Y8 Multo

UPDATED June 2026

Year level: 8

Approximate number of lessons: 2

Learning goals

Through this probability experience, ākonga will:

- plan a probability investigation with kaiako support, to establish advice to create a bingo card that has the best chance of winning
- use lists, tables, and digital tools to systematically record data from repeated trials of probability experiments, and then determine the probabilities
- create data visualisations for findings in probability experiments and identify similarities and differences between the findings and corresponding theoretical probabilities
- use their knowledge of equally likely outcomes to find the probability for the different products in the game of Multo
- learn how to use patterns in data to establish advice on how to create a bingo card that has the best chance of winning
- use their knowledge of probability to inform decision-making in games of chance

Vocab

product	factor	prime	composite
likely	unlikely	probability	chance
diagonal	square numbers	horizontal	vertical
multiples			

Resources

- **Multo game cards** - print one set and cut up, place in a bag
- **Multo sorting board** - print one copy onto card (2 pages)
- **Multo grids** - make enough copies for two per ākonga
- **Multo noticing and wondering slide deck** - make a copy for kaiako to share with ākonga
- **Blank multiplication tables** - make copies as needed for ākonga

Activity - Introduction - Lesson 1

Games of chance

Ask ākonga about what chance means - get them to work in small groups and brainstorm any ideas they have.

Ask ākonga about games of chance they play. Record the games on the board or by other means. For each game gather information about what makes it a chance game (*what is the chance element*) rather than a game that relies on skills. Describe the *chance outcomes*.

Create and display a table and record the ideas from ākonga.

For example:

Game	What is the chance element?	Chance outcomes
Monopoly	Roll two dice to move around the board. Also chance selection from the chance and community chest cards.	Sum of the two dice, 2-12
Snake and Ladders	Roll two dice to move around the board.	Sum of the two dice, 2-12
Bingo	Numbers selected from a “hat”.	E.g., for 100 numbers in the bingo game	1-100
Yahtzee	Roll five dice to get different scores or combinations of dice	Combinations of five dice and three rolls per turn

Bingo

Ask ākonga specifically about Bingo.

- What do they know about it?
    - Typically a 5 x 5 grid with 25 unique numbers
    - The numbers can be from 1-100 or similar
    - A number is chosen at random, and if it is on your card you put a counter on it, or cross it out.
- How do you win?
    - Getting five in a “row”, horizontally, vertically or diagonally.

Multo

Introduction

We are going to explore a game of chance called *Multo*. Your challenge will be to establish advice on how to create a *Multo* bingo card that has the best chance of winning. A *Multo* bingo card is 4 x 4 and has 16 numbers on it, compared with a traditional bingo card that is 5 x 5 and has 25 numbers on it. The numbers are selected from the products of the multiplication facts from 0 x 0 to 9 x 9.

Objective of the game

Similar to traditional bingo, players need to cross out four in a row, column or diagonal to win, but in addition Multo also gives a win for crossing out the four corners (see Slide 3).

rows

x	x	x	x

columns

	x		
	x		
	x		
	x		

diagonals

x			
	x		
		x	
			x

corners

x			x
x			x

Multo bingo cards

The set up of the *Multo* bingo cards is different to traditional bingo.

- Make your own bingo card by choosing 16 numbers to go on it.
- The numbers on the card must all be different.
- The numbers to choose from are the products of the multiplication facts from 0 x 0 to 9 x 9.

Play the game

Ākonga can draw a 4 x 4 grid in their book or can be given *Multo* grids to use.

- Ākonga fill in the *Multo* grid (bingo card) with 16 different numbers that are products of the multiplication facts from 0 x 0 to 9 x 9.
    - Get ākonga to check one another's game boards before they start
        - Check for each number used once only
        - Check that each number is a product of one of the multiplication facts from 0 x 0 to 9 x 9.
        - Don't get them to list all the possible outcomes at this stage, that is for later.
- Kaiako select a *Multo* game card from the bag and reads out the card e.g. if the *Multo* game card was 3 x 2 this could be 3 times 2, 3 multiplied by 2, 3 twos, the product of 3 and 2. Kaiako can place the *Multo* game card on the corresponding product on the *Multo* sorting board. This is to aid in checking what products have been called.
- Ākonga search for the product (solution to the multiplication fact) on their *Multo* grid (bingo card). If they have the product (solution) they cross it off on their grid.

- Play continues until the first ākonga crosses out four products in a row, column, diagonal or the four corners. At which point they call out '*Multo!*'.
- Using the *Multo* sorting board, kaiako check to see if ākonga is correct. If so they are the "winner", if not play resumes.

Play the game again

- Ākonga can have the option to redraw their grid (bingo card) with a different combination of numbers.
- Ākonga keep the grids (bingo cards) for each game, these will be used shortly.
- Place all the *Multo* game cards back into the bag, give it a good shake before playing again.

Noticing and wondering
Get ākonga into smaller groups of 3-4.

- Ask them to place all of their *Multo* grids (bingo cards) on the table.
  - What do they notice?
  - What do they wonder?
- Capture ideas on sheets of paper, in a shared doc, or on a slide deck.

THIS COULD BE THE END OF THE FIRST LESSON - will depend on how the class has managed the logistics so far.

Activity - probability investigation - Lesson 2

Ākonga work together in groups of 3-4 to undertake a probability investigation. Ideally ākonga plan and undertake the investigation themselves, with kaiako support. The ideas listed below are supports that kaiako can draw on to prompt ākonga to make progress. It is not intended that kaiako "tell" ākonga what to do.

? PROBLEM:

What advice would you give to create a bingo card that has the best chance of winning *Multo*?

Prompts for ākonga

- Discuss the problem, what does it mean by advice?
  - why would it be advice rather than just design a bingo card?
- What is meant by best chance?
- What aspects of the game need to be considered in working out the advice?
  - Note for kaiako, ākonga might discuss
    - e.g., what outcomes are possible (what products are possible)?
    - e.g., they will need to find out how frequently different products turn up

- e.g., need to think about the squares on the board and how they might contribute to four in a row, column, diagonal or four corners.

PLAN:

Ākonga plan to collect data about the possible outcomes to inform their advice. Prompt ākonga to discuss in their groups ideas to collect data. Ideas could include but are not limited to...

Exploring possible outcomes

- Grouping all of the *Multo* game cards with the same product together to get a dot plot of the products.
- List all the *Multo* game cards and work out the products, then make a tally chart of the products or a frequency table.
- Use technology, e.g., CODAP or spreadsheets to generate all the *Multo* game cards, find their products and then make a data visualisation of the products.
- Use a times table chart to work out all the products and then summarise using a tally or frequency chart.
- Calling all the *Multo* game cards out and recording the products, then sorting these to get the frequencies of each product.

About the 4 x 4 grid

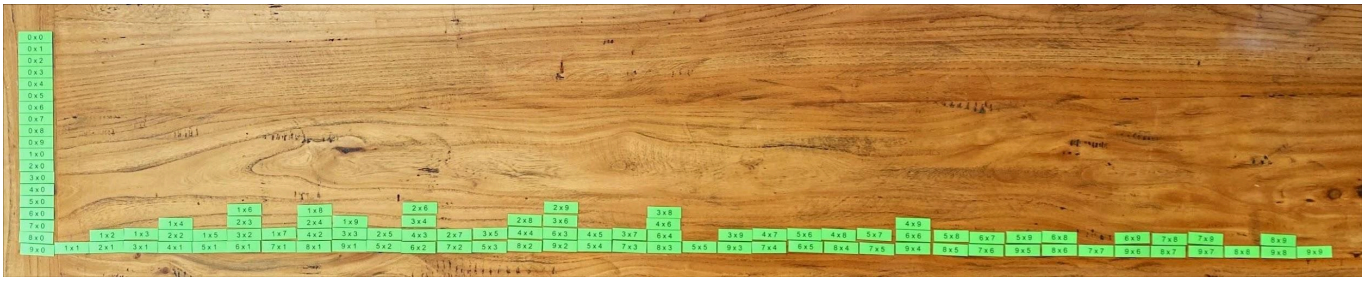
- Drawing grids to show where all the rows are, the columns are, the diagonals and the corners.
- Collating information onto a single grid by discussing what each square on the grid might be part of, e.g., a row, a column, a diagonal or a corner.

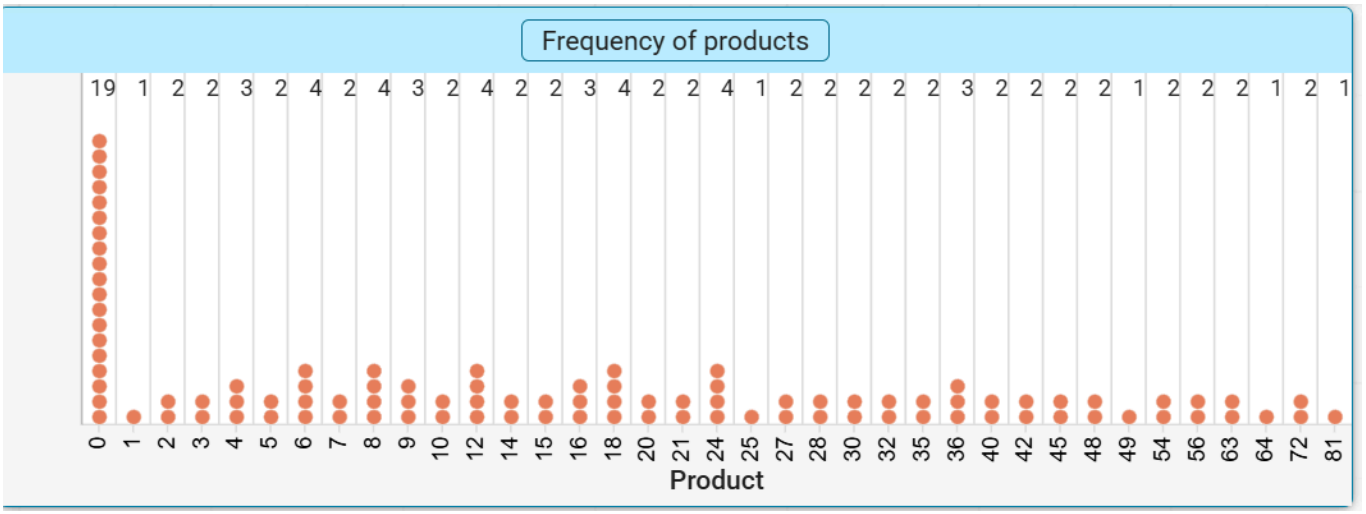
DATA:

Ākonga use their chosen method and generate all the possible outcomes for the game of *Multo*. Outcomes are recorded and summarised.

ANALYSIS:

Ākonga make data visualisations to show the frequencies of the different products for the game of *Multo*.





Ākonga describe what their data visualisations are showing and what this means for the game of *Multo*.

Patterns of products that can be pulled out include (or prompts to explore these patterns in the products more):

- Exploring the numbers that have two pairs only, are they all primes? (No, why not?, once we get above 10 for the product not all pairs of factors are included, e.g., 14 is 7 x 2, 2 x 7, but is also 14 x 1 and 1 x 14 and we are only looking at creating products with factors up to 9.
- Prime numbers greater than 10 are not included - why not? The factors of primes greater than 10 include 1 and the number, but our cards are only up to 9 x 9
- Some numbers have an odd number of factor pairs, what is special about these numbers, 1, 4, 9, 16 etc - they are all square numbers
- Look at the missing numbers in the range from 0-81, and look at the even numbers missing, what do you notice about them? E.g. 22, 44, 66 and 26, 34, 38, 46, 50, 52, 58 etc
- What about the odd numbers that are missing, notice that some are primes, some are multiples of 3, 5, 7 etc, why are they not included in the list of products for the *Multo* game? (e.g., The numbers need to have a factor pair where both factors are equal to or less than 9. Or, if a number uses a prime factor greater than 9, then it cannot appear.)
- Extend the activity to explore factors of the numbers from 1-100, and design a probability game that uses all of the factor pairs for products from 1-100, or to look at making a *Multo* bingo card that would be very unlikely to win.

Descriptions are likely to include ideas about where numbers might be placed in the squares on the *Multo* bingo card and will help with the conclusion.

CONCLUSION:

Ākonga create advice about the placement of numbers on the *Multo* bingo card. They test out their advice by playing a few games.

Prompts to support ākonga with their conclusion include:

- What numbers would you choose to have the best chance of winning?

- Where would you place these numbers on the Multo bingo card?
- Why would you put that number in the centre/corner/edge?
- What evidence do you have to make that decision?

Notes for kaiako

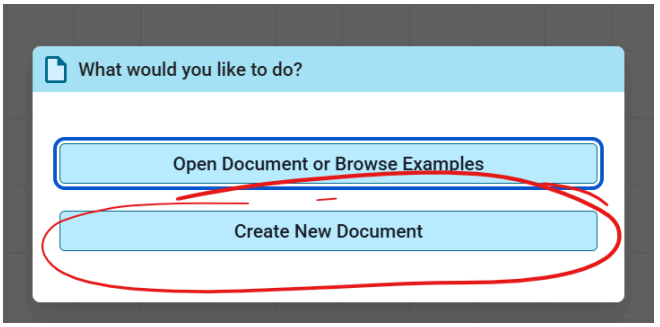
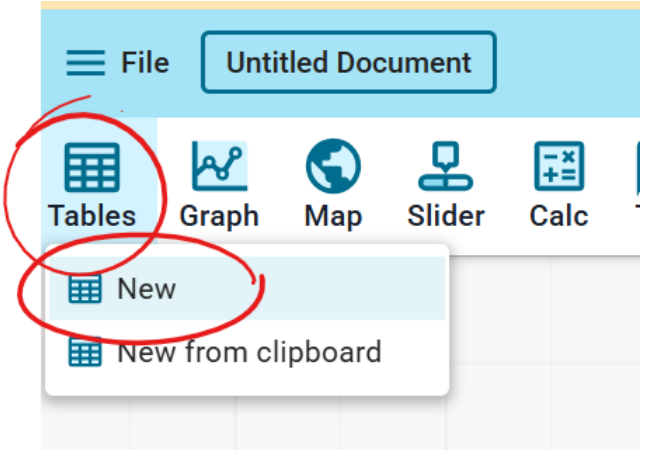
- Based on the *Multo* activity from Maths 300 via the AMSI website
- Game recommended by Kylie Begg, thank you.

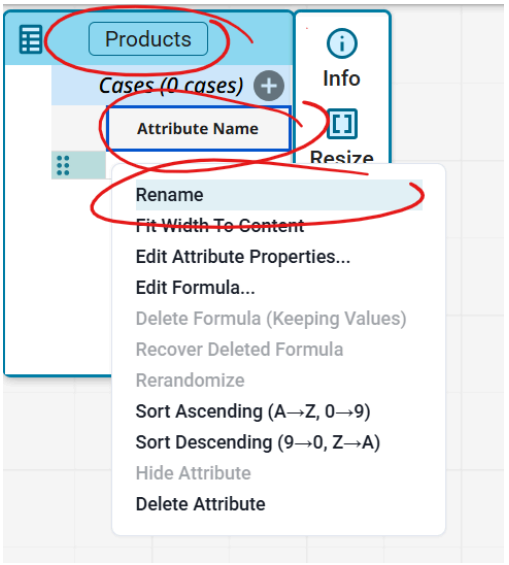
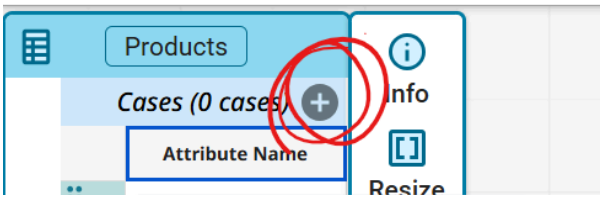
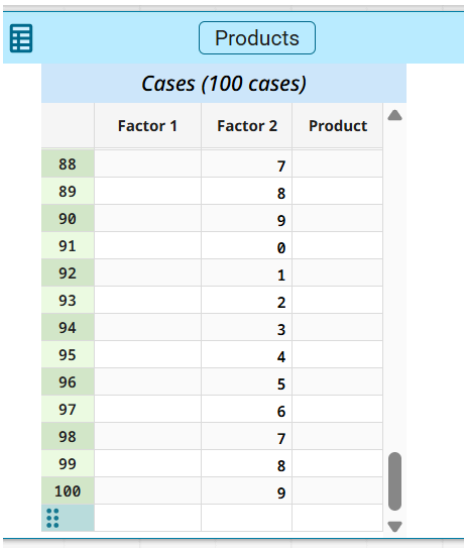
Links to Multo activities and readings by others

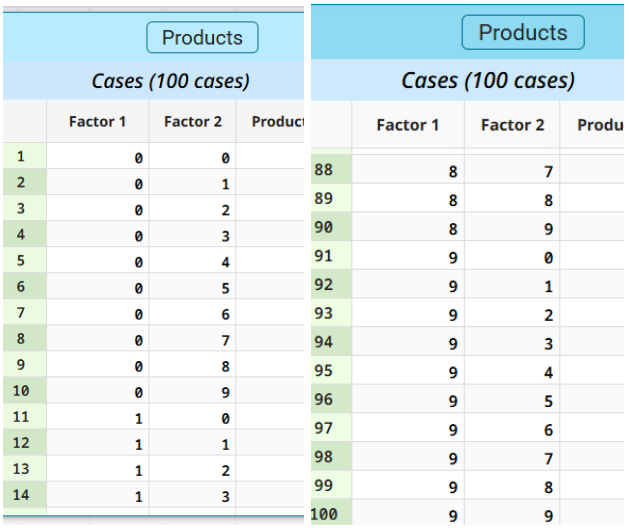
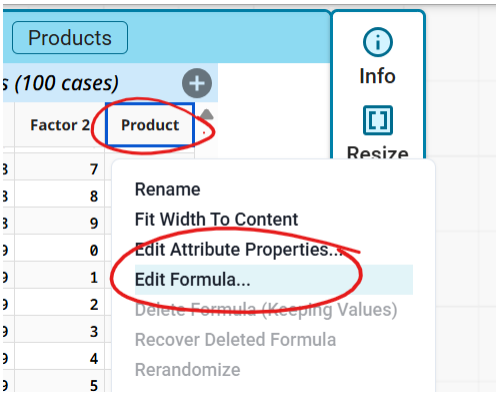
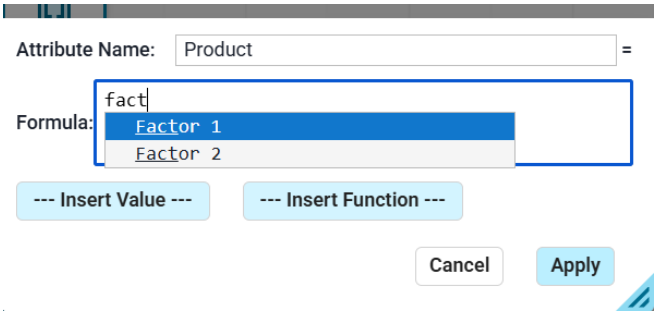
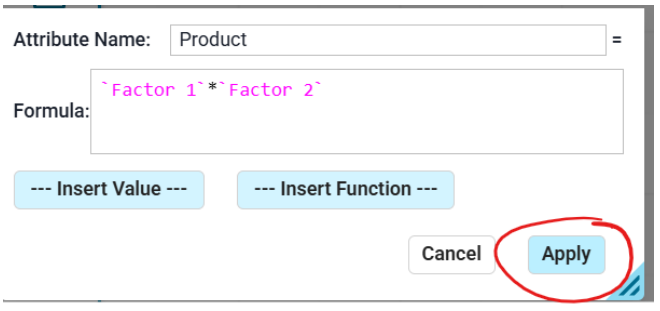
- MULTO (MULTIPLICATION BINGO)
- The MULTO game developed by Maths 300, is based on the game bingo.
- Rich tasks for middle years https://mathsstarters.net/files/Flavel_Selby_paper.pdf
- Mini-Multo activity for practicing multiplication facts for a single factor How to Play Mini Multo: Fun Multiplication Game | Integrow Numeracy Solutions

Using CODAP to generate all possible outcomes and then display

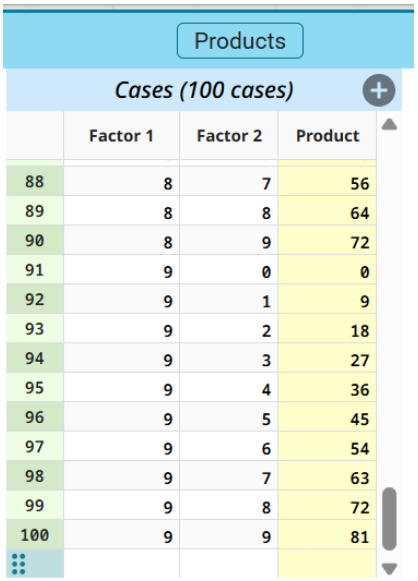
Create a new CODAP document https://codap.concord.org/app/

Instructions	Image from CODAP
Click on the link https://codap.concord.org/app/ to go to CODAP. Select **Create New Document.**	
Make a new table. Click on **Tables** then select **New.**	

Name the table **Products.** Click on Attribute Name. Select **Rename.** Rename as **Factor 1**.	
Add two more attributes. Click on the + in the grey circle to do this (twice). Rename as above. Rename as **Factor 2** & **Product**.	
Fill in Factor 2 first, repeat 0-9 digits ten times. To move down a row, hit enter.	

Fill in Factor 1, repeat the factor e.g., 0, ten times.	
Click on **Product** and select **Edit Formula**.	
Type in the formula: Factor 1 * Factor 2 As you start to type the name the attributes come up, select the one you want. (Factor 1) Type in the * for multiply, then type the second attribute name (Factor 2)	
Note when the attribute name is correct it comes up pink. `Factor 1`*`Factor 2` Click on **Apply**.	

This then autofills all the products for the 100 calculations.



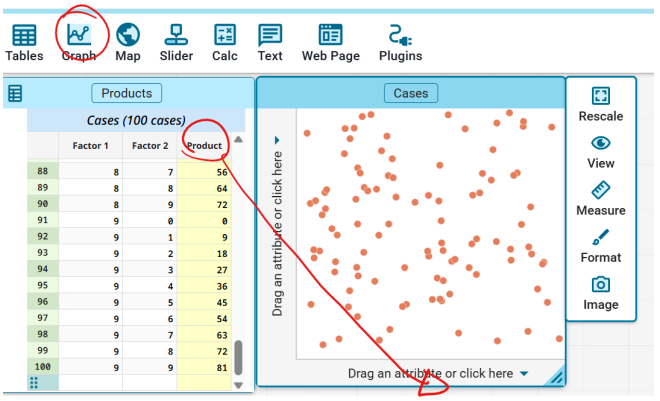
	Factor 1	Factor 2	Product
88	8	7	56
89	8	8	64
90	8	9	72
91	9	0	0
92	9	1	9
93	9	2	18
94	9	3	27
95	9	4	36
96	9	5	45
97	9	6	54
98	9	7	63
99	9	8	72
100	9	9	81

To make a graph.

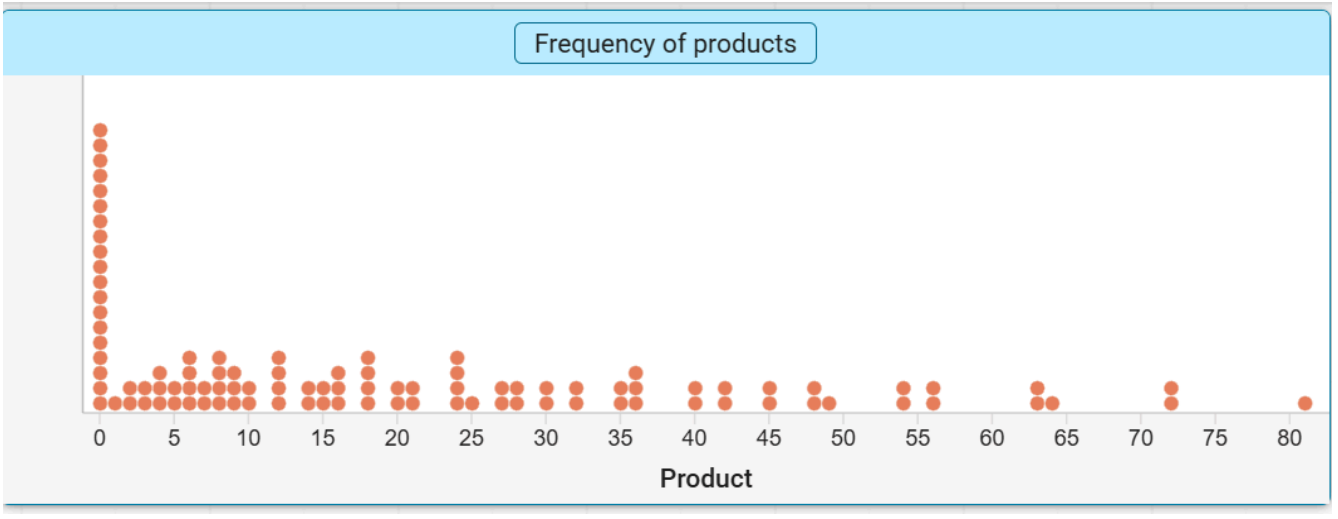
Click on the **Graph** icon.

This opens a graph window.

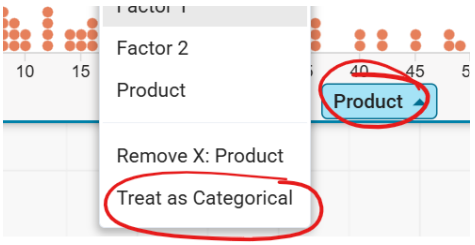
Click and drag the attribute (**Product**) to the x-axis to make a graph of the products.



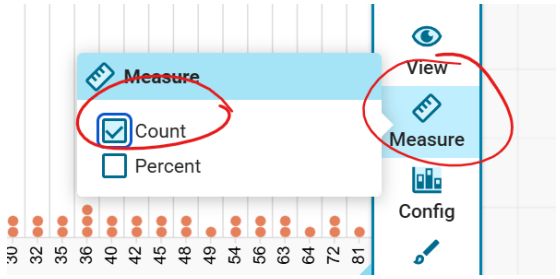
Stretch the graph to make it longer so that the different products are clear.
Give the graph a title.



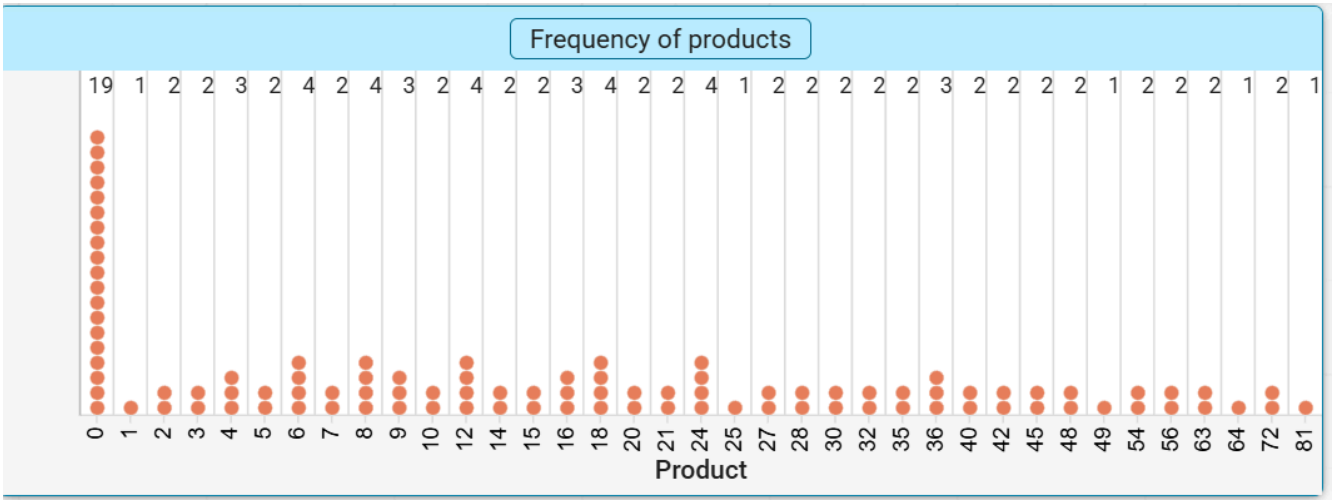
Click on **Product** on the x-axis.
Select **Treat as Categorical**.

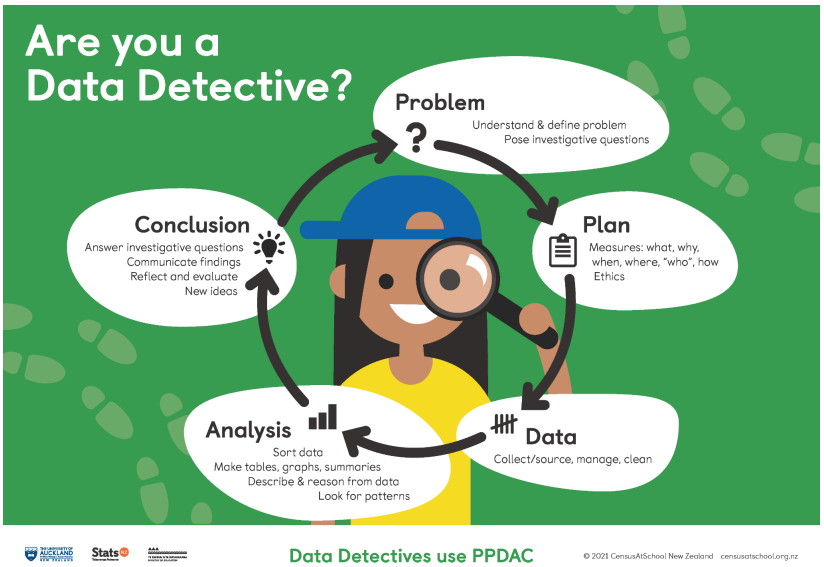


Click on the ruler (**Measure** menu) and select **Count**.



This gives all the products with their counts.





https://new.censusatschool.org.nz/resource/data-detective-poster/

Y8 *Multo* student materials

Resource list with preparation

Resource	Preparation required	Approx numbers
Multo game cards	Print and cut up. Place in a bag.	One for kaiako, but if you want ākonga to play in smaller groups then additional sets would be needed. Also if wanting to use the game cards to make a physical dot plot of all possible outcomes, then would need one copy per group - see PLAN in lesson 2.
Multo sorting board	Print onto card (2 pages) - if A3 card available that would be even better.	One for kaiako, but if you want ākonga to play in smaller groups then additional sorting boards would be needed.
Multo grids Optional	Print and cut up.	There are 9 boards per page, print enough for two per ākonga. Additional copies needed if wanting to play additional games in smaller groups.
Blank multiplication tables	Print and cut the page in half.	There are 2 boards per page. Print enough as needed for ākonga.
Completed multiplication table	Print the page and cut in half - summary tables of products on the other half.	Print if required to support ākonga who are unable to complete the multiplication table.
Summary tables of products	Print the page and cut in half - completed multiplication table on the other half.	Print if required to support ākonga who are unable to complete the summary table of products.
Summary of Multo 4x4 grid positions	Print as required.	Print if required to support ākonga.

Multo game cards

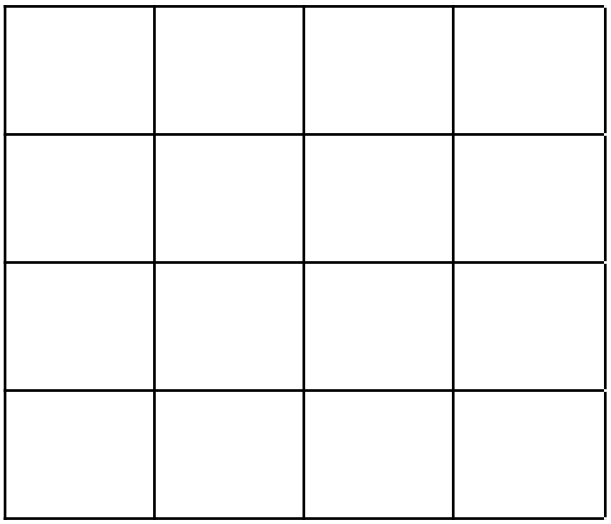
0 x 0	2 x 0	4 x 0	6 x 0	8 x 0
0 x 1	2 x 1	4 x 1	6 x 1	8 x 1
0 x 2	2 x 2	4 x 2	6 x 2	8 x 2
0 x 3	2 x 3	4 x 3	6 x 3	8 x 3
0 x 4	2 x 4	4 x 4	6 x 4	8 x 4
0 x 5	2 x 5	4 x 5	6 x 5	8 x 5
0 x 6	2 x 6	4 x 6	6 x 6	8 x 6
0 x 7	2 x 7	4 x 7	6 x 7	8 x 7
0 x 8	2 x 8	4 x 8	6 x 8	8 x 8
0 x 9	2 x 9	4 x 9	6 x 9	8 x 9
1 x 0	3 x 0	5 x 0	7 x 0	9 x 0
1 x 1	3 x 1	5 x 1	7 x 1	9 x 1
1 x 2	3 x 2	5 x 2	7 x 2	9 x 2
1 x 3	3 x 3	5 x 3	7 x 3	9 x 3
1 x 4	3 x 4	5 x 4	7 x 4	9 x 4
1 x 5	3 x 5	5 x 5	7 x 5	9 x 5
1 x 6	3 x 6	5 x 6	7 x 6	9 x 6
1 x 7	3 x 7	5 x 7	7 x 7	9 x 7
1 x 8	3 x 8	5 x 8	7 x 8	9 x 8
1 x 9	3 x 9	5 x 9	7 x 9	9 x 9

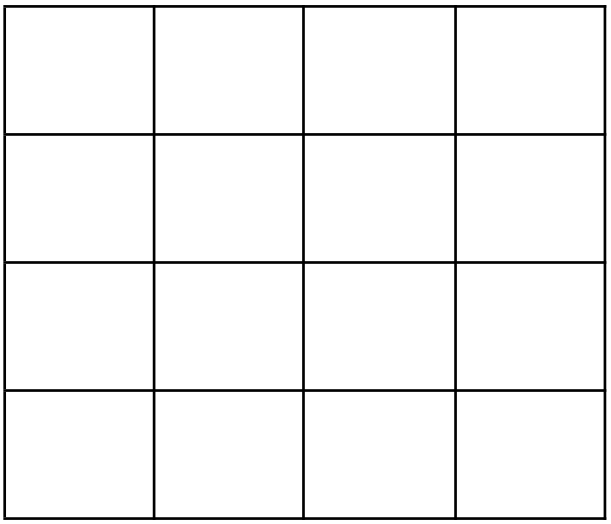
Multo sorting board

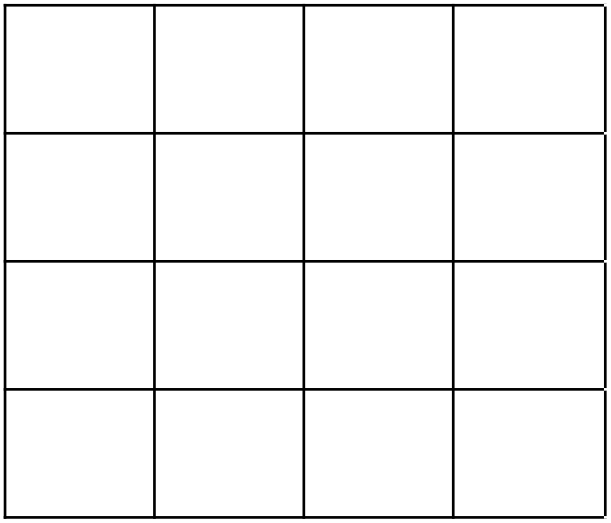
0	1	2
3	4	5
6	7	8
9	10	12
14	15	16
18	20	21

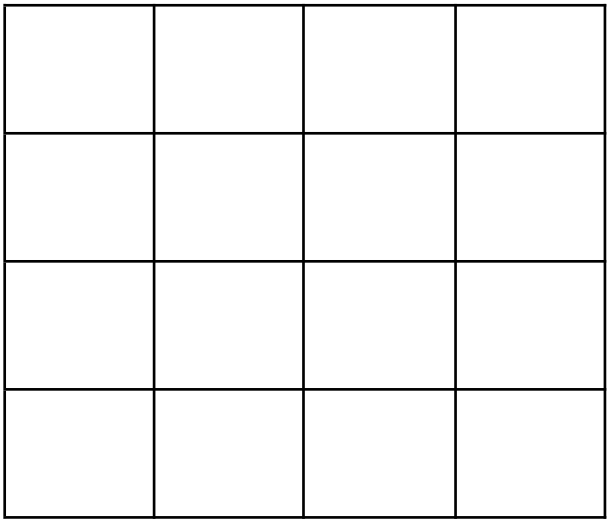
24	25	27
28	30	32
35	36	40
42	45	48
49	54	56
63	64	72 & 81

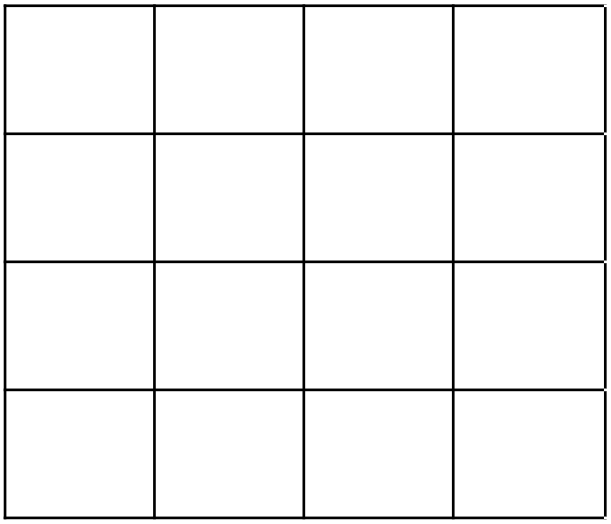
Multo grids

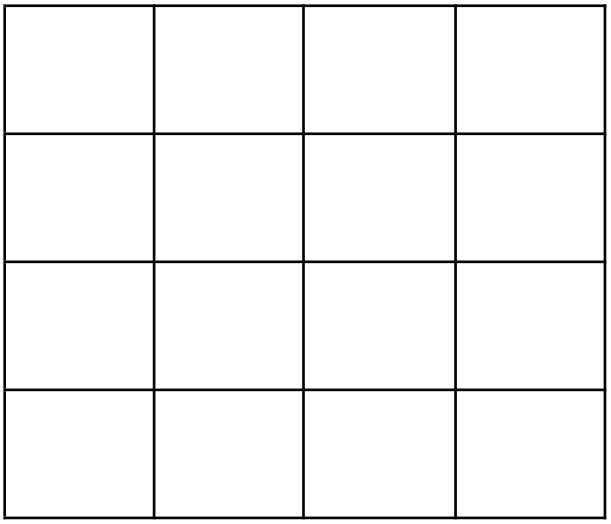












Multo using tables

Blank multiplication tables

x	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

x	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Completed multiplication table

x	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Summary tables of products

Product	0	1	2	3	4	5	6	7	8	9
Count	19	1	2	2	3	2	4	2	4	3
Fraction	$\frac{19}{100}$	$\frac{1}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{3}{100}$	$\frac{2}{100}$	$\frac{4}{100}$	$\frac{2}{100}$	$\frac{4}{100}$	$\frac{3}{100}$

Product	10	12	14	15	16	18	20	21	24	25
Count	2	4	2	2	3	4	2	2	4	1
Fraction	$\frac{2}{100}$	$\frac{4}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{3}{100}$	$\frac{4}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{4}{100}$	$\frac{1}{100}$

Product	27	28	30	32	35	36	40	42	45	48
Count	2	2	2	2	2	3	2	2	2	2
Fraction	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{3}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{2}{100}$

Product	49	54	56	63	64	72	81
Count	1	2	2	2	1	2	2
Fraction	$\frac{1}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{2}{100}$	$\frac{1}{100}$	$\frac{2}{100}$	$\frac{2}{100}$

Summary of Multo 4x4 grid positions

Row Column Diagonal Corner	Row Column	Row Column	Row Column Diagonal Corner
Row Column	Row Column Diagonal	Row Column Diagonal	Row Column
Row Column	Row Column Diagonal	Row Column Diagonal	Row Column
Row Column Diagonal Corner	Row Column	Row Column	Row Column Diagonal Corner