Frequency**	**Experimental probability**
1			
2			
3			
4			
5			
6			
8			
9			
10			
12			
15			
16			
18			
20			
24			
25			
30			
36			