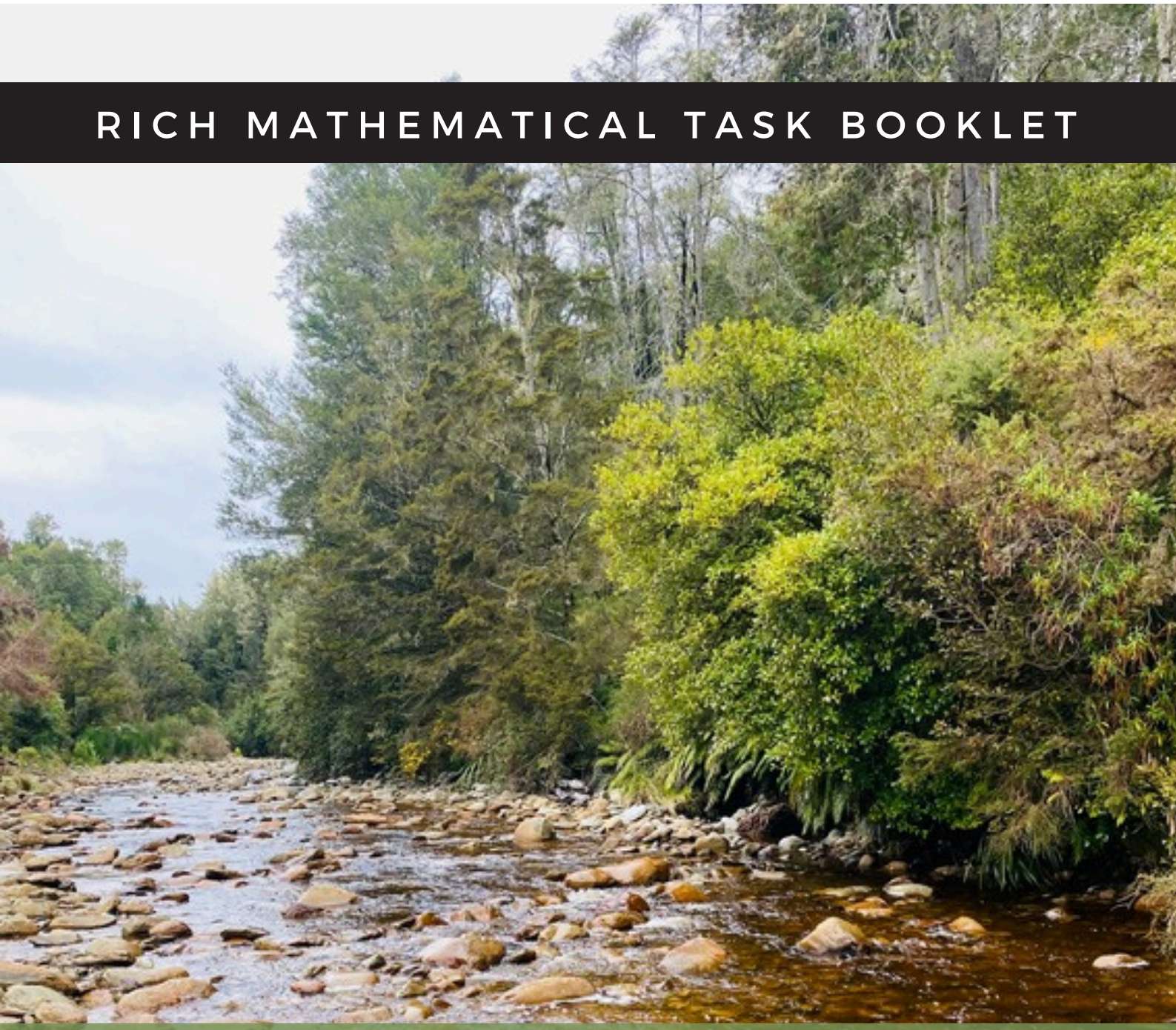
RICH MATHEMATICAL TASK BOOKLET



Conceptual Starters Phase ONE

How To Guide

These conceptual starters have been designed and planned to meet learning intentions of the New Zealand curriculum. Whilst it is a large collection of starters there are many more starters that can be used in your mathematics programs.

Each starter is:

- Designed to be used more than once.
- Written with a small number of other examples, however almost all starters could be adapted and used with a variety more different numbers, patterns and materials.
- Encouraging the use of mathematical practices.
- Supporting the use of dialogue and communication during these starters.

- Designed to be chosen intentionally and used to revisit or build upon concepts taught throughout the year.

Mathematical Practices are:

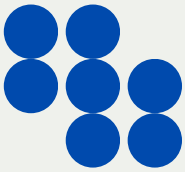
- Making an explanation
- Making a justification
- Arguing mathematically
- Making a generalisation
- Representing

Expect, scaffold, and support your students to use these mathematical practices when sharing their ideas during these starters. Using correct mathematical language is to be encouraged.
Always, encourage and celebrate all contributions and ideas that are shared from all students.
Be ambitious, don't limit your students to small numbers. They need exposure and chances to reason with numbers to at least 10,000.

Most of these starters can be adapted and used as independent tasks as well.

All students can be successful mathematicians when given the opportunities to succeed.

Subitising



Materials – subitising dot card, or Powerpoint.

Teacher Notes

Subitising is the ability to recognise the number of objects in a group without needing to count them.

Instructions:

Before putting the image on the screen or board, tell students "I am going to flash something onto the screen for a short period of time, I would like you to see what you notice"

Flash the image onto the screen for 3 seconds

Encourage the students to think about "What did you notice?" Show image for another 3 seconds

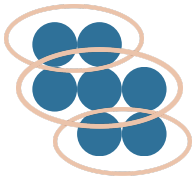
Encourage the students to check their thinking and then share their ideas with a buddy.

Facilitate a whole class discussion discussing all the ideas

Record these on the board. Use talk moves to facilitate participation and develop understanding. Encourage students to repeat key ideas.

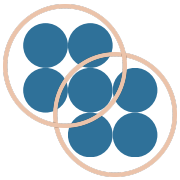
1,2,3,4,5,6,7

I saw 2, 4, 6, 7



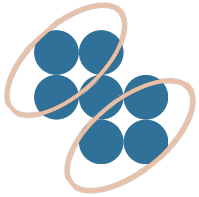
I saw 2, 3, 2
2 + 3 + 2 =

2 + 3 = 5
5 + 2 = 7



4 + 4 - 1 = 7

4 + 4 =8
8 - 1 = 7



3 + 3 - 1 = 7

3 + 3 = 6
6 + 1 = 7

Curriculum Links

During the first six months

Subitise (recognise without counting) the number of objects in a collection of up to 5

During the first year
Subitise (recognise without counting) the number of objects in a collection of up to 10, including by combining two patterns of 1–5 objects

During the second year
Group objects in a collection of at least 10, subitise the number of objects in each part, and find the total number in the collection using the parts

By the end of year three
Estimate the number of objects in a collection of less than 100, using patterns and groupings

Big Ideas

A quantity (whole) can be decomposed into different parts, the parts can be composed to form the whole.

Mathematical Language

Numbers 0 -100, groups of, addition, join, same as, subitise.

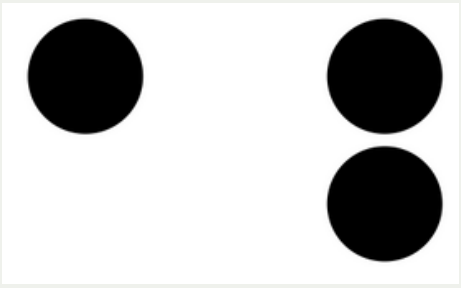
Suggested Learning Outcomes

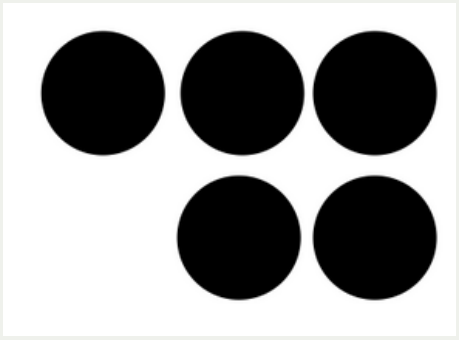
Notice groupings of objects

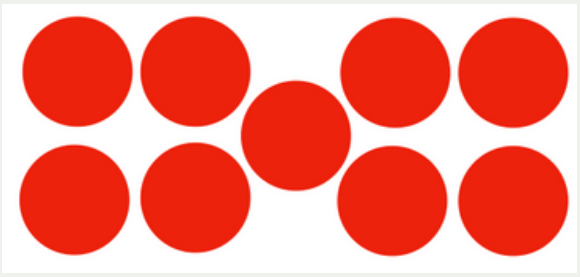
Instantly recognise groupings to 6

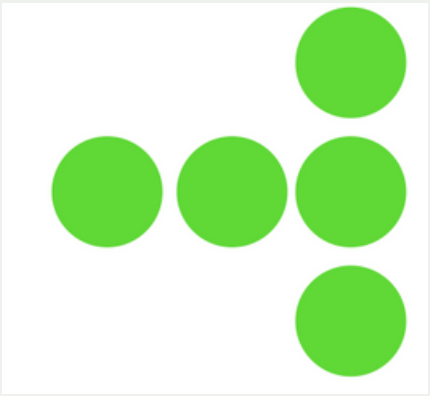
Justify and explain mathematical thinking

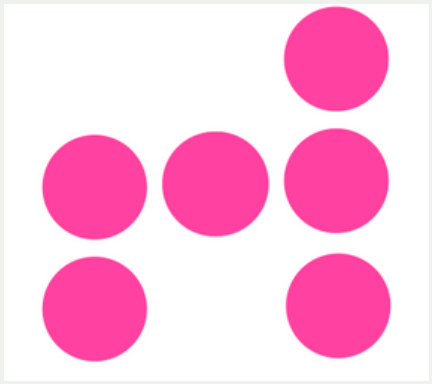
Other Examples

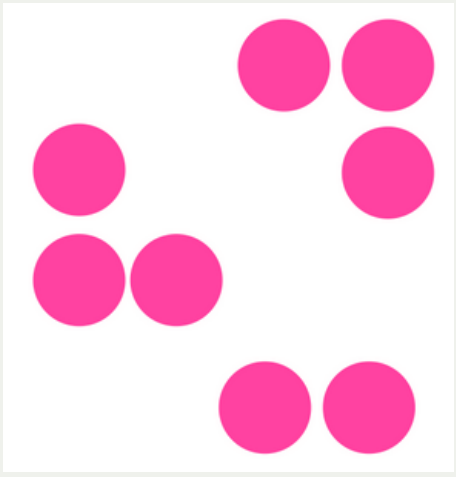


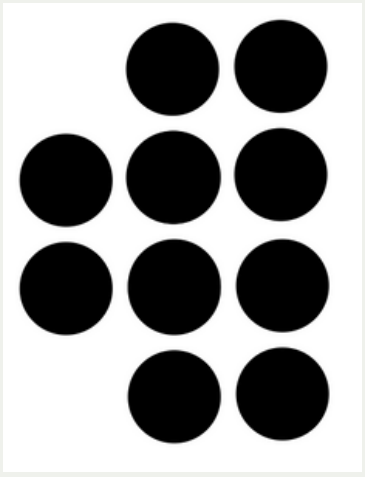




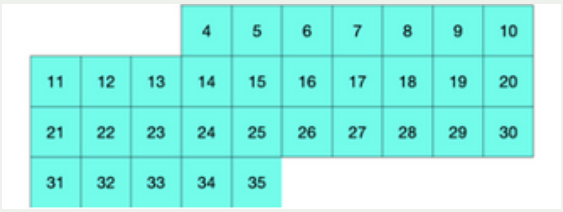








Counting



Materials - use 100s board as visual representation

Teacher Notes

Counting is an important skill for students to develop. It is important to always extend the count.

Key questions to ask students:
"What number is next? Why?"
"What patterns can you see in the numbers we counted today?"
"What do you notice?"

Instructions:
Tell students they are all going to count together out loud starting from any given number. If you are skip counting then introduce the count.

Note: *it is not expected that all children will "know" all counting sequence. Increase or reduce teacher scaffolding as needed to support students participating in the count.*

As students count, flip the hundreds board numbers over or write the numbers in a structured table. Pause/restart/repeat as needed to ensure participation. Stop when needed.

Ask students "what do you notice about the numbers?", "what patterns do you notice". Give wait time for individual thought, or for think, pair, share.

Encourage the students to make predictions about other numbers. What number is next? Ten more? Ten less?

Other Examples

This activity can be repeated multiple times, with a range of numbers and sequences between 0-10,000.

Avoid constantly starting from one when counting.

We want to encourage students to count on from other numbers.

Curriculum Links

During the first six months
Count forwards or backwards from any whole number between 1 and 10, and then between 1 and 20

During the first year
Count forwards or backwards in 1s, 2s, and 10s from any whole number between 1 and 20, and then between 1 and 100

During the second year
Count forwards or backwards in 1s, 2s, 5s, and 10s from any whole number between 1 and 100

By the end of year three
Count forwards or backwards in 2s, 3s, 5s, and 10s from any whole number between 1 and 1,000

Big Ideas

The world is full of patterns and structures that we use mathematics and statistics to understand.

Mathematical Language

Pattern, place value (hundreds, tens, ones), number words (one hundred and thirty three...), add, subtract

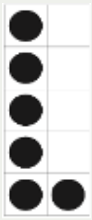
Suggested Learning Outcomes

Notice patterns in the number sequence

Predict patterns

Explain and justify their thinking

Tens Frames - to 10



“What do you see and how do you see it?”

Materials - tens frames cards

Teacher Notes

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

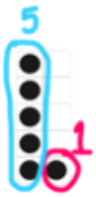
Instructions:
Display a tens frame card from 0-10 (e.g., 6).

Ask students “What do you see and how do you know?”

Give thinking time, then turn and talk to a buddy.

At first students may count 1:1. Facilitate a discussion that presses for different ways of grouping or partitioning. E.g., "I know its 6 because there is a line of 5 and 1 more”, or “There are 10 spaces and 4 are empty”

Record students thinking e.g.,



or 6 = 5 + 1

Ask students “If we have 6, how many more do we need to make 10?” 6 + ? = 10.

Repeat with all numbers from 0-10.

Note: *for Y0 students you may prefer to ask, “can you make this pattern on a tens frame?” or “can you show this pattern using your fingers”*

Curriculum Links

During the first six months
Identify, read, and write whole numbers up to at least 10
During the first year
Partition and regroup up to 20 objects in different ways, using a systematic approach and noticing patterns
During the second year
Partition and regroup whole numbers up to at least 100, using a systematic approach and noticing patterns (e.g., 10 + _ = 70, 20 + _ = 70, 30 + _ = 70)
By the end of year three
Partition and regroup whole numbers up to at least 1,000, using a systematic approach and noticing patterns (e.g., 400 + 300 = _ , 350 + _ = 500)

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Te reo Māori and other Pacific languages explicitly describe the logic of the base 10 numbering system.

Mathematical Language

Less, More, Tens Frame, Ones, Tens, Hundreds, Place-value, Addition, Subtraction, Equals, Number words

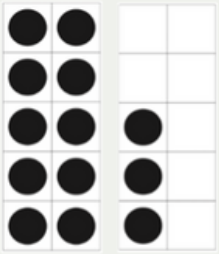
Suggested Learning Outcomes

Join and separate groups of up to a total of 10 objects, and find the result by grouping and counting

Explain how many tens and ones are in numbers

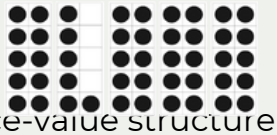
Other Examples

Teen Numbers (e.g., 13)



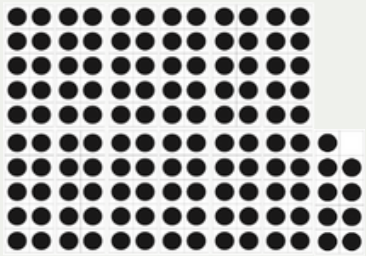
This time press for the place-value language of tens and ones “thirteen is one ten and three ones.”
Draw links to the place-value structure evident within Te reo Māori and other Pacific languages e.g., tekau mā toru (Te re Māori), hongofulu mā tolu (Tongan).

Tens Numbers (e.g., 46)



This time press for the place-value structure “I know this is 46 because there are four tens, and 6 ones”
“10 + 10 + 10 + 10 + 6”
Whā tekau mā ono (Te reo Māori), fāngofulu mā ono (Tongan)

Hundreds Numbers (e.g., 129)

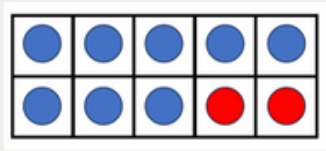


This time the focus should be on the nested view of place-value e.g., “There are 12 tens, which is the same as 120”, “129 has 12 tens and 9 ones”.

Students may also skip count in 10’s (10,20,30,40 etc) or apply multiplication (12 x 10, 12 groups of 10).

Students may also round to the nearest ten e.g., “If we had 1 more dot there would be 13 tens”, “13 tens are equal to 130” “13 tens – 1 = 129”

Tens Frames - Bonds to 10



“What do you see and how do you see it?”
Materials - tens frames cards

Teacher Notes

Instructions:
Tell students you are going to display an image for a short amount of time, and their job is to think about what they saw.

Display the tens frame for 3 seconds.

Give students time to think about what they saw.

Display the tens frame for another 3 seconds.

Students to turn and talk to a partner about what they saw.

Display the tens frame again (keeping it displayed).

Select a few students to share. E.g., “I saw 2 red in the corner, and then the rest are blue.”

Teachers model the recording of the number sentences as 8 and 2 is ten, 8 + 2 = 10. “We know that there are 8 blue counters and 2 red counters, and when we join them together, they make 10 counters” so 8 + 2 = 10

Other Examples

This can be repeated with bonds for any number up to 10. e.g bonds to 7.

Move onto bonds up to 20 such as 11 + 9, 18 + 2 and ask students “what do you notice?”.

Model the inverse relationship between addition and subtraction. e.g. 10 - 8 = 2

This is a task that can be set up as an independent activity. E.g. What are all of the number sentences that this tens frame is showing us? 1 + 9 = 10, 9 + 1 = 10, 10 - 9 = 1, 10 - 1 =9

Curriculum Links

During the first six months
Join and separate groups of up to a total of 10 objects by grouping and counting

During the first year
Explore addition facts up to 10 and their corresponding subtraction facts (families of facts), including doubles and halves

During the second year
Recall addition facts up to 10, and explore addition facts up to 20 and their corresponding subtraction facts (families of facts), including doubles and halves

By the end of year three
Recall addition facts up to 20 and their corresponding subtraction facts (families of facts), including doubles and halves

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learning Outcomes

Join and separate groups of up to a total of 10 objects, and find the result by grouping and counting

Mathematical Language

Less, More, Tens Frame, Ones, Tens, Hundreds, Place-value, Addition, Subtraction, Equals, Number words

Adding Dice Patterns

Teacher Notes

The focus of this activity is for students to notice and use groupings when finding a total. Students may wish to use a basic facts chart to support this.

Instructions:

Display image and ask “can you find out how many dots there are? What basic facts or groupings could you use?”

In pairs (or individually) allow students time to record how they might group these patterns to find the total. Notice students who are using doubling (4 + 4), multiplication (3 x 3), making tens (3 + 3 + 4) etc

Select different students to explain how they joined the sets and notate their explanation. E.g.,

Explicitly reinforce the idea that we can use groupings and known facts to find the total instead of counting.

Other Examples

Roll a set of dice (real or virtual).

Use dominoes as another opportunity to group.

Repeat this activity as independent activity either set up with dice for students to roll or pre-determined numbers.

Curriculum Links

During the first six months
Join and separate groups of up to a total of 10 objects and grouping and counting
During the first year
Multiply and divide using equal grouping or counting
During the second year
Multiply and divide using equal grouping or skip counting (e.g., in 2s, 5s, and 10s)

By the end of year three
Multiply a one- or two-digit number by a one-digit number, using skip counting or known facts (e.g., 4 × 6, 2 × 23)

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learning Outcomes

Use basic facts and groupings to add multiple numbers

Explain how they grouped sets of objects

Mathematical Language

Add, group, multiply, double, join, equal

Starting and Joining Sets

What are some different ways we can put these toys into two baskets? How do you know?

Materials - replace photo with 10 objects from the classroom.

Teacher Notes

Before you begin the activity decide whether the focus should be on addition, subtraction, inverse relationship or commutative property (see examples below). Try to record students' ideas in a structured way that will allow patterns to be identified.

Addition	Subtraction	Inverse Relationship		Commutative Property
0+10=10	10-0=10	0+10 =	10-0	0+10=10+0
1+9=10	10-1=9	1+9=10	10-1=9	1+9=9+1
2+8=10	10-2=8	2+8=10	10-2=8	2+8=8+2
3+7=10	10-3=7	3+7=10	10-3=7	3+7=7+3
4+6=10	10-4=6	4+6=10	10-4=6	4+6=6+4
5+5=10	10-5=5	5+5=10	10-5=5	5+5=5+5
6+4=10	10-6=4	6+4=10	10-6=4	
7+3=10	10-7=3	7+3=10	10-7=3	
8+2=10	10-8=2	8+2=10	10-8=2	
9+1=10	10-9=1	9+1=10	10-9=1	
10+0=10	10-10=0	10+0=10	10-0=10	

Instructions:

Ask students to turn and talk about the different ways they could arrange the objects into the two baskets. Record initial ideas.

Have one child put some toys in one basket then another child to place the rest in another basket. Record the number sentence e.g., 4 + 6 = 10
Ask “is there a different way we can put the toys in the baskets?”.

Choose other students to model the next idea. Record. E.g., 3 + 7 = 10. Repeat until all ideas are shared.

Reinforce the mathematical idea you are focussing on. E.g., addition – joining sets together, subtraction – separating a group, commutative property – the order in which you add two numbers won't change the outcome, inverse relationship – addition and subtraction are the opposite of each other.

Once all ideas are collected ask students “are there any patterns you can see from the numbers we have recorded. E.g.,

Curriculum Links

During the first six months
Partition up to 5 objects, and then up to 10 objects, using a systematic approach and noticing patterns

During the first year
Partition and regroup up to 20 objects in different ways, using a systematic approach and noticing patterns

During the second year
Partition and regroup whole numbers up to at least 100, using a systematic approach and noticing patterns (e.g., 10 + _ = 70, 20 + _ = 70, 30 + _ = 70)

By the end of year three
Partition and regroup whole numbers up to at least 1,000, using a systematic approach and noticing patterns (e.g., 400 + 300 = _ , 350 + _ = 500)

Big Ideas

Numbers can be composed and decomposed in different ways by using patterns.

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Addition Patterns		Subtraction Patterns	
0+10=10		10-0=10	
1+9=10		10-1=9	Goes up in one
2+8=10	Goes up in one	10-2=8	
3+7=10		10-3=7	
4+6=10		10-4=6	
5+5=10		10-5=5	Goes down by one
6+4=10	Goes down by one	10-6=4	
7+3=10		10-7=3	
8+2=10		10-8=2	
9+1=10		10-9=1	
10+0=10		10-10=0	

Note: This starter could be used every day of a week (dependent of the age of your students), starting with manipulating the materials, the recording of the mathematical sentences may occur on the second day to ensure an in-depth discussion of these patterns.

Other Examples

Repeat the task using other numbers e.g., 7, 14, 20

Keep or change the mathematical focus depending on your professional noticing's.

This is another activity that can be set up as an independent activity.

Suggested Learning Outcomes

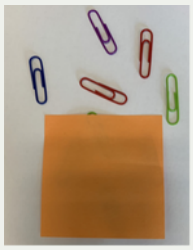
Join and separate groups of up to a total of 10 objects

Find a total by grouping and counting

Mathematical Language

Number words, number sentence, add, subtract, equal, separate, join.

What is Hidden? - Change Unknown

We started with 9 and we hid some. How many did we hide?

Materials – objects from classroom

Teacher Notes

This task focuses specifically on change unknown equations.
5 + ? = 9 or 9 - ? = 5

Instructions:
Place a chosen number of items on the board/ floor. Ask students to check how many there are.

Tell students you are going to hide some of the objects, and their job is to figure out how many are hidden. Ask students to close their eyes and use a post-it or container to cover some of the objects. E.g.,

Ask students to open their eyes and think about how many are covered and why. Encourage students to visualize (imagine) the objects under the post it

Students to turn and talk to a partner about what they think. Facilitate a conversation drawing on different ideas, and record these on the board. E.g., 5 + ? = 9, so 5 + 4 = 9, 5, 6, 7, 8, 9 (counting on from 5)

Remove the post –it to reveal the hidden objects so students can confirm their thinking.

Repeat using the same 9 objects, but this time cover a different amount.

Other Examples

Arrays 14 + __ = 20 or 20 - __ = 14

To increase the complexity, cover two parts of the set.
12 + __ + __ = 20 or 20 - ___ - ___= 20.

Curriculum Links

During the first six months
Join and separate groups of up to a total of 10 objects by grouping and counting

During the first year
Explore addition facts up to 10 and their corresponding subtraction facts (families of facts), including doubles and halves

During the second year
Recall addition facts up to 10, and explore addition facts up to 20 and their corresponding subtraction facts (families of facts), including doubles and halves

By the end of year three
Recall addition facts up to 20 and their corresponding subtraction facts (families of facts), including doubles and halves

Big Ideas

Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Different number sentences can be associated with the same concrete or real-world situation.

Suggested Learning Outcomes

Predict how many objects are in a set

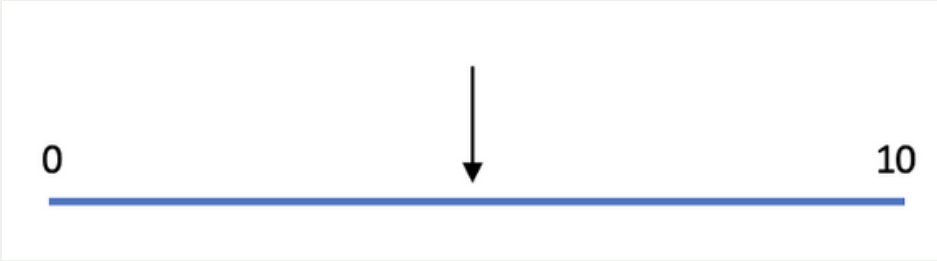
Record change unknown number sentences

Visualise small quantities

Mathematical Language

Unknown, add, subtract, total, equals

Where's the Point?



What number is the arrow pointing to? Explain why.

Teacher Notes

The purpose of this activity is to support students' development of a mental representation of the number system, as well as developing a sense of the relationship between numbers.

It is important that students provide a reason behind their thinking. E.g., "We think this is 5 because it looks like the arrow is halfway to 10".

Instructions
Ask students to turn and talk to a buddy about where they think the arrow is pointing and why.

Randomly select a partner to share their ideas and expect an explanation. E.g., "because?"

Ask students "do you agree or disagree that this is 5 and why?" or alternatively ask "is there another way of explaining how this is 5?"

Repeat multiple times by either changing the placement of the arrow or the value of the start/end point of the number line (see other examples).

Expect students to also draw on their understandings of fractions of a set, using benchmark fractions such as $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{8}$

Curriculum Links

During the first six months
Compare and order whole numbers up to at least 10 and ordinal numbers (e.g., 1st, 2nd, 3rd), using words

During the first year
Compare and order whole numbers up to at least 20 and ordinal numbers (e.g., 1st, 2nd, 3rd), using words or numerals and suffixes

During the second year
Compare and order whole numbers up to at least 100

By the end of year three
Compare and order whole numbers up to at least 1,000

During the first three years
Use estimation to predict results and to check the reasonableness of calculations

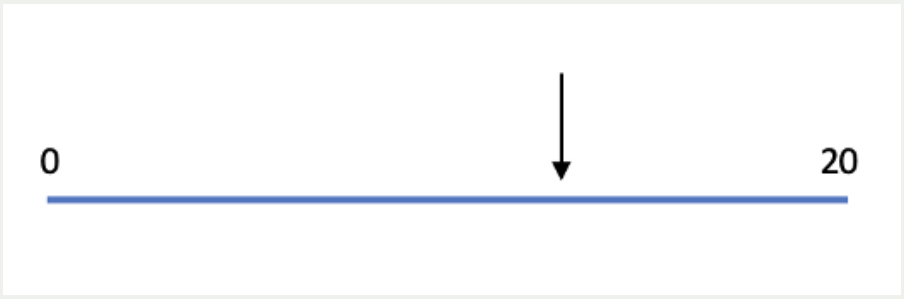
Big Ideas

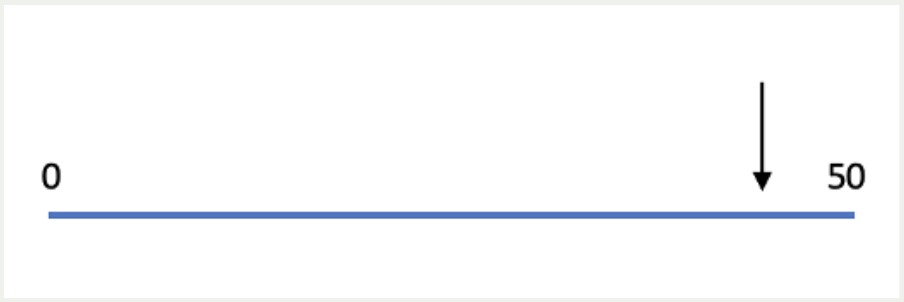
The set of real numbers is infinite, and each real number can be associated with a unique point on the number line.

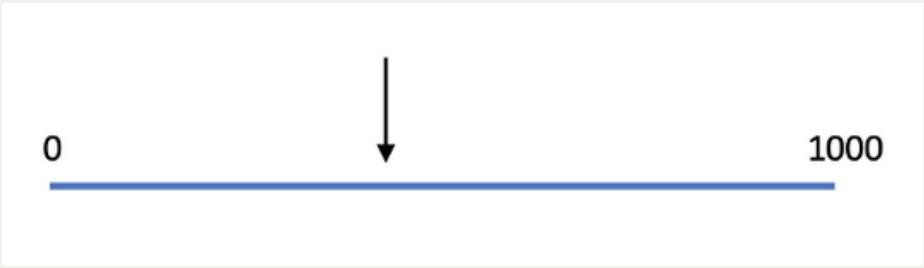
Other Examples

This activity can be done with any sized number line, see below.

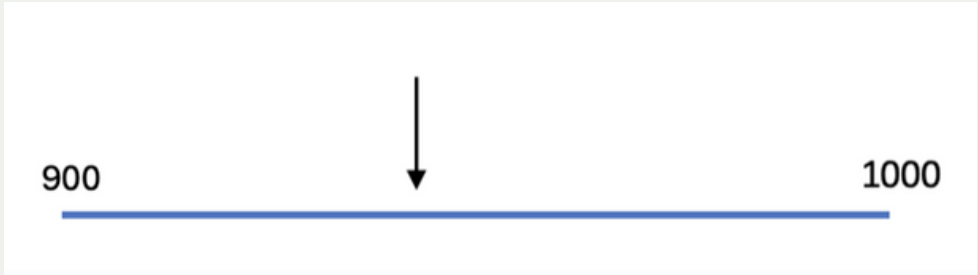
Within Phase One students need experience reasoning with numbers up to at least 1,000.







The starting value does not always have to be zero.



Suggested Learning Outcomes

Predict and explain where numbers are placed on the number line.

Use a number line to represent the number sequence.

Mathematical Language

Number line, more than, less than, before, after, half-way, between

My Number is...

I am thinking of a number greater than 12 but less than 15. What could the number be?

Materials – pen and paper or whiteboards

Teacher Notes

The purpose of this starter is to support students in recalling, ordering, teen numbers, in both te reo Māori and te reo Pākeha.

Instructions:

Each group will need a whiteboard or piece of paper.

Teacher says "I'm going to think of a teen number, you are going to guess what my number is"

"The number I am thinking of is greater than 12 tekau ma rua but less than 15 tekau ma rima, write the mystery number on your board. (You may wish to mark 12 and 15 on an empty number line).

Allow time for groups to think/discuss and record their answer.

Choose a group to explain their answer. Reinforce using a number line we are looking for a number greater than 12, but less than 15. Therefore, it could be 13 tekau ma toru or 14 tekau ma wha. Mark these on the number line.

Other Examples

Greater than 10, less than 14
Greater than 0, less than 16
Greater than 18, less than 40

Over time this activity can be extended to any number to 1,000. E.g., Greater than 210, less than 290.

Curriculum Links

During the first six months
Compare and order whole numbers up to at least 10 and ordinal numbers (e.g., 1st, 2nd, 3rd), using words

During the first year
Compare and order whole numbers up to at least 20 and ordinal numbers (e.g., 1st, 2nd, 3rd), using words or numerals and suffixes

During the second year
Compare and order whole numbers up to at least 100

By the end of year three
Compare and order whole numbers up to at least 1,000

During the first three years
Use estimation to predict results and to check the reasonableness of calculations

Big Ideas

Numbers can be compared using greater than, less than, or equal.

Suggested Learning Outcomes

Order numbers.

Explain if a number is greater than or less than.

Mathematical Language

Teen numbers, digit, more than, less than, bigger, smaller,

Teen or Ty?

Is this 13 or 30? How do you know?

Materials – place value blocks

Teacher Notes

The purpose of this starter is to support students in recalling, ordering, teen numbers, in both te reo Māori and te reo Pākeha.

Instructions:

Display the image and ask students to explain to a partner whether it is 13 or 30.

Use talk moves to facilitate a discussion that focuses on explaining the place-value structure of the number. E.g., "I think this number is 30 because I can see three tens". "One ten, two tens, three tens". "This cannot be 13 because there are no ones".

Draw links to te reo Māori (or other languages). E.g., toru tekau (three tens)

Ask students to make 13 and 30 using the materials.

Facilitate a conversation on the tens and ones in each number.

Record using different representations such as place-value house, arrow cards, words e.g., 10 + 3 = 13

Other Examples

Is this 16 or 60? Explain your thinking.
Is this 18 or 80? Explain your thinking.
Is this 89 or 90? Explain your thinking.

Curriculum Links

During the first six months
Compare and order whole numbers up to at least 10 and ordinal numbers (e.g., 1st, 2nd, 3rd), using words

During the first year
Compare and order whole numbers up to at least 20 and ordinal numbers (e.g., 1st, 2nd, 3rd), using words or numerals and suffixes

During the second year
Compare and order whole numbers up to at least 100

By the end of year three
Compare and order whole numbers up to at least 1,000

During the first three years
Use estimation to predict results and to check the reasonableness of calculations

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

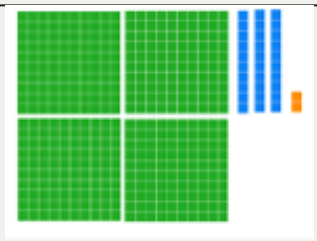
Suggested Learning Outcomes

Recognise and represent the ten-and-ones structure of teen numbers (11-19) and ty numbers.

Mathematical Language

Place value, tens, ones, number words, teen, ty

Place Value Blocks to 1000



What number does this represent? Explain why.

Materials – place value blocks

Teacher Notes

The purpose of this activity is for students to count in groups of hundreds, tens and ones (supporting place-value development). As well as exploring the many ways 1000 can be represented.

Instructions:

Ask students what number this picture represents? (direct students to the size of the blocks).

Give a short time for individual thinking, then ask students to explain their thinking to a buddy.

Encourage students to use the language of place-value in their explanations, and to count in groups (not 1:1). E.g., "I know its 432 because there's four hundreds 100, 200, 300, 400, three tens, 10, 20, 30 and 2 ones".

Discuss how many orange one cubes make one blue ten and how many ten blocks make one green hundred block. Extend students by asking them to continue the pattern to find out how many green hundreds would make a one thousand block?

Record the numbers in a variety of ways (e.g. writing it in expanded form (400 + 30 + 2= 432), writing it in words, drawing and putting the digits in a place value house.

Other Examples

You may wish to use this site to make your own numbers.
https://mathigon.org/polypad#number-tiles

Curriculum Links

During the first six months
Identify, read, and write whole numbers up to at least 10

During the first year
Identify, read, and write whole numbers up to at least 20, and represent them using the ten-and-ones structure of teen (11-19) and -ty (multiples of 10) numbers

During the second year
Identify, read, and write whole numbers up to at least 100, and represent them using base 10 structure

By the end of year three
Identify, read, and write whole numbers up to at least 1,000, and represent them using base 10 structure

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learning Outcomes

Explain how many hundreds, tens and ones are in numbers to 1000.

Mathematical Language

Place value, tens, ones, hundreds, equal

Reading numbers to 1,000

Teacher Notes

Instructions:

Display the image. Ask students to turn and tell a partner what they think this number is.

Read the number together. Support students to use the correct name: five thousand, seven hundred and twenty-two.

Ask a series of questions that focus on the place-value of the numbers. E.g., “What does this 5 represent?”, “What is the value of the ones place?”, “How many hundreds are there?”, “What digit is in the thousands place? What does that mean?”

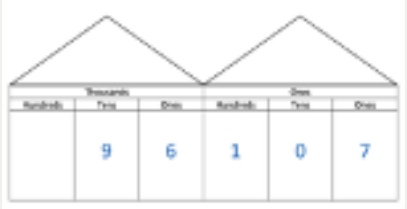
Show an image of 5722 on place-value blocks if required.

You might also wish to record the number in expanded form 5000 + 700 + 20 + 2 = 5722.

Repeat with a range of numbers at least to 1,000.

Other Examples

This could be repeated as a student lead activity. A student can write a number for their buddy, ask them to read it. Then practice asking a question such as “How many thousands are there?”.



Curriculum Links

During the first six months
Identify, read, and write whole numbers up to at least 10

During the first year
Identify, read, and write whole numbers up to at least 20, and represent them using the ten-and-ones structure of teen (11-19) and -ty (multiples of 10) numbers

During the second year
Identify, read, and write whole numbers up to at least 100, and represent them using base 10 structure

By the end of year three
Identify, read, and write whole numbers up to at least 1,000, and represent them using base 10 structure

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learning Outcomes

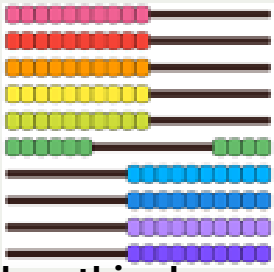
read numbers up to 1000

Explain the value of the ones, tens, hundreds and thousands place.

Mathematical Language

Place value, tens, ones, hundreds, digit.

Abacus



What number does this abacus show? Explain why

Materials – abacus (or online version)

Teacher Notes

The purpose of this activity is for students to count in groups of tens and ones (supporting place-value development). As well as exploring the many ways 100 can be represented.

Instructions:

Ask students what number does this abacus show? (direct students to look at the left side of the abacus)

Give a short time for individual thinking, then ask students to explain their thinking to a buddy.

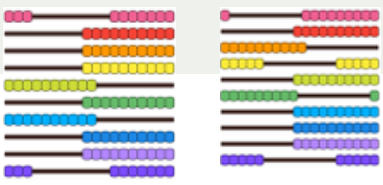
Press for students to use the language of place-value in their explanations, and to count in groups (not 1:1). E.g., "I know its 56 because there's 5 tens 10, 20, 30, 40, 50 and then 6 ones".

1. Ask students if anyone counted in another way. Reinforce the idea that there are multiple ways representing any given number.
2. Repeat multiple times with differing examples as below.
3. Reinforce that the abacus always holds 100 beads, so no matter what the formation, the total will never change.

Once students can count in tens and ones, you can extend the task by making bonds to 100 (e.g., 56 + 44 = 100).Alternatively, you may choose to start with teen numbers if students are new to school.

Other Examples

Teen numbers
Tens and Ones e.g. 21. 52 etc
Tens e.g. 70, 30 etc
Tens and one (complex)



Curriculum Links

During the first six months
Identify, read, and write whole numbers up to at least 10

During the first year
Identify, read, and write whole numbers up to at least 20, and represent them using the ten-and-ones structure of teen (11-19) and -ty (multiples of 10) numbers

During the second year
Identify, read, and write whole numbers up to at least 100, and represent them using base 10 structure

By the end of year three
Identify, read, and write whole numbers up to at least 1,000, and represent them using base 10 structure

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learning Outcomes

Count a set of objects using groups of tens and ones.

Explain how many tens and ones are in numbers to 100.

Mathematical Language

Hundreds, tens, ones, add, subtract, equal, abacus.

Before and after to 1,000

Before		After
	5	
	15	
	45	
	245	
	895	
	6,015	
	10,005	

Materials – hundreds chart if needed

Teacher Notes

Students need multiple opportunities to notice and generalise patterns within the structure of our number system. It is not expected they will already "know" these numbers (provide 100's chart for support.

Instructions:

Ask students "What comes before 5? What comes after 5?". Record on chart. Repeat for 15 and 45.

Ask students "What do you notice about the before and after numbers?".

What comes before and after 245? How do you know?

Repeat for the other numbers in the chart.

Once the chart is complete ask students "What do you notice is the same?" "What do you notice is different?".

Explicitly connect that in the before column, the digit in the ones place is always 4. In the after column, the digit in the ones place is always 6.

Other Examples

Repeat this activity with any number. This can also be used as an independent task for students to explore after this has been used as a starter.

Before		After
	6	
	16	
	36	
	116	
	986	
	4136	
	10 006	

Before		After
	2	
	12	
	52	
	112	
	882	
	7082	
	10 002	

Before		After
	10	
	20	
	100	
	900	
	5600	
	8000	
	10 000	

Before		After
	1	
	11	
	81	
	101	
	381	
	7611	
	10 001	

Curriculum Links

During the first six months
Count forwards or backwards from any whole number between 1 and 10, and then between 1 and 20

During the first year
Count forwards or backwards in 1s, 2s, and 10s from any whole number between 1 and 20, and then between 1 and 100

During the second year
Count forwards or backwards in 1s, 2s, 5s, and 10s from any whole number between 1 and 100

By the end of year three
Count forwards or backwards in 2s, 3s, 5s, and 10s from any whole number between 1 and 1,000

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learning Outcomes

Identify the number before and after any given number.

Notice patterns within numbers.

Mathematical Language

before, after, greater than, less than, left, right, ones, tens hundreds thousands

Estimate - How many?

Estimate: How many shells do you think there are in the jar to the nearest 10. Why?

Materials: items in containers or images

Teacher Notes

The purpose of this activity is for students to estimate how many things are in the jar. Explain to the students that estimation is an educated guess.

Instructions:

Show the picture of materials in jar (or real jar if available).

Ask the students to estimate how many shells might be in the jar to the nearest 10. Allow thinking time.

Turn and tell your buddy about how many you think are there and why.
Ask for a range of student responses and record these on the board.
Compare the different estimates.

Tell the students how many shells are in the jar (to the nearest 10) and them to discuss if their estimate was close or far off.
Discuss – were most people close or far off?

Repeat this with different size jars and different materials in the jar. Over time develop the understanding that if the object is small, more will fit in the jar. If the object is big, less will fit in the jar.

Other Examples

This activity could also be done as a rotation. E.g., have 8 stations each with a different jar. In small groups, students move around each station and record an estimate to the nearest 10 or 100. Notice what students are recording/ discussing and choose some estimations to share back to the whole class that will allow a rich discussion about why we might agree or disagree with that estimation.

Curriculum Links

During the first three years
Use estimation to predict results and to check the reasonableness of calculations

Big Ideas

The base ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value.

Suggested Learming Outcomes

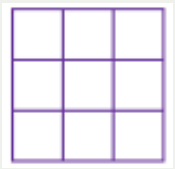
Estimate amounrs as numbers.

Compare amounts to numbers
(e.g. closer to 10, 20 or 100)

Mathematical Language

before, after, greater than, less than, left, right, ones, tens hundreds thousands

Drawing Arrays



How might we descibe this array? Could you draw it?

Arrays - drawn or printed.

Teacher Notes

The activity supports the development of students structural thinking. Students need multiple opportunities to practice drawing a range of arrays.

Instructions:

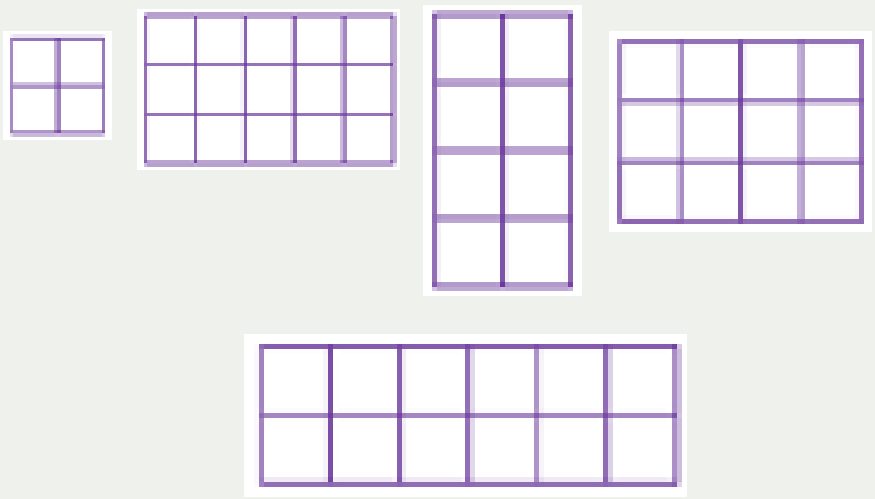
Display the array. Ask students “how can we describe this?”

Facilitate a conversation drawing on a range of student's ideas. Revoice these using correct mathematical language. E.g., Student: “it's got 3, and 3 and 3”. Teacher: “you’re saying there is one row of 3, two rows of 3, three rows of three. Is that right?”

Record ideas on the board, make the link between repeated addition and multiplication explicit. E.g., we can write 3 + 3 + 3, 3 x 3 or 3 groups of 3.

Ask students to draw the array. Allow sufficient time for students to attempt and refine their drawing.

Other Examples



Curriculum Links

During the first year
Multiply and divide using equal grouping or counting

During the second year
Multiply and divide using equal grouping or skip counting

By the end of year three
Multiply a one- or two-digit number by a one-digit number, using skip counting or known facts

Big Ideas

Numbers can be grouped in an infinite number of ways – the number in a set stays the same no matter how it is arranged or represented.

Suggested Learming Outcomes

Represent a grid in a structured way.

Explain how many groups are in an array.

Mathematical Language

Groups, array. multiplication, repeated additiotion, equality, communtative property

Arrays - Same and different

What is the same and what is different?

Teacher Notes

The purpose of this activity is to explore the commutative property of multiplication and engage in the mathematical practices of connecting situations and generalising findings.

Commutative Property: two numbers can be multiplied in any order, and it will not change the result. E.g., 7 x 2 = 14, 2 x 7 = 14, so 7 x 2 = 2 x 7

Instructions:

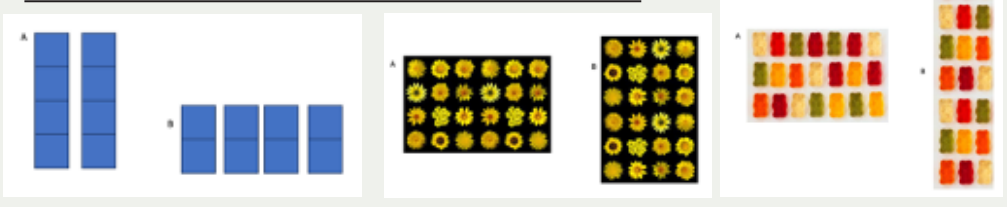
Display the image and ask students to think about what is the same and what is different.

Allow time for students to turn and talk.

Collect and record students' ideas. E.g.,

1. If not suggested by students, make the connection that these arrays show 3 x 4 (three groups of 4) or 4 x 3 (four groups of 3). Link to repeated addition if necessary.
2. Ask students "Will we still get the same total if we write 4 x 3 or 3 x 4?"
3. Discuss that this is called the commutative property. When we multiply two numbers the order doesn't matter, the answer will still be the same.

Other Examples



Curriculum Links

During the first year
Multiply and divide using equal grouping or counting

During the second year
Multiply and divide using equal grouping or skip counting

By the end of year three
Multiply a one- or two-digit number by a one-digit number, using skip counting or known facts

Big Ideas

For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra.

Suggested Learming Outcomes

Identify similarities and differences between two representations.

Use skip counting, groupings and multiplication

Mathematical Language

Groups, array, multiplication, repeated addition, equality, commutative property

Measurement Division

If we have 20 shells and put them into groups of 4. How many groups can we make??

Teacher Notes

Measurement division involves knowing the number of objects in each group, and finding how many groups we can make. To develop a conceptual understanding students will need to model measurement division using materials.

Instructions:

Give each pair of students a bag with 20 shells (objects).

Ask "if we put the shells into groups of 4, how many groups can we make?"

Allow time for students to model this division problem on materials. Notice if students are sharing out 1:1, or they are measuring out in 4's.

Highlight a group that has made 4's. E.g.,

Explicitly count the groups, 1 group of 4, 2 groups of 4 .... to 5 groups of 4.

Record 20 ÷ 4 = 5. Reinforce that we had 20 objects and put them into groups of 4. Now we have 5 groups.

Other Examples

We have 24 apples and put 6 into each bag. 24 ÷ 6 =
We have 14 cherries and put 2 on each cake. 14 ÷ 2 =
We have 30 children and sit 5 at each table. 30 ÷ 5 =
80 ÷ 5 =, 40 ÷ 10, 21 ÷ 3 =, 120 ÷ 40 =

Curriculum Links

During the first year
Multiply and divide using equal grouping or counting

During the second year
Multiply and divide using equal grouping or skip counting

By the end of year three
Multiply a one- or two-digit number by a one-digit number, using skip counting or known facts

Big Ideas

Objects in a set can be grouped and counted to get a final total.
Numbers can be grouped in an infinite number of ways – the number in a set stays the same no matter how it is arranged or represented.

Suggested Learming Outcomes

Solve simple division problems by measuring out groups

Count in groups

Mathematical Language

Divide, groups of, measure, share, total.

I wonder how many ways we can make...

I wonder how many ways we could make 36.
What could the number sentences be?

Teacher Notes

The purpose of this activity is to encourage students to think flexibly about number, and to explore some of the infinite ways a number can be represented.

Instructions:

"Today we are going to complete a challenge. I wonder how many ways we can make 36, what could the number sentences be?"

Allow students a short amount of time to record ideas with a partner (on a whiteboard/scrap paper/materials). Gather and record ideas from all the partners. E.g.,

Notice what students have done so far and ask a question that will exend thinking futhers e.g., "I wonder how else we could make 36 using subtraction?"

Allow a short amount of time for students to work together again. Collect and record new ideas.

Note: Students will often use addition or known multiplication facts to begin with. Ensure you ask questions that will encourage students to think more deeply. E.g.,

- Could we use repeated addition? Could we use division?
- Are there other ways we could use multiplication?
- Could we add three numbers instead of two?
- Is there a pattern we could use to find all the addition sentences?
- Is there a pattern we could use to find more multiplication sentences?

Other Examples

Continue to add to this over several days or assign as an independent activity.

Use an array of numbers between 1 and 1000.

Curriculum Links

During the first six months
Partition up to 5 objects, and then up to 10 objects, using a systematic approach and noticing patterns

During the first year
Partition and regroup up to 20 objects in different ways, using a systematic approach and noticing patterns

During the second year
Partition and regroup whole numbers up to at least 100, using a systematic approach and noticing patterns (e.g., 10 + _ = 70, 20 + _ = 70, 30 + _ = 70)

By the end of year three
Partition and regroup whole numbers up to at least 1,000, using a systematic approach and noticing patterns (e.g., 400 + 300 = _ , 350 + _ = 500)

Big Ideas

Numbers can be partitioned and recombined in different ways by using patterns.

Suggested Learning Outcomes

Group, partition, and recombine whole numbers up to 1,000

Mathematical Language

Addition, subtraction, multiplication, division, equal, equation.

Can you make...

How many ways can you make 20 using these numbers?

3	8	11	4	1
13	2	6	7	19

You make use these numbers more than once.

Teacher Notes

The focus of this activity is to explore making a target number through trial and error. Students may wish to use materials or a basic facts card to support them.

Instructions
"Our challenge today is to find out how many ways we can make 20 using only the numbers in the boxes. With your buddy see if you can record at least three different ways."

Ask each pair to share one way they found. Record on the board.

It is likely that students will first attempt this activity by adding up to 20. To extend thinking ask students "Can we use also use subtraction or multiplication to make 20?"

Allow students time to find other ways. Continue to ask questions that will extend thinking. E.g., "Do you think we could use division somehow?"

Continue to add to list of solutions over a few days or set as an independent investigation.
A few of the many possible solutions

13 + 7 = 20	19 + 1 = 20	11 + 8 + 1 = 20	6 x 2 = 12
12 + 8 = 20	3 x 7 = 20	21 – 1 =20	
8 x 2 = 16	11 x 3 = 33	11 x 2 = 22	8 x 3 = 24
16 + 4 = 20	33 – 13 = 20	22 – 2 = 20	24 – 4 = 20

Other Examples

This activity can be repeated with any target number to 1,000.

This can extend into an indepedent activity as well.

Curriculum Links

During the first six months
Join and separate groups of up to a total of 10 objects by grouping and counting

During the first year
Explore addition facts up to 10 and their corresponding subtraction facts (families of facts), including doubles and halves

During the second year
Recall addition facts up to 10, and explore addition facts up to 20 and their corresponding subtraction facts (families of facts), including doubles and halves

By the end of year three
Recall addition facts up to 20 and their corresponding subtraction facts (families of facts), including doubles and halves

Multiply and divide using equal grouping or skip counting or known facts

Big Ideas

Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Suggested Learning Outcomes

Add and subtract numbers to 20

Multiply single digit numbers

Mathematical Language

Add, subtract, multiply, divide, equals, equation, number words

Where is the maths...?

Where is the maths in this photo?

Materials - replace with one that suits your local context

Teacher Notes

The purpose of this activity is for students to practice forming a mathematical question. This activity can cover all strands of the mathematics curriculum (number, measurement, algebra, space, statistics & probability).

Instructions:

Today we are going to practice asking questions. What maths question can we ask about this picture?

Allow students time to turn and talk to a partner.

Collect and record questions. E.g.,

How many dumplings are there?
How many fit on the grill?
What is the price?

Ask a question that will encourage students to consider other areas of mathematics. E.g., "What could we ask about temperature in this picture?" or "What could we ask about length in this picture?"

To extend the activity, ask students to estimate (with reasoning) the answer to one of their questions

Other Examples

Repeat with any photo that will engage the students in your class.

Curriculum Links

During the first three years
Work with others to pose a question for investigation

Make connections with ideas in other learning areas and in familiar local contexts.

Big Ideas

The world is full of patterns and structures that we use mathematics and statistics to understand.
Mathematical practices are central to learning and doing mathematics.

Suggested Learning Outcomes

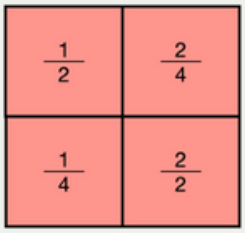
Form and ask a question

Identify mathematics in everyday contexts

Mathematical Language

Question, amount, price, size, shape, temperature, length, area, estimation.

Which one doesn't belong?



Which one does not belong and why?

Teacher Notes

The focus of this activity is on giving a mathematical reason. As well as realising there are multiple ways of examining things.

Instructions:

Tell students they need to look carefully at the four objects and decide which one doesn't belong and why. They must have a mathematical reason.

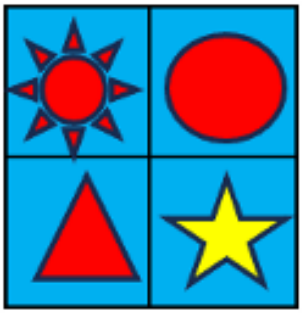
Give initial thinking time, then ask students to "turn and talk" to explain their idea to a partner, before sharing with the whole group.

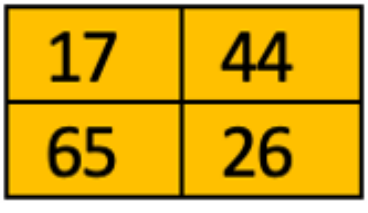
Reinforce that each reason is valid, and each object might not belong depending on what attribute is focused on.
Explicitly praise when students justify and explain their thinking "Wow, you are justifying your thinking".

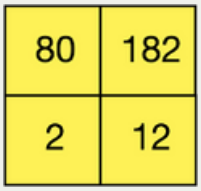
Other Examples

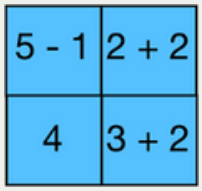
Multiple examples can be found online.

This coould focus on any area of mathematics such as shape, time, number etc.









Curriculum Links

During the first three years

Suggest connections between concepts, ideas, approaches, and representations

Present basic explanations and arguments for an idea, solution, or process.

Make connections with ideas in other learning areas and in familiar local contexts.

Big Ideas

The world is full of patterns and structures that we use mathematics and statistics to understand.

Mathematical practices are central to learning and doing mathematics.

Suggested Learming Outcomes

Notice similarities and differences between items

Give a mathematical reason as to why something is the same or different

Mathematical Language

Same, different, mathematical reason, because, less than, greater than, fraction, even, odd, total, add.

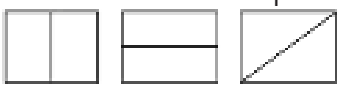
Making a half

How can we cut the cake in half?

Teacher Notes

Instructions:

Show students the picture of the cake and allow time for students to talk/ draw/ or cut a cake outline into halves.

Select students to share who have split their whole into two equal parts for example: 

Facilitate students to notice that when talking about fractions we always refer to the unit as one whole. Each of the halves must be equal (same size).

Record using the word half before introducing notation $\frac{1}{2}$

Other Examples

Repeat with other unit fractions (quarters, sixths, eighths etc.)

Avoid using circle shaped objects to partition.

Example:

Share this ribbon between 8 people. What would each piece look like as a fraction?

Curriculum Links

During the first three years
Identify, read, write, and represent halves

Big Ideas

A fraction describes the division of a whole (region, set, segment) into equal parts.

A whole can be divided (partitioned) into equal parts, e.g. one whole is equal to two half parts.

Each of those parts can be put back together to make a whole.

Suggested Learning Outcomes

Share a whole into two equal parts

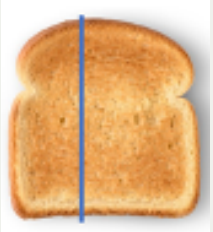
Put two equal parts (units) together to make one whole.

Count or add fractional parts to make one whole.

Mathematical Language

Whole, half, halves, fraction, share, fair, divide, same as, equal, more than, less than.

Is this half?



This toast is cut in half.
Do you agree or disagree? Explain why.

Teacher Notes

Instructions:

Show the picture and say "this toast is cut in half. Do you agree or disagree?"

Give students time to talk to a partner, then indicate using thumbs if they agree or disagree.

Select students to share their thoughts. Developing the understanding that each half must be of equal size. Therefore, we disagree with this statement because the two pieces are not equal.

Repeat with other examples that show/ & do not show equal parts. Cover thirds, quarters, sixths, eighths etc.

Other Examples

Repeat with other unit fractions (quarters, sixths, eighths etc.)

Avoid using circle shaped objects to partition.

This could be set up as an independent rotation activity using play dough or pre-printed images or shapes.

Curriculum Links

During the first three years:
Identify, read, write, and represent halves

Present basic explanations and arguments for an idea, solution, or process.

Big Ideas

A fraction describes the division of a whole (region, set, segment) into equal parts.

A whole can be divided (partitioned) into equal parts, e.g. one whole is equal to two half parts.

Each of those parts can be put back together to make a whole.

Suggested Learning Outcomes

Identify if a whole is divided into equal parts

Recognise halves, thirds, quarters, eighths of one whole

Agree or disagree with a statement using reasoning

Mathematical Language

Whole, half, halves, fraction, share, fair, divide, same as, equal, more than, less than.

Fraction of a set

With your partner find as many different ways you can share these candles equally?
What are all the different ways you can record and show halves, quarters and eighths.

Teacher Notes

The purpose of this activity is for students to find halves, quarters and eighths of a set of numbers.

Show students the picture of the candles and select students to share who have split their whole (eight candles) into two, four and eight equal parts.

Facilitate the students to notice that when talking about fractions we always refer to the unit whole as one or one whole and halves, quarters and eigths (not two pieces or bits). If students say two bits or two pieces informally revoice as two halves, four quarters, eight eighths and that they are both the same and equal.

In pairs have students think and share (allow older students to record, younger students record for them) all the ways half, quarter and eighths can be recorded or described as eg., half, two halves,., same as, two equal pieces, half of the whole group... do this for quarters and then eighths.

Record using the words half/quarter/eighth before introducing notation.

Extend the activity by asking the students what fractions are equivalent eg., Encourage the students to justify their thinking around why these are the same size fractions

Other Examples

Repeat this activity with different numbers of candles and different sized groups.

This is another activity that students can use independently

Curriculum Links

During the first year
Find a half or quarter of a set using equal sharing and grouping.

During the second year
Find a half and quarter of a set by identifying groups and patterns (rather than sharing by ones), and identify the whole set or shape when given a half or quarter

By the end of year three
Find a unit fraction of a whole number (e.g., one third of 15), and identify the whole set or amount when given a unit fraction (e.g., "1 quarter of the set is 3, what is the whole set?")

Big Ideas

A fraction describes the division of a whole (region, set, segment) into equal parts.

A whole can be divided (partitioned) into equal parts, e.g. one whole is equal to two half parts.

Each of those parts can be put back together to make a whole.

Suggested Learning Outcomes

Share a whole into two, four and eight equal parts

Put two, four and eight equal parts (units) together to make one whole.

Count or add fractional parts to make one whole.

Mathematical Language

Whole, half, halves, fourths, quarters, eighths, fraction, share, fair, divide.

How many are in the set?

If these three pineapples are one quarter of the set. Will there be nine in the whole set?
Explan why or why not?

Teacher Notes

The purpose of this activity is for students to find the whole set when given a fraction of it. Students practice explaining and justifying.

Instructions:

Show the pineapple question.

Give a short time for individual thinking, then ask students to explain their thinking to a buddy.

Encourage students to use a variety of representations eg. Materials, drawings, fraction tiles...

If the students do not use fraction tiles, then introduce them. This is a great visual to support all students to see the relationship between units and the whole.

Repeat multiple times with differing examples.

Other Examples

If three pineapple are one third of a set, how many pineapples are in a whole set?

If the whole is 12. Draw your own or use fraction tiles to show how many fractions you can make?

Curriculum Links

During the first year
Find a half or quarter of a set using equal sharing and grouping.

During the second year
Find a half and quarter of a set by identifying groups and patterns (rather than sharing by ones), and identify the whole set or shape when given a half or quarter

By the end of year three
Find a unit fraction of a whole number (e.g., one third of 15), and identify the whole set or amount when given a unit fraction (e.g., "1 quarter of the set is 3, what is the whole set?")

Big Ideas

A fraction describes the division of a whole (region, set, segment) into equal parts.

A whole can be divided (partitioned) into equal parts, e.g. one whole is equal to two half parts.

Each of those parts can be put back together to make a whole.

Suggested Learming Outcomes

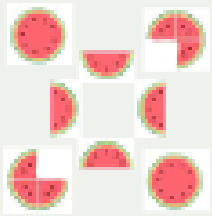
Put two, four and eight equal parts (units) together to make one whole.

Count or add fractional parts to make one whole.

Mathematical Language

Whole, half, halves, fourths, quarters, eighths, fraction, share, fair, divide.

How many wholes?



How many whole watermelons are in the photo?

Teacher Notes

Instructions:

Show the students the photo and ask them what they see. Listen for use of fractional language.

Let students work in pairs to work out how many there are. Notice who cuts $\frac{3}{4}$ into a $\frac{1}{2}$ and a $\frac{1}{4}$ You could have cut-up pieces for students to physically manipulate. Represent student thinking so all can see. Name and write the fraction parts. Write equations such as $\frac{1}{2} + \frac{1}{2} = 1$ whole, $\frac{3}{4} + \frac{1}{4} = 1$.

Extend thinking by asking what if the watermelon pieces were cut into thirds. What would that look like? How many halves / quarters / thirds make a whole?

Other Examples

Photo credit: Sakir Gökçebag (http://sakirgokcebag.com/PhotoPojects.aspx?d=05++WM&f=02-Sakir-Gokcebag-.jpg)

This activity can be used with fraction tiles to allow students to practice adding different fractions together.

Curriculum Links

During the first year
identify and represent halves and quarters as fractions of sets and regions, using equal parts of the whole

During the second year
identify, read, write (using symbols and words), and represent halves, quarters, and eighths as fractions of sets and regions, using equal parts of the whole

By the end of year three
Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line

Big Ideas

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit
A comparison of a part to the whole can be represented using a fraction.
A fraction describes the division of a whole (region, set, segment) into equal parts.

Suggested Learming Outcomes

Share a whole into equal parts.

Count or add fractional parts to make one whole.

Mathematical Language

Whole, half, halves, thirds, fraction, share, fair, divide, same as, equal.

Money - ordering

Put the coins in order from smallest to biggest.
Materials: play money or images of coins and notes.

Teacher Notes

The aim of this task is to explore the value of each New Zealand coin. Many students can have the misconception that if you have more coins you have more money.

Note this task follows on from the money sorting task prior.

Instructions:

Have materials (play money or printed pictures) and paper/pen/ whiteboards for students to record their ideas.

Ask the students to put the coins in order from smallest to biggest value.

Notice for student reasoning.

When selecting students to share their ideas, ask why the ten cents is small than the 20 cents etc.

Notice if anyone has the misconcpetion of coin size.

Other Examples

Continue this task with other groupings of coins.

This can also be an independent activity set up to explore.

Curriculum Links

During the first three years
Recognise and order New Zealand denominations up to $20 according to their value.

Big Ideas

For most money amounts, there are different, but finite combinations of currency that show the same amount; the number of coins in two sets does not necessarily indicate which of two sets has the greater value

Suggested Learming Outcomes

Recognise and name different denominations

Order denominations according to value

Mathematical Language

Money, currency, dollar, cent, join, add, separate, subtract, banknote, coin.

Money - How much money do I have?

How much money do I have?
Materials: play money or images of coins and notes.

Teacher Notes

The aim of this task is to encourage students to explore grouping in money e.g. coins that are the same, or group 2 x 20cent and 1 x 10 cents = 50cents.

Instructions:

Have materials (play money or printed pictures) and paper/pen/ whiteboards for students to record their ideas.

Ask the students to work out the total of the coins. Students may need enouragement to initally group coins that are the same.

Notice for student reasoning and students that have grouped in a systematic way that allows .

When sharing back ideas notate on the board
50 cents + 50 cents = $1

Ask the students: What way is easiest to group the coins? Why?

Other Examples

Do this task again with the same coins and this time ask - using these coins how many different ways could we make $1.

This can be used with different coins to highight different groupings.

Curriculum Links

During the first three years
Recognise and order New Zealand denominations up to $20 according to their value.

Make groups of 'like' denominations, and calculate their value.

Make amounts of money using one- and two-dollar coins and 5-, 10-, 20-, 50-, and 100-dollar notes.

Big Ideas

For most money amounts, there are different, but finite combinations of currency that show the same amount; the number of coins in two sets does not necessarily indicate which of two sets has the greater value

Suggested Learming Outcomes

Recognise and name different denominations

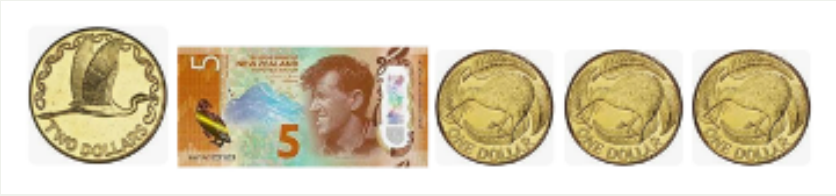
Order and group denominations according to value

Add denominations of the same value

Mathematical Language

Money, currency, dollar, cent, join, add, separate, subtract, banknote, coin.

Money (Is it $5)



I think the gold coins are woth the same amount as the $5 note. Do you agree or disagree?

Materials: play money or images of coins and notes.

Teacher Notes

Instructions:

Before starting, check that students know the names of the coins/notes and their value.

Have materials (play money or printed pictures) and paper/pen/whiteboards for students to record their ideas.

Encourage students in their groups to construct a sound mathematical explanation to justify their thinking.

Notice students who have a misconception about the value of money e.g. because you have four coins you have more money than one note (counting the number of items).

Record as a number sentence $2 + $1 + $1 +$1 = $5

Other Examples

You may also like to get students to set up 'play shops' as an independent station to explore money further.

Curriculum Links

During the first three years

Recognise and order New Zealand denominations up to $20 according to their value.

Make groups of 'like' denominations, and calculate their value.

Make amounts of money using one- and two-dollar coins and 5-, 10-, 20-, 50-, and 100-dollar notes.

Big Ideas

For most money amounts, there are different, but finite combinations of currency that show the same amount; the number of coins in two sets does not necessarily indicate which of two sets has the greater value

Suggested Learning Outcomes

Recognise and name different denominations

Make amounts of $1, $2, $5, $10

Join and separate money using different denominations

Mathematical Language

Money, currency, dollar, cent, join, add, separate, subtract, banknote, coin.

Money (Making $10)

How can you make $10 with notes or coins?
Materials: play money or images of coins and notes.

Teacher Notes

Instructions:

Before starting, check that students know the names of the coins/notes and their value.

Have materials (play money or printed pictures) and paper/pen/whiteboards for students to record their ideas.

Allow students time to explore different ways of making $10. Share back and record the different ways.

Look for any pairs who use a systematic way of recording different combinations, highlight their system.

Choose two different combinations that make $10 (e.g., $5 + $5 = $10 and $2 + $2 + $2 + $2 + $2) and put them side by side in two piles. Ask students "which pile would you rather have any why?"

Notice students reasoning. Does anyone have a misconception that the 5 coins is worth more money than 2 notes.

Other Examples

How many ways can you make $15 using coins?
How many ways can you make $20 using coins and notes?
How many ways can you make $50 using notes?
How many ways can you make $100 using notes?

Curriculum Links

During the first three years
Recognise and order New Zealand denominations up to $20 according to their value.

Make groups of 'like' denominations, and calculate their value.

Make amounts of money using one- and two-dollar coins and 5-, 10-, 20-, 50-, and 100-dollar notes.

Big Ideas

For most money amounts, there are different, but finite combinations of currency that show the same amount; the number of coins in two sets does not necessarily indicate which of two sets has the greater value

Suggested Learming Outcomes

Recognise and name different denominations

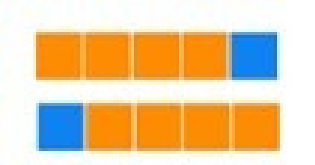
Make amounts of $1, $2, $5, $10

Join and separate money using different denominations

Mathematical Language

Money, currency, dollar, cent, join, add, separate, subtract, banknote, coin.

Commutative Property of Addition



Look at the coloured blocks below, what do you notice about the patterns?

Here are the number sentences that match the block patterns. Can you explain how they match?
4 + 1 = 5, 1 + 4 = 5

Materials: block images or multilink cubes

Teacher Notes

Key Concepts

Equality: the equals sign represents equality between the left and right side of the equation (many students believe = is a command to calculate an answer, which is unhelpful).

Commutative Property: a + b = b + a or 4 + 1 = 4 + 1. We can add a set of numbers in any order, and the sum will never change. This does not hold for subtraction.

Inverse Relationship: Subtraction is the inverse operation of addition (a+b=c so c-b=a). Addition facts give rise to families of facts that use subtraction.

Generalising: this begins by noticing a pattern over a few specific instances, then establishing properties that hold for all instances.

Instructions:

Present the first block pattern (Part 1) to students and ask "What do you notice? Students turn and talk to a partner. Listen to and record student responses.

Encourage explanations or reasoning that draws on patterning, equality or relationships. Ensure one or more of the key concepts are made explicit.

Present the number sentences (Part 2). Students discuss and justify how the picture of the blocks matches the number sentence with a partner before sharing back to the whole group.

Curriculum Links

During the first year
Explore addition facts to 10.

During the second year
Recall addition facts to 10 and explore addition facts to 20.

By the end of year three
Recall addition facts to 20.

Big Ideas

The commutative property applies to addition (e.g., 2 + 5 = 5+ 2)

Suggested Learning Outcomes

Read and write addition and subtraction equations.

Explain the inverse relationship between addition and subtraction.

Follow and apply a pattern

Mathematical Language

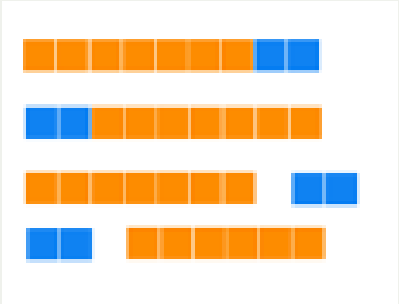
Number words, add, subtract, equals, equality, balance, symbols, commutative property, pattern, inverse, family of facts

Teacher Notes continued

Introduce the key concept of the commutative property in addition.
To extend this further ask: “Would this pattern work for 100 + 400?” or “Who can think of another pattern we could try?”

Other Examples

Look at the coloured blocks below, what do you notice about the pattern?



Match the number sentences with the pattern blocks?

9 – 2 = 7
2 + 7 = 9

Create as many visual patterns for the addition sentences with a partner?

7 + 3 = 10
3 + 7 = 10

Can you fill in the missing gaps in the number sentences?

16 + 10 = 26
10 + ___ = 26

70 + 30 = 100
__ + 70 = ___
___ + 200 = 1000
800 + ____ = 1000

Problem String (Commutative Property)

4 + 3 =
3 + 4 =

4 + 13 =
13 + 4 =

4 + 23 =
23 + 4 =

4 + 53 =
53 + 4 =

4 + 103 =
103 + 4 =

Teacher Notes

Commutative Property: a + b = b + a or 5 + 9 = 9 + 5. We can add a set of numbers in any order, and the sum will never change.

Have materials such as number lines, 100s boards, place value houses, pre-printed tens frames etc. available for students to use or to represent big ideas

Use talk moves to facilitate participation and develop understanding. Encourage students to repeat key ideas as their peers share.

Instructions:
Present students with the first equation in the string.

Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy.
Listen to/ record student responses on board.

Continue this process for each equation in the string.

Press for explanations or reasoning that draws on patterning, equality, place value or relationships.

Ensure one or more of the key concepts are made explicit.

Curriculum Links

During the first year
Explore addition facts to 10.

Partition and regroup up to 20 objects in different ways, using a systematic approach and noticing patterns.

During the second year
Recall addition facts to 10 and explore addition facts to 20.

Partition and regroup whole numbers up to at least 100, using a systematic approach and notcing patterns.

By the end of year three
Recall addition facts to 20.

Partition and regroup whole numbers up to at least 1000 using a systematic approach noticing patterns

Big Ideas

The commutative property applies to addition (e.g., 2 + 5 = 5+ 2)

Suggested Learming Outcomes

Recognise equations that are equal in value

Explain that changing the order of two numbers when adding them does not change the end result

Mathematical Language

Commutative property, add, equation, equals, relationship, place value, ones, tens.

Teacher Notes continued

To further extend this task: “Would this pattern work for 4+503? 4+1003?” etc. or “Who can think of another pattern we could try?” Once students have noticed the commutative property this could also be represented as an equation e.g. 3+4 = 4+3

Other Examples

Double digit numbers e.g.

30 + 20 =
20 + 30 =

40 + 50=
50 + 40=

60 + 30 =
30+60 =

Or

12 + 13 =
13 + 12 =

22 + 23 =
23 + 22 =

32 + 33 =
33 + 32 =

Early Multiplication e.g.

2 x 3 =
3 x 2 =

2 x 4 =
4 x 2 =

2 x 8 =
8 x 2 =

Bonds to 10 e.g.

6 + 4 =
4+ 6 =

16 + 4 =
4 + 16 =

26 + 4 =
4 + 26 =

36 + 4 =
4 + 36 =

Problem String (+4)

6 + 4 =
16 + 4=
26 + 4 =
36 + 4 =
46 + 4 =
96 + 4 =
106 + 4 =
226 + 4 =

Teacher Notes

Have materials such as number lines, 100s boards, place value houses, pre-printed tens frames etc. available for students to use or to represent big ideas.

Use talk moves to facilitate participation and develop understanding. Encourage students to repeat key ideas as their peers share.

Instructions

Present students with the first equation in the string. Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy. Listen to/ record student responses on board.

Continue this process for each equation in the string.

Press for explanations or reasoning that draws on patterning, equality, place value or relationships. Ensure one or more of the key concepts are made explicit. To further extend this task: "Would this pattern work for 4+503? 4+1003?" etc.

Other Examples

Place Value increases 10 x e.g.

2 + 3 =
20 + 30 =
200 + 300 =
2000 + 3000 =

Or
2 + 3 =
20 + 3 =
200 + 3 =
2000 + 3 =

Bonds to 100 e.g.
60 + 40 =
160 + 40 =
260 + 40 =
360 + 40 =

Subtraction
7 - 2 =
17 - 2 = etc

Multiplication
2 x 3
20 x 3 etc

Curriculum Links

During the first year
Explore addition facts to 10.

Partition and regroup up to 20 objects in different ways, using a systematic approach and noticing patterns.

During the second year
Recall addition facts to 10 and explore addition facts to 20.

Partition and regroup whole numbers up to at least 100, using a systematic approach and notcing patterns.

By the end of year three
Recall addition facts to 20.

Partition and regroup whole numbers up to at least 1000 using a systematic approach noticing patterns

Big Ideas

The commutative property applies to addition (e.g., 2 + 5 = 5+ 2)

Suggested Learming Outcomes

Recognise equations that are equal in value

Explain that changing the order of two numbers when adding them does not change the end result

Mathematical Language

add, equation, equals, relationship, place value, ones, tens,

Problem String (Repeated addition and multiplication)

2 + 2 =
2 x 2 =
2 + 2 + 2 =
3 x 2=
2+2+2+2=
4 x 2 =
2+2+2+2+2=
5 x 2=

10 x 2=
13 x 2=

Teacher Notes

Provide materials [e.g. 100s board, counters, unifix cubes, happy hundreds board, numicon] for students if needed. Use a representation to model the big idea.

Use talk moves to facilitate participation and develop understanding. Encourage students to repeat key ideas as their peers share.

Instructions

Present students with the first equation in the string. Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy. Listen to/ record student responses on board.

Continue this process for each equation in the string. Press for explanations or reasoning that draws on patterning, equality, place value or relationships. Ensure one or more of the key concepts are made explicit.

Students can solve in any way that makes sense to them, including using materials, counting on fingers, skip-counting, using known facts, by using previous equations in string to solve e.g. 10x2 is (5x2) + (5x2); 13x2 is (10x2) + (3x2)

Curriculum Links

During the first year
multiply and divide using equal grouping or counting.

During the second year
multiply and divide using equal grouping or skip counting.

By the end of year three
Multiply a one or two digit number by a one digit number, using skip counting or known facts.

Big Ideas

Multiplication and division involve recognising and working with groups, the number of groups, and the total

Suggested Learming Outcomes

Recognise equations that are equal in value

Explain that changing the order of two numbers when adding them does not change the end result

Mathematical Language

equation, sum, product, addition, add, multiplication, multiply, groups of, skip-count, repeated addition, double.

Other Examples

Other multiplication tables e.g.	Other multiplication tables e.g.
5+5= 2x5=	10+10= 2x10=
5+5+5= 3x5=	10+10+10= 3x10=
5+5+5+5= 4x5=	10+10+10+10= 4x10=
5+5+5+5+5= 5x5=	10+10+10+10+10= 5x10
10x5= 13x5=	10x10 13x10

Problem String (Multiplying by Two)

2 x 2 =
10 x 2 =
12 x 2 =

4 x 2 =
20 x 2 =
24 x 2 =

6 x 2 =
40 x 2 =
46 x 2 =

53 x 2 =

Teacher Notes

Provide materials [e.g. 100s board, counters, unifix cubes, happy hundreds board, numicon] for students if needed. Use a representation to model the big idea: draw an array.

Students can solve in any way that makes sense to them, including using materials, counting on fingers, skip-counting, using known facts, by using previous equations in string to solve e.g. 20x2 is (10x2) + (10x2)

Instructions

Present students with the first equation in the string. Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy. Listen to/ record student responses on board.

Continue this process for each equation in the string. Press for explanations or reasoning that draws on patterning, equality, place value or relationships. Ensure one or more of the key concepts are made explicit.

To further extend this task: "Would this relationship work for 47 x 2? or 124 x 2 etc.

Other Examples

3 x 5 =
10 x 5 =
13 x 5 =

8 x 5 =
10 x 5 =
18 x 5 =

6 x 5 =
20 x 5 =
26 x 5 =

33 x 5 =
Repeat using other multiplication tables.

Curriculum Links

During the first year
multiply and divide using equal grouping or counting.

During the second year
multiply and divide using equal grouping or skip counting.

During the third year
Multiply a one or two digit number by a one digit number, using skip counting or known facts.

Big Ideas

Multiplication and division involve recognising and working with groups, the number of groups, and the total

Suggested Learming Outcomes

Multiply by grouping and using number patterns

Partition a two digit number into tens and one to multiply

Use known multiplication facts to work out the product of unknown facts

Mathematical Language

equation, factor, product, multiplication, skip-count, repeated addition, place value, tens, one, multiply.

Problem String (Division)

4 ÷ 2 =
10 ÷ 2 =
14 ÷ 2 =

6 ÷ 2 =
30 ÷ 2 =
36 ÷ 2 =

8 ÷ 2 =
50 ÷ 2 =
58 ÷ 2 =

86 ÷ 2 =

Teacher Notes

Provide materials [e.g. 100s board, counters, unifix cubes, happy hundreds board, numicon] for students if needed. Use a representation to model the big idea: draw an array.

Students can solve in any way that makes sense to them, including using materials, counting on fingers, skip-counting, using known facts.

Instructions

Present students with the first equation in the string. Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy. Listen to/ record student responses on board.

Continue this process for each equation in the string. Press for explanations or reasoning that draws on patterning, equality, place value or relationships. Ensure one or more of the key concepts are made explicit.

To further extend this task: "Would this relationship work for 98÷2? 124÷2?" etc.

Other Examples

3 ÷ 3 =
30 ÷ 3 =
33 ÷ 3 =

6 ÷ 3 =
90 ÷ 3 =
96 ÷ 3 =

12 ÷ 3 =
30 ÷ 3 =
42 ÷ 3 =

78 ÷ 3 =

Repeat using other division tables.

Curriculum Links

During the first year
M*ultiply and divide using equal grouping or counting.*

During the second year
Multiply and divide using equal grouping or skip counting.

During the third year
Multiply a one or two digit number by a one digit number, using skip counting or known facts.

Big Ideas

Multiplication and division involve recognising and working with groups, the number of groups, and the total

Suggested Learning Outcomes

Divide by grouping and using number patterns

Partition a two digit number into tens and one to divide

Use known division facts to work out the quotient of unknown facts.

Mathematical Language

equation, place value, partition, tens, one, divide, division, divisor, dividend, quotient.

Problem String (Multiplying by Five)

4x5=
5x4=

7x5=
5x7=

9x5=
5x9=

20x5=
5x20=

Teacher Notes

Provide materials [e.g. 100s board, counters, unifix cubes, happy hundreds board, numicon] for students if needed. Use a representation to model the big idea: draw an array.

Commutative Property: a x b = b x a or 5 x 9 = 9 x 5. We can multiply a set of numbers in any order, and the product will never change

Instructions

Present students with the first equation in the string. Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy. Listen to/ record student responses on board.

Continue this process for each equation in the string. Press for explanations or reasoning that draws on patterning, equality, place value or relationships. Ensure one or more of the key concepts are made explicit.

To further extend this task: “Would this relationship work for 87 x 5? 5 x 87?” etc.

Once students have noticed the commutative property this could also be represented as a balanced equation e.g. 5x3 = 3x5 and a generalised equation with variables axb=bxa

Other Examples

Repeat using other multiplication tables.

Curriculum Links

During the first year
Multiply and divide using equal grouping or counting.

During the second year
Multiply and divide using equal grouping or skip counting.

During the third year
Multiply a one or two digit number by a one digit number, using skip counting or known facts.

Big Ideas

Multiplication and division involve recognising and working with groups, the number of groups, and the total

Suggested Learming Outcomes

Multiply by grouping and using number patterns

Recognise equations that are equal in value

Explain that changing the order of two factors when multiplying them does not change the end product

Mathematical Language

equation, factor, product, multiplication, multiply, commutative property.

Problem String (Inverse)

4 x 2 =
2 x 4 =
8 ÷ 4 =
8 ÷ 2 =

8 x 2 =
2 x 8 =
16 ÷ 2 =
16 ÷ 8 =

2 x 10 =
10 x 2 =
20 ÷ 2 =
20 ÷ 10 =

2 x 24

Teacher Notes

Provide materials [e.g. 100s board, counters, unifix cubes, happy hundreds board, numicon] for students if needed. Use a representation to model the big idea: draw an array.

Inverse operations are opposite operations. They are the operation that reverses the effect of another operation.

Instructions

Present students with the first equation in the string. Turn and talk with a buddy. Listen to/ record student responses on board.

Present the students with the next equation in the string. Ask them what do you notice? Turn and talk with a buddy. Listen to/ record student responses on board.

Continue this process for each equation in the string. Press for explanations or reasoning that draws on patterning, equality, place value or relationships. Ensure one or more of the key concepts are made explicit.

To further extend this task: “Would this relationship work for 87 x 5? 5 x 87?” etc.

Once students have noticed the commutative property this could also be represented as a balanced equation e.g. 5x3 = 3x5 and a generalised equation with variables axb=bxa

Other Examples

Repeat using other multiplication tables.

Curriculum Links

During the first year
Multiply and divide using equal grouping or counting.

During the second year
Multiply and divide using equal grouping or skip counting.

By the end of year three
Multiply a one or two digit number by a one digit number, using skip counting or known facts.

Big Ideas

Multiplication and division involve recognising and working with groups, the number of groups, and the total

Suggested Learming Outcomes

Multiply by grouping and using number patterns

Recognise equations that are equal in value

Explain that changing the order of two factors when multiplying them does not change the end product

Mathematical Language

equation, factor, product, multiplication, multiply, inverse, relationship, divide, division, quotient, dividend, divisor.

Equality

4 + 2 = ___ + 3
8 + 4 = ___ + 5
11 + 7 = ___ + 10
54 + 18 = ___ + 20

What is the missing number and why?

Teacher Notes

The focus of this task is on the equals sign as showing a balance/relationship. Use arrows and notation to show relationships on the equations to the students. Reinforce the idea of balance across the equals sign and that = means the same as.

Instructions:

Ask students what number goes in the gap and how do they know?

When a student responds/you have chosen a student, encourage other students to agree or disagree with the maths reasoning using their thumbs (two thumbs together they agree, two thumbs apart is disagree).

Expect students to explain why they agree or disagree to promote mathematical practices.

Ensure that students understand what true and false means. Introduce notation of not equal (≠) for the number sentences that they think are false.

Students may begin by demonstrating misconceptions (9 + 6 = 15 + 4 is true because 9 + 6 = 15). This can be used to position students to agree/disagree.

This starter is a good indepedent task once the big idea has been intentionally taught.

Students may also write their own equality statements for their peers to solve.

Curriculum Links

During the first year
Solve true or false sentences and open number sentences using one digit numbers.

During the second year
Solve true or false statements and open number sentences using two digit numbers

During the third year
Solve true or false statements and open number sentences using an understaning of the equal sign.

Big Ideas

Equations show relationships of equality between parts on either side of the equal sign. The properties of equality are: If the same real number is added or subtracted to both sides of an equation, equality is maintained; If both sides of an equation are multiplied or divided by the same real number (not dividing by 0), equality is maintained; Two quantities equal to the same third quantity are equal to each other.

Suggested Learming Outcomes

Solve equivalence problems and explain and justify the solutions.

Understand the relationship across the equal sign is a statement of balance.

Mathematical Language

equation, factor, product, multiplication, multiply, inverse, relationship, divide, division, quotient, dividend, divisor.

Other Examples

 = 2

Agree or disagree? What could you do to agree with this?
(3-1 = 2, or 2 + 1 = 3)
Teacher records equation on the board to support students in understanding what they have said and how it is recorded mathematically.

9 + 4 = 8 + 5
Agree or disagree? Why? Without calculating an answer why do you agree/ disagree?

(note students who say they disagree because 8 + 4 = 12. These students require further opportunities to consolidate relational understandings e.g., balance across the equal sign).

17 + 19 = 27 + ____?
What number would go in the space? Agree or disagree? Why? Without calculating an answer why do you agree/ disagree?

9 = 9
Agree or disagree? Why?

(note students who say they disagree because and equation isn't written like that. These students require further opportunities to consolidate relational understandings e.g., balance across the equal sign).

5 x 3 = 3 x 3 x 3 x 3 x 3
Agree or disagree? Why?
Without calculating an answer why do you agree/ disagree?

(note only use multiplicative when students have an understanding of 'groups of'.

Use a variety of numbers and letters to consolidate this understanding.

Overlapping Circles

There are 5 regions in these circles.
Where could you place the digits 1 – 5 so each circle has the same value?

Teacher Notes

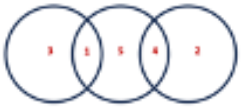
Students will need to use trial and error and/or materials to find possible solutions.

Instructions:

Clearly show the five regions in the over lapping circles.

Explain that only one digit can be placed in each region and the regions making each whole circle will be added together. We are aiming for each whole circle to have the same total.

Allow time for students to experiment arranging the numbers in different places.

Notice how students are attempting the task. Validate incorrect solutions as a valuable part of the investigation process. This could be us  *disagree if the totals are equal. E.g.,*

$3+1=4$
$1+5+4=10$
$4+2=6$

Do we agree or disagree that each circle has an equal total? Why/why not? What numbers do you think we could move in our next attempt to make it equal?

If a solution is found, highlight how the total number in each circle is equal (even though the sum looks different).
5 + 1 = 6 1 + 3 + 2 = 6 2 + 4 = 6

Other Examples

2,3,4,5,7	2,4,6,8,10
1,4,16,17,20	5,10,15,20,25
3,5,15,18,20	3,6,9,12,15

Investigate: will it work for any 5 consecutive numbers like it worked for 1,2,3,4,5? Why or why not?

Investigate: will it work for the first 5 numbers in any given counting sequence (e.g., counting by 4's, counting by 10's)? Why or why not?

Curriculum Links

During the first six months
partition up to 5 objects and then up to 10 objects.

During the first year
Partition and regroup up to 20 objects in different ways.

During the second year
Partition and regroup whole numbers up to at least 100.

During the third year
Partition and regroup whole numbers up to at least 1000.

Big Ideas

A quantity (whole) can be decomposed into different parts, the parts can be composed to form the whole.

Suggested Learming Outcomes

Investigate how to place the numbers in different ways

Find and explain groupings that are equal in total

Mathematical Language

Equal, add, total, digits, trial and error.

Number Bonds

Part 1: Look at the following number sentences. What do you notice? What do you wonder?

9 + 5 = 14
14 - 9 = 5
14 = 5 + 9
14 - 5 = 9
14 = 9 + 5

Part 2: Using the pattern above what number sentences would go with... 9 + 7 = 16

Teacher Notes

Key Concepts

Equality: the equals sign represents equality between the left and right side of the equation (many students believe = is a command to calculate an answer, which is unhelpful).

Commutative Property: a + b = b + a or 5 + 9 = 9 + 5. We can add a set of numbers in any order, and the sum will never change. This does not hold for subtraction.

Inverse Relationship: Subtraction is the inverse operation of addition (a+b=c so c-b=a). Addition facts give rise to families of facts that use subtraction.

Generalising begins by noticing a pattern over a few specific instances, then establishing properties that hold for all instances.

Instructions:

Present the first set of number sentences (Part 1) to students and ask "What do you notice? What do you wonder? Students turn and talk to a partner.

Listen to/ and record student responses during a share back
.
Press for explanations or reasoning that draws on patterning, equality or relationships. Ensure one or more of the key concepts are made explicit.

Present 9+7 =16 (Part 2). Students to record other number sentences that follow this pattern. Remind students there is no need to calculate.

To extend this further ask: "Would this pattern work for 900 + 700?" or "Who can think of another pattern we could try?"

Curriculum Links

During the first year
Explore number facts up to 10 amd their corresponding subtraction facts.

During the second year
Recall addition facts up to 10 and explore addition facts up to 20 and their corresponding subtraction facts.

During the third year
Recall addition facts up to 20 and their corresponding subtraction facts.

Big Ideas

The commutative property applies to addition (e.g. 2 + 5 = 5 + 2)

Suggested Learming Outcomes

Recognise expressions that are equal in value.

Read and write addition and subtraction equations.

Explain the inverse relationship between addition and subtraction.

Follow and apply a pattern

Mathematical Language

Number words, add, subtract, equals, equality, balance, commutative property, pattern, inverse, family of facts.

Other Examples

Bonds with 5: e.g.,
5 + 2 = 7
7 – 5 = 2
7 = 5 + 2
7 – 2 = 5
7 = 2 + 5

5 + 3 = 8 ...

Teen facts: e.g.,
10 + 3 = 13
13 –10 = 3
13 = 10 + 3
13 – 3 = 10
13 = 3 + 10

10 + 7 = 17 ...

Bonds to 10: e.g.,
4 + 6 = 10
10 – 4 = 6
10 = 4 + 6
10 – 6 = 4
10 = 6 + 4

5 + 5 = 10 ...

Double Digits: e.g.,
22 + 12 = 34
34 – 22 = 12
34 = 22 + 12
34 – 12 = 22
34 = 12 + 22

22 + 14 = 36 ...

Double Digits: e.g.,
22 + 12 = 34
34 – 22 = 12
34 = 22 + 12
34 – 12 = 22
34 = 12 + 22

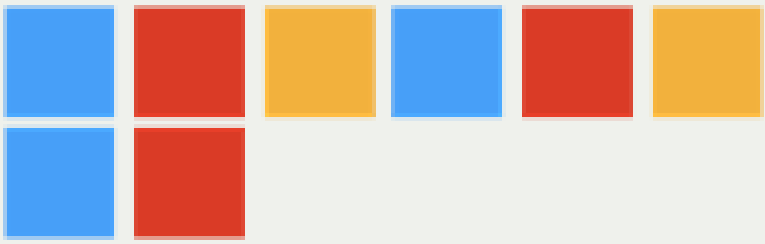
22 + 14 = 36 ...

Hundreds and Thousands: e.g.,
400 + 600 = 1000
1000 – 400 = 600
1000 = 400 + 600
1000 – 600 = 400
1000 = 600 + 400

400 + 700 = 1100 ...

This is another activity that once intentionally taught can be set up as a fast finisher activity or indepdent tasks.

Representing Patterns



Here is a pattern.
What do you notice?
How could you represent this pattern in a different way?

Teacher Notes

Instructions:

For this starter use a simple three unit of repeat pattern. You could draw this pattern or have it made with materials.

Initially ask the students "What do you notice about this pattern?"

Encourage the students to turn and talk and then select students to share back key mathematical ideas.

Encourage other students to repeat these ideas as they are being shared.

Ask the students "If we had to make this same pattern but we only had our blue pens (or another material) how could we make it?"

Encourage students to share their ideas and notice what students are discussing.

Share back or prompt the students to discuss using numbers or letters etc to represent this pattern.

Extend the discussion by asking, could it be represented like this: a a a, b b b, or 1,2,3,4,5,6,7,8?

Encouraging the students to justify why the pattern may be represented as 123,123,12 or abc,abc,ab.

Explicitly praise when students explain and justify their thinking.

Curriculum Links

During the first six months
Copy, continue, create and describe a repeating pattern with two elements.

During the first year
Copy, continue, create and describe a repeating pattern with three elements.

During the second year
Recognise and describe the unit of repeat in a repeating pattern.

During the third year
Recognise, continue and create repeating and growing patterns, and describe a rule to explain a pattern.

Big Ideas

Patterns can be made of numeric or spatial elements in a sequence governed by a rule.

Suggested Learming Outcomes

Describe a pattern.

Represent a pattern using a variety of materials or symbols.

Justify pattern reasoning.

Mathematical Language

Pattern, repeating pattern, unit of repeat, element, sequence, predict, rule, growing pattern,

Other Examples

Use materials from around the classroom to make different patterns and varying units of repeat.

Such as:

Give other patterns such as:

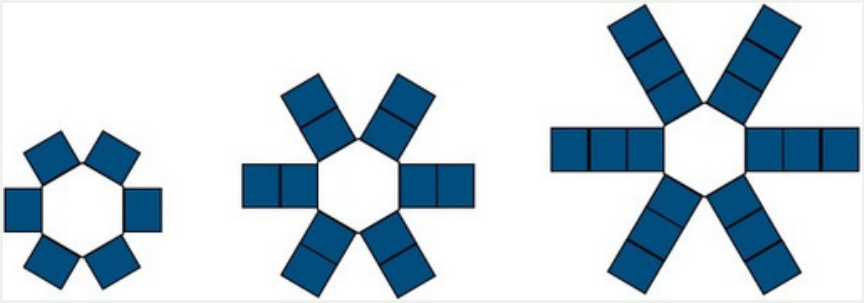
a b a b a b a b

(ask students to represent using colours or shapes on a whiteboard- with a buddy)

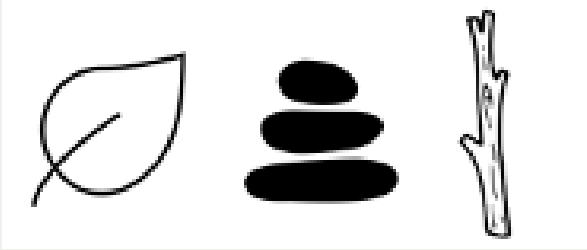
1 2 2 3 1 2 2 3 1 2 2 3

(ask students to represent using colours or shapes on a whiteboard- with a buddy)

Extend representing patterns by using growing patterns. How could you represent this growing pattern using letters or numbers?



Patterns in Nature



Here is a pattern.
What do you notice?

Materials - use objects from local environment

Teacher Notes

Instructions:

Get students to sit around the edge of the mat. Place the found objects in a repeating pattern in the middle (e.g. leaf, rock, stick, leaf, rock stick). Keep some aside to add on later.

Ask students to turn and talk with a partner to answer the following questions.

What do you notice is happening?

What is the unit of repeat?

What would come next? Why? (students could then place the next element/s)

What would the 14th object look like? How do you know?

Get students to close their eyes while you remove an element/s from the pattern. Then get them to talk about what's missing. Expect students to explain and justify how they know.

Other Examples

Note that a pattern could have two elements (e.g. stick, rock, stick rock) or three or more elements (stick, rock, leaf, stick, rock, leaf).

As students become confident with 2 and 3 element patterns, you can challenge them with patterns with more elements.

Note: As an independent activity students could create their own patterns to be shared during the conceptual staters.

Curriculum Links

During the first six months
Copy, continue, create and describe a repeating pattern with two elements.

During the first year
Copy, continue, create and describe a repeating pattern with three elements.

During the second year
Recognise and describe the unit of repeat in a repeating pattern.

During the third year
Recognise, continue and create repeating and growing patterns, and describe a rule to explain a pattern.

Big Ideas

Patterns can be made of numeric or spatial elements in a sequence governed by a rule.

Suggested Learming Outcomes

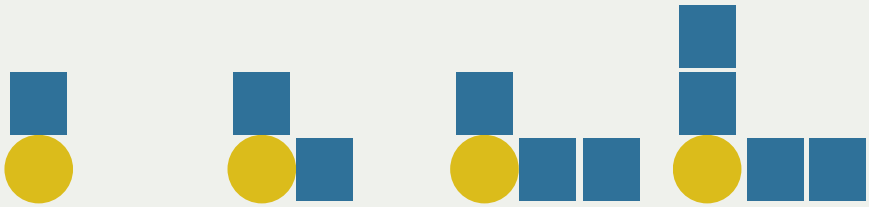
Copy, continue, create, and describe a repeating pattern with three elements, and identify missing elements in a pattern

Use both the unit of repeat and the ordinal position (e.g., first, second, and third) of a repeating pattern to predict further elements

Mathematical Language

Pattern, repeating pattern, unit of repeat, element, sequence, predict, rule, growing pattern.

Constant and Variation



Look at how this pattern grows.
What do you notice?
What is staying the same and what is changing?

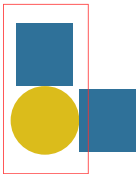
Teacher Notes

The focus of this task is on noticing what part of the pattern is staying the same (constant) and what part of the pattern is changing (variable). Students can then use this to predict what near and far patterns might look like.

Instructions:

Display image and ask students to turn to a partner and talk about what they notice.

Ask students "what is staying the same". Discuss ideas and annotate on a diagram (circling the circle and square that are the constant:

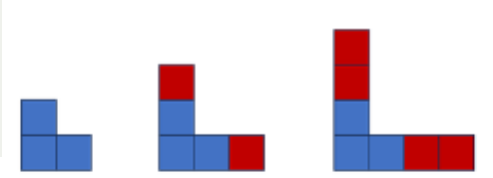


Ask students "what is changing?" and "how is it changing?". Allow time for students to turn and talk. Annotate the change on the diagram in a different colour.

Ask students to summarise in their own words what is staying the same and what is changing. E.g., "The first two shells are always the same. Each time 1 more is added on the right." Tell your partner what you think Pattern 4 will look like (or Pattern 5, Pattern 10, Pattern 50 etc).

Other Examples

Create a series of growing patterns to continue this understanding. This can be done using materials within the classroom e.g.



Curriculum Links

During the third year
Regosnise, continue and create repeating and growing patterns, and describe a rule to explain a pattern.

Big Ideas

Patterns can be made of numeric or spatial elements in a sequence governed by a rule.

Suggested Learming Outcomes

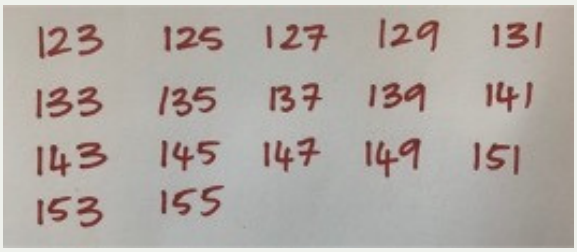
Identify how a pattern is staying the same or changing

Predict what further patterns will look like.

Mathematical Language

Recognise

Choral Counting



Example: count in 2's starting from 123

Teacher Notes

Choral Counting: extends "rote" counting by recording the count and allowing students opportunities to consider what they notice about the number sequence. Through this activity students can identify patterns and develop understandings about the structure of our number system.

Key questions to ask students: "What do you notice?", "What patterns can you see?", "Why do you think that?", "What do you think would go here and why?"

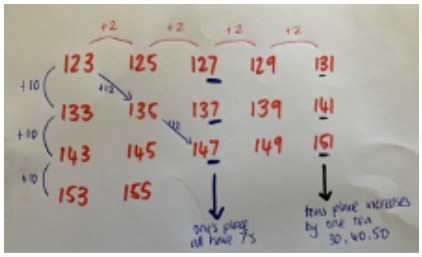
Instructions:

Tell students they are all going to count together out loud in 2's starting at 123.
Note: it is not expected that all children will "know" this sequence. Increase or reduce teacher scaffolding as needed to support students participating in the count.

As students count, record the numbers in a structured table as per the photo above. Pause/restart/repeat as needed to ensure participation. Stop once you get to 155.

Ask students "what do you notice about the numbers?", "what patterns do you notice". Give wait time for individual thought, or for think, pair, share.

Collect the student's responses and annotate thinking on the written count. Reinforce the language of place-value and show on place-value materials if needed.



Ask students "What number do you think will be underneath 153? Accept all ideas, but expect students to provide a mathematical reason for their predictions.

Repeat making predictions with other examples, E.g., What number might be three rows under 151. Explain why.

Curriculum Links

During the first six months
Count forward and backwards from any whole number between 1 and 10, and then between 1 and 20.

During the first year
Count forward and backwards in 1s, 2s, 10s from any whole number between 1 and 10, and then between 1 and 100.

During the second year
Count forwards and backwards in 1s, 2s, 5s, 10s from any whole number between 1 and 100.

During the third year
Count forwards or backwards in 2s, 3s, 5s and 10s from any whole number between 1 and 1,000.

Big Ideas

The world is full of patterns and structures that we use mathematics and statistics to understand.

Suggested Learning Outcomes

Notice patterns in the number sequence

Predict numbers in patterns

Explain and justify their thinking

Mathematical Language

Pattern, place value (hundreds, tens, ones), number words (one hundred and thirty three...), add, subtract

Other Examples

Continue building on each count the following day or throughout the week. You could apply the count to a different number e.g. counting in 2's from 223. So students can see that our number system repeats again and again.

This activity can be repeated multiple times, with a range of numbers and sequences between 0-1,000. Phase One requires students to have multiple opportunities to explore, notice and develop understandings of numbers up to 1,000.

With younger students, start with counting in 1's from 5 etc. Then move into 2,s, 10s, 5s from known facts. Example today we are choral counting in 2's from 6.

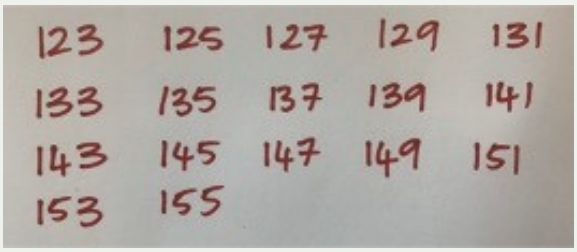
Once students have had opportunities to explore those patterns start exploring the following.

Count in 5's from 4
Count in 10's from 11
Count in 2's from 3.
Count in 100's from 55.
Count in 100's starting from 2301
Count in 10's starting from 31
Count in 5's starting from 206
Count in 30's starting from 330
Count in 1's starting from 922

Count in $\frac{1}{2}$'s starting from 7 $\frac{1}{2}$

Count in $\frac{1}{4}$'s starting from $3\frac{1}{4}$

Pascals Triangle



Example: count in 2's starting from 123

Teacher Notes

Pascal's triangle is a triangular array of numbers arising from probability theory. The are many interesting relationships that can be found and explored within this pattern.

Instructions:

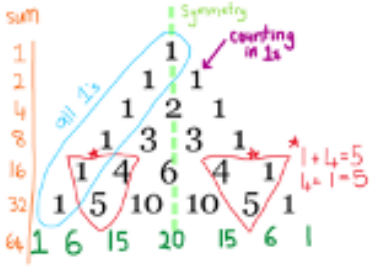
Display the image

Ask students "What do you notice?" Turn and talk to a partner.

Collect and annotate students' ideas.

Ask students to predict what will come in the next line.

Over a series of days add more lines to the triangle and discover further patterns. This can also be used as an investigative indepdent task.



Just a few of the secrets of pascals triangle are:
Each number is the sum of the two numbers above it.
The sum of each row adds to increasing powers of two.
Number patterns are present in every column. Natural numbers: 1,2,3,4,5; triangular numbers: 1,3,6,10; tetrahedral numbers: 1,4,10,20 etc.
Colour all the odd numbers, what do you notice?
Where can you find the exponents of 11?

Other Examples

There are a variety of triangles online or choose your own.

Aim is that students just explore numbers and find patterns.

Curriculum Links

During the first six months
Count forward and backwards from any whole number between 1 and 10, and then between 1 and 20.

During the first year
Count forward and backwards in 1s, 2s, 10s from any whole number between 1 and 10, and then between 1 and 100.

During the second year
Count forwards and backwards in 1s, 2s, 5s, 10s from any whole number between 1 and 100.

During the third year
Count forwards or backwards in 2s, 3s, 5s and 10s from any whole number between 1 and 1,000.

Big Ideas

The world is full of patterns and structures that we use mathematics and statistics to understand.

Suggested Learning Outcomes

Notice patterns in the number sequence

Predict numbers in patterns

Explain and justify their thinking

Mathematical Language

Pattern, triangle, symmetry, addition, subtraction, numbers, equals, row, column.

Direct Comparison

Find an object smaller than your hand.

Find an object bigger than your hand.

Find an object the same size as your hand.

Teacher Notes

Direct comparison involves physically comparing objects to determine which one is smaller, bigger or equal. This judgement is made through observation rather than using a unit of measure. This will support students' sense of measurement and develop mathematical language.

Instructions:

"Can you find an object in the classroom that is smaller than your hand?"

Once every student has found something, ask "Can you explain to a partner why the object is smaller than your hand".

Collect and annotate students' ideas.

Randomly choose a student to share their explanation with the class. Revoice the use of mathematical language and refinement of an explanation e.g., "that's right, you were showing us that the width of the pen is smaller than your hand" or "the triangle is smaller than your hand because it doesn't cover the whole surface area"

Repeat for objects larger and the same size as your hand.

Other Examples

Find objects smaller, bigger, equal to the length of your foot.

find objects smaller, bigger, equal to your height.

Find objects smaller, bigger and equal to your book or pen.

Curriculum Links

During the first six months
Directly compare two objects by an attribute.

During the first year
Compare the length, mass (weight), volume or capacity of objects directly or indirectly - by comparing with another object.

During the second year
Compare and order several objects using informal units of length, mass, volume or capacity.

During the third year
Compare and order objects using metric units of length, mass (weight) or capacity.

Big Ideas

Measurement involves a selected attribute of an object (length, area, mass, volume, capacity) and a comparison of the object being measured against a unit of the same attribute.

Suggested Learming Outcomes

Directly compare two objects by length, width or area.

Identify if an object is larger, smaller or the same size.

Mathematical Language

Smaller, bigger, same, measurement, compare, size, length, width, height, area.

Comparing Objects

Can you sort all these classroom object in order from shortest to longest?

Materials: Set of classroom objects (different sizes)

Teacher Notes

The purpose of this activity is for the students to explore length and do direct comparison to measure the objects.

Instructions:

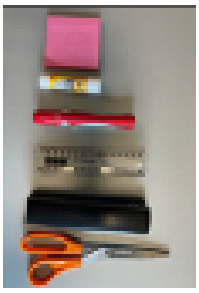
Collect a set of objects from the classroom and ask students to turn and talk to a buddy about how they will sort it from shortest to longest.

Ask students to clearly explain and then arrange the objects from shortest to tallest.

Allow other students the opportunity to agree or disagree with students explanation of how they put the objects in order from smallest to longest.

Ensure the focus remains on the use of measurement language and model this when required.

Notice the benchmarks that students use to estimate how long each object is.



Other Examples

Repeat this activity with other objects from around the classroom.

This can be set up as an independent activity.

Curriculum Links

During the first six months
Directly compare two objects by an attribute.

During the first year
Compare the length, mass (weight), volume or capacity of objects directly or indirectly - by comparing with another object.

During the second year
Compare and order several objects using informal units of length, mass, volume or capacity.

During the third year
Compare and order objects using metric units of length, mass (weight) or capacity.

Big Ideas

Measurement involves a selected attribute of an object (length, area, mass, volume, capacity) and a comparison of the object being measured against a unit of the same attribute.

Suggested Learming Outcomes

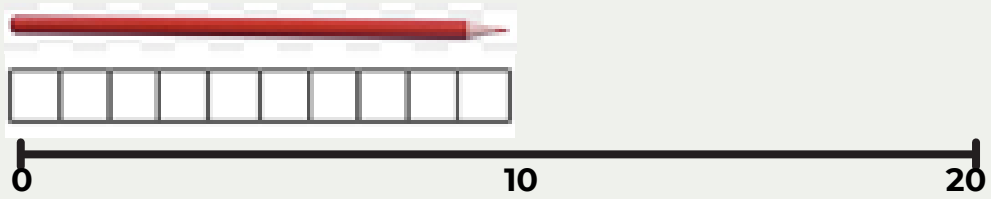
Directly compare two or more objects according to an appropriate measure

Use measuring language to justify thinking e.g. length, width, height.

Mathematical Language

Smaller, bigger, same, measurement, compare, size, length, width, height, area.

How long in the Pencil



How long is the pencil?
Use blocks and a numberline to help you.
Materials: pencil, blocks, number line

Teacher Notes

Instructions:

Display the image and ask students to explain or prove to a buddy how they know what the length of the pencil is (10 blocks, 10cm long).

Use talk moves to facilitate a discussion that focuses on explaining the length of the pencil in centi-cubes and centimetres.

Represent the length using a variety of materials (centi-cubes, multilink, rods, match sticks).

Intentionally teach the principles of measurement. Measuring starts at the beginning of the object being measured (on the number line it starts at 0). The size of the measurement unit must remain the same. Measurement units are repeated with no gaps or overlaps (notice the blocks have no gaps or overlaps). The measurement is the total number of units used (the end of the object signals the measurement count).

Facilitate a discussion about the relationship between the length of the pencil (10cm) and the length of the number line (20 cm).

Ask students to find other objects around the room that are the same length than the 10cm pencil. Then find objects shorter and longer than the pencil.

Other Examples

Repeat this activity with other objects from around the classroom.

This can also be set up as an independent activity.

Curriculum Links

During the second year
Estimate and use an informal unit repeatedly to measure length, mass, volume, or capacity of an object.

During the third year
Estimate and then reliably measure length,, capacity, and mass using whole number metric units.

Big Ideas

Measuring starts at the beginning of the object being measured.
The size of the measurement unit must remain the same

Suggested Learming Outcomes

Use non-standard units to measure length.

Use measurement language to describe the comparison of length.

Mathematical Language

Smaller, bigger, same, measurement, compare, size, length, width, height, area.

Estimating 1-Metre

Place your counter where you estimate 1 metre is from this baseline.

Materials: counters, 1-metre ruler

Teacher Notes

The purpose of this activity is to support students in developing a sense for the length of 1-metre. The metre is the base unit of length in the metric system. All other measures are derived from the metre (e.g. centimetre = one hundredth of a metre).

Instructions:

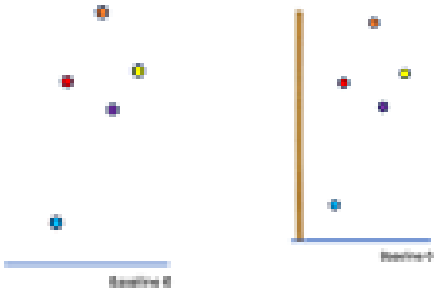
Each person or pair will need one counter.

Tell students "Place your counter where you think 1-metre is from this baseline".

"What do we notice about all our different estimates?" Turn and talk.

Place a 1-metre ruler down. Ask "What do you notice about your estimate compared to the 1-metre ruler". Ensure the discussion includes whether the estimates were greater than, less than or equal to 1-metre.

Move the baseline to a different place in the room and repeat.



Other Examples

Repeat with 1-metre from a number of different baselines within your classroom or school environment. This can also include "How high is 1-metre from the floor?"

Repeat with 2 metres, 3 metres, 4 metres etc.

To increase the complexity, estimate measurements that include both metres and centimetres e.g., 1.3m, 75cm, 1.5m, 90cm

Curriculum Links

During the second year
Estimate and use an informal unit repeatedly to measure length, mass, volume, or capacity of an object.

During the third year
Estimate and then reliably measure length,, capacity, and mass using whole number metric units.

Big Ideas

Measuring starts at the beginning of the object being measured.
The size of the measurement unit must remain the same

Suggested Learming Outcomes

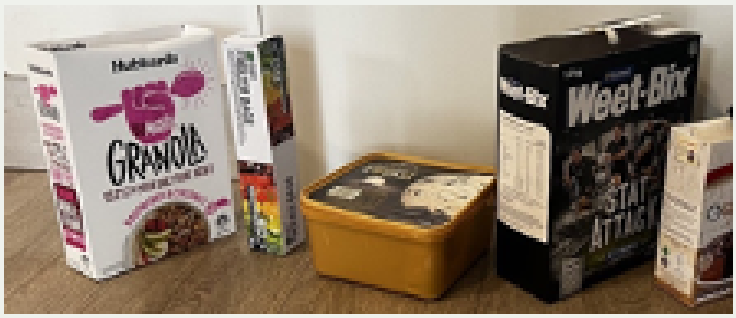
Make a reasonable estimate for a metre.

Directly compare an item with a metre.

Mathematical Language

Estimate, metre, centimetre, greater than, less than, equal to, length, ruler, standard measure.

What box takes up the most space? (Volume)



Order these boxes from biggest to smallest.

Materials: use boxes or containers from the classroom.

Teacher Notes

Instructions:

Display the photo or items and ask students to explain or prove to a buddy how they can order the six boxes from smallest to biggest according to how much space they take up.

Use talk moves to facilitate a discussion that focuses on explaining the amount of space an object takes up is also known as volume (volume is the measure of space taken up by a three dimensional object- NZ Maths).

Explain the line underneath is a continuum and helps us order systematically (smallest to biggest).

To extend students add the measurement unit count and be intentional to make the connection between how this continuum is also a representation of a number-line.

Other Examples

Ordering other items within the classroom to compare the volume (space taken up).

Follow up independent activity would be to ask the students to estimate and then use materials (eg. square blocks, multi link cubes) to physically fill the space of empty boxes.

Curriculum Links

During the first six months
Directly compare two objects by an attribute.

During the first year
Compare the length, mass (weight), volume or capacity of objects directly or indirectly - by comparing with another object.

During the second year
Compare and order several objects using informal units of length, mass, volume or capacity.

During the third year
Compare and order objects using metric units of length, mass (weight) or capacity.

Big Ideas

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Suggested Learning Outcomes

Estimate the volume of a container.

Explain the relationship between size of the measurement unit and the measurement count.

Count whole numbers of units to describe the measurement.

Compare the volume of a container using non-standard units

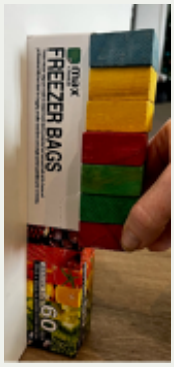
Mathematical Language

Estimate, metre, centimetre, greater than, less than, equal to, length, ruler, standard measure.

Finding the Volume

It takes 12 blocks to fill this box. Do you agree or disagree?

Materials: boxes and blocks from the classroom.



Teacher Notes

Instructions:

Display the photo and ask students to explain or prove to a buddy how they know they are correct or not.

When students give their statement, ask them to justify by adding the word 'because... after their statement.

Use the talk move 'agree' or 'disagree' with student statements to facilitate explanations and justifications about how to measure the space it takes to fill a box.

Facilitate a discussion around what other non-standard units we can use to measure volume (lego, multilink, square blocks, smaller boxes).

Model the use of the Principles of Measurement.
The Principles of Measurement
- *The size of the measurement unit must remain the same.*
- *Measurement units are repeated with no gaps or overlaps (notice the blocks have no gaps or overlaps).*
- *The measurement is the total number of units used (the end of the object signals the measurement count).*

Other Examples

Carly says it will take 60 cubes to fill the space in the box. Is she correct? Why or why not?

Repeat this starter multiple times with materials from the classroom.

Curriculum Links

During the second year
Estimate and use an informal unit repeatedly to measure length, mass, volume, or capacity of an object.

During the third year
Estimate and then reliably measure length,, capacity, and mass using whole number metric units.

Big Ideas

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Suggested Learning Outcomes

Estimate the volume of a container.

Explain the relationship between size of the measurement unit and the measurement count.

Count whole numbers of units to describe the measurement.

Compare the volume of a container using non-standard units

Mathematical Language

Space, volume, compare, order, more than, less than and the same as, smallest, biggest.

How long is One Minute

How long is one minute?

Teacher Notes

Instructions:

Discuss the word estimate and its meanings. Discuss other words to describe estimate, e.g. guess, accurately guess.

Have the students sit quietly and put up their hand when they think one minute is over. Wait for all hands to go up but note students who were the closest to one minute.

Repeat again and state when the minute ends.

Ask the students - what did you notice when estimating a minute. Did it feel long or short?

Facilitate the discussion about why a minute can sometimes feel long or short. For example waiting a minute for a bus in the rain verses having a minute to choose a chocolate in the shops. What minute would feel like it was going quicker?

Other Examples

Repeat this activity multiple times.

introduce the idea of completing a task or series of activities within the minute. Have students estimate how many they could do before completing the activity in a minute.

Curriculum Links

During the third year
Identify the duration of events using years, months, weeks, days, hours, minutes and seconds.

Big Ideas

Time duration for events can be compared using such ideas as longer, shorter, and equal as well as different measurements of time.

Suggested Learming Outcomes

Estimate the duration of a minute.

Use mathematical language to explain their thinking.

Mathematical Language

The counting numbers.
Minute, second, hour.
How long? How many?

Days of the Week

Today is Tuesday, tomorrow is?
Yesterday was?

Teacher Notes

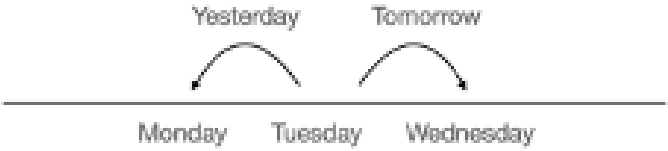
This is a starter that can be done during the morning routine.

Instructions:

Ask the first question. Encourage students to share their ideas with their buddies before sharing with the class. .

Notice the students that have a clear understanding of the order of the days of the weeks.

Represent the days on the week on a number line or calendar so students can see the days being represented.



Encourage the students to notice the pattern with the days of the week, they repeat again and again.

To extend this starter encourage the students to predict further days, such as, in four days time what day will it be? Or how many days until Saturday?

This is an activity thats needs to be repeated multiple times.

Other Examples

Use the same starter with calendar months, If it is February what month is next etc.

Curriculum Links

During the first year
Name and order the days of the week, and sequence of events in a day using everyday language of time.

During the second year
Name and order the months and seasons, and describe the duration of familiar events using months, weeks, days, and hours

During the third year
Identify the duration of events using years, months, weeks, days, hours, minutes, and seconds

Big Ideas

Time duration for events can be compared using such ideas as longer, shorter, and equal as well as different measurements of time.

Suggested Learning Outcomes

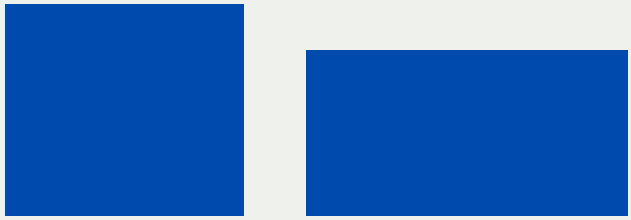
Order days of the week.

Justify and explain their thinking.

Mathematical Language

Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, tomorrow, today, yesterday.

Shape Properties



What are the same or different attributes of these 2 dimensional shapes?

Materials required: different shapes (physical or images)

Teacher Notes

Instructions:

As a class, discuss the kinds of shapes students are familiar with. Ask students to turn and talk to each other about the shapes they know and can see in the classroom and to describe the shapes.

On the whiteboard, draw a square and a rectangle and ask students to turn and talk and explain and justify what is the same or different attributes of the 2-dimensional shapes.

When students share the responses, record the properties of the shapes on the whiteboard.

Monitor for students using vocabulary which is everyday maths language and revoice using the language of geometry.

Other Examples

Draw different 2d shapes, parallelograms or 3 dimensional shapes and ask students to discuss the similarities and what is different about the shapes. Explain and justify.

Curriculum Links

During the first six months
Identify, sort by one feature, and describe familiar 2D shapes

During the first year
Identify, describe, and sort familiar 2D and 3D shapes presented in different orientations, including triangles, circles, rectangles (including squares), cubes, cylinders, and spheres

During the second year
identify, describe, and sort 2D and 3D shapes, including ovals, semicircles, polygons (e.g., hexagons, pentagons), rectangular prisms (cuboids), pyramids, hemispheres, and cones, using the attributes of shapes

During the third year
Visualise, identify, compare, and sort 2D and 3D shapes, using the attributes of shapes

Big Ideas

Two-and-three dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.

Suggested Learming Outcomes

Use geometrical language to describe two-and-three-dimensional shapes according to their attributes or features

Mathematical Language

2-dimensional shape, square, rectangle, angle, corner, vertex, line of symmetry, attribute, sharp corners, blunt corners, parallel

Sorting Shapes

Sort these shapes into groups. Justify your reasoning for each group.

Materials required: different shapes (physical or images)

Teacher Notes

The purpose of this activity is for students to identify the attributes of simple shapes and to use these to identify commonalities and differences between shapes.

Instructions:

Ensure each group or partner has a set of shapes to manipulate.

Ask students "what can you tell us about these shapes

Facilitate a group conversation that encourages students to describe the attributes, not just the name of the shape. E.g., "How do you know this is a circle?" "What else makes this a square?"

Ask students to sort the shapes on the mat.

Select groups to share who used different attributes.

Expect students to describe using geometric language how they sorted the shapes.

Encourage other students to repeat key mathematical ideas.

Other Examples

Continue this activity with a variety of different shapes.

This can be extended into an independent activity.

Curriculum Links

During the first six months
Identify, sort by one feature, and describe familiar 2D shapes

During the first year
Identify, describe, and sort familiar 2D and 3D shapes presented in different orientations, including triangles, circles, rectangles (including squares), cubes, cylinders, and spheres

During the second year
identify, describe, and sort 2D and 3D shapes, including ovals, semicircles, polygons (e.g., hexagons, pentagons), rectangular prisms (cuboids), pyramids, hemispheres, and cones, using the attributes of shapes

During the third year
Visualise, identify, compare, and sort 2D and 3D shapes, using the attributes of shapes

Big Ideas

Two-and-three dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.

Suggested Learming Outcomes

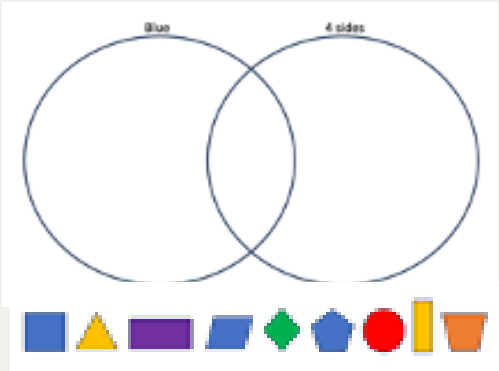
Sort shapes

Justify and explain reasoning.

Mathematical Language

Circle, triangle, rectangle, square, pentagon, hexagon, star, octogon, shapes, sides, numbers.

Sorting by attributes



Where should each shape go and why?

Materials required: different shapes (physical or images)

Teacher Notes

The purpose of this activity is for students to identify the attributes of simple shapes and to use these to identify commonalities and differences between shapes.

Instructions:

Explain the purpose of a Venn diagram (if new to students).

Students to choose a shape and place it within (or outside) the diagram.

Ask "can you explain why you put the shape there?".

Allow other students the opportunity to agree or disagree with where the shape is placed.

Ensure the focus remains on the use of geometric language and reasoning.

Once the diagram is complete, encourage students to make statements about what they notice. E.g., "There are two shapes that are blue and have 4 sides."

Note: if you do not have sorting shapes available, use everyday objects from your classroom instead.

Other Examples

Choose two properties from; colour, size, number of sides, number of vertices, name of shape, texture, has a right-angle. E.g., Red and 4 vertices.

To increase the complexity, include a third circle in the Venn diagram. E.g., green, 4 sides and small. This can also be repeated with 3-dimensional shapes.

This can be extended into an independent activity.

Curriculum Links

During the first six months
Identify, sort by one feature, and describe familiar 2D shapes

During the first year
Identify, describe, and sort familiar 2D and 3D shapes presented in different orientations, including triangles, circles, rectangles (including squares), cubes, cylinders, and spheres

During the second year
identify, describe, and sort 2D and 3D shapes, including ovals, semicircles, polygons (e.g., hexagons, pentagons), rectangular prisms (cuboids), pyramids, hemispheres, and cones, using the attributes of shapes

During the third year
Visualise, identify, compare, and sort 2D and 3D shapes, using the attributes of shapes

Big Ideas

Two-and-three dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.

Suggested Learming Outcomes

Sort shapes

Justify and explain reasoning.

Mathematical Language

Sides, colour words, same, different, properties, shape names (triangle, circle, square, rectangle etc)

Is it a triangle?

This is a triangle.
Do you agree or disagree with this statement? Explain why.

Teacher Notes

The purpose of this activity is to analyse and reason with the properties of shapes. A triangle is a closed polygon that has three straight sides and three vertices (corners). A triangle has three internal angles that add to 180 degrees.

Instructions:

Display the image (or hold up a triangle). Ask students "Do you agree or disagree that this is a triangle? Tell the person next to you why."

Listen for students who are using geometric reasoning or talking about the properties of shape.

Collect students' ideas, allow opportunities to agree or disagree.

Co-construct a developing definition of a triangle, based on geometric properties e.g., "A triangle must have three sides and three corners".

Repeat the task with other examples. Encourage students to add to, and refine their definition of a triangle e.g., "A triangle is a 2D shape that must have three straight sides. It has three angles inside."

Note: many students may have the misconception that it is not a triangle. This is because triangles are commonly presented in written materials as: 

Other Examples

Repeat the task with a range of other shapes that are and are not triangles. These shapes could be objects from your local environment, or pictures as below.

Curriculum Links

During the first six months
Identify, sort by one feature, and describe familiar 2D shapes

During the first year
Identify, describe, and sort familiar 2D and 3D shapes presented in different orientations, including triangles, circles, rectangles (including squares), cubes, cylinders, and spheres

During the second year
identify, describe, and sort 2D and 3D shapes, including ovals, semicircles, polygons (e.g., hexagons, pentagons), rectangular prisms (cuboids), pyramids, hemispheres, and cones, using the attributes of shapes

During the third year
Visualise, identify, compare, and sort 2D and 3D shapes, using the attributes of shapes

Big Ideas

Two-and-three dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.

Suggested Learning Outcomes

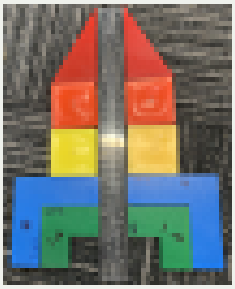
Use evidence and reasoning to explain why I agree or disagree with statements.

Identify and explain the geometric properties of a triangle.

Mathematical Language

Triangle, vertices (corner), side, angle, equilateral, isosceles, scalene, angles, right-angle.

Line of Symmetry



Can you and your partner make a symmetrical design?
Materials: rulers (or string) selection of shapes or small objects.

Teacher Notes

A shape that can be folded down a line to make two exact matching halves is said to have line symmetry or reflective symmetry. The fold-line is called a line of symmetry.

Instructions:

Explain to students that the ruler (or piece of string etc) will be the line of symmetry. Put students into partners and decide who will be Student A and Student B.

Tell Student A to design a pattern on one side of the line of symmetry (whilst Student B closes their eyes).

Student B then needs to complete the other side of the pattern to make it symmetrical.

Ask students to examine their design (or others designs) and agree or disagree if it is symmetrical, and why.

Errors can be used as an opportunity for learning. E.g., Do you agree or disagree that this design is symmetrical?(Students may notice that the choice of shape is symmetrical, but the colours are not).

Other Examples

Repeat this task with different shapes and different partners.

You may have half the image made for all students to complete the pattern to make it symmetrical.

This is an activity that can be set up independently.

Curriculum Links

During the first year
Flip, slide, and turn 2D shapes to make a pattern

During the second year
Recognise lines of symmetry in patterns or pictures, and create or complete symmetrical pictures or patterns

During the third year
Predict the result of a one-step transformation (reflection, translation, or rotation) on 2D shapes

Big Ideas

Objects in space can be transformed in an infinite number of ways, and those transformations can be described and analysed mathematically.

Suggested Learning Outcomes

Explain the meaning of a line of symmetry

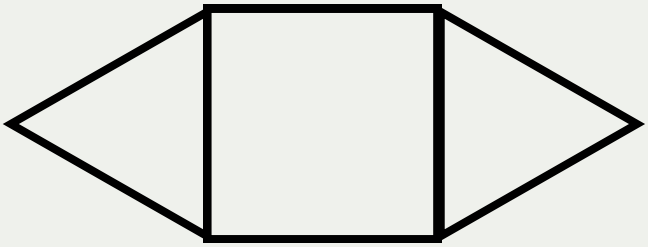
Create a symmetrical pattern.

Use geometrical & positional language to explain designs
Identify and explain the geometric properties of a triangle.

Mathematical Language

Line of symmetry, symmetrical, left, right, above, below, names of shapes, colour words.

Shapes - Quick Images



Teacher Notes

Students can complete this quick image independently, by either drawing or using shape blocks.

Instructions:

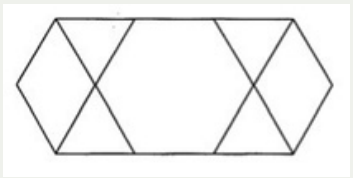
Show the image for 3 seconds. Give students a short time to draw or make a figure that matches the mental image they have formed so far.
Show the image again for 3 seconds. Allow time for students to revise their drawings or building according to what they saw in the second viewing.

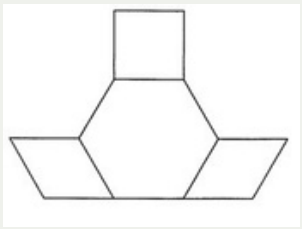
Show the image for the third and final time. This time leave the image visible so that all students can complete and revise their solutions.

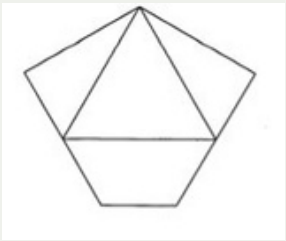
Support students to explain their image using geometric and positional language.

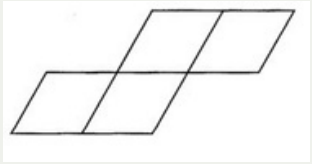
Other Examples

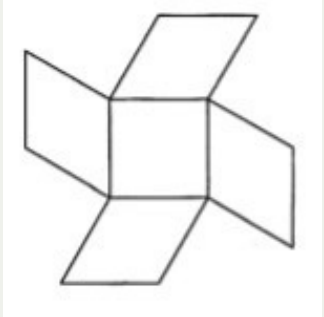
Repeat this task with different images.

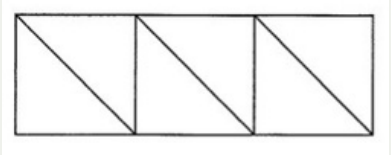


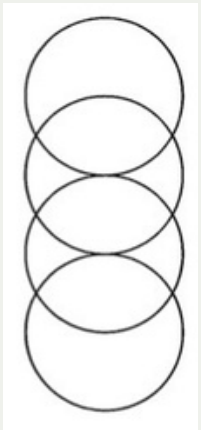












Curriculum Links

During the first six months
Compose by trial and error a target shape using smaller shapes, and decompose a shape into smaller shapes

During the first year
Anticipate which smaller shapes might be used to compose a target shape, and then check by making the shape

During the second year
Anticipate which smaller shapes might be used to compose and decompose a target shape,
and then check by making the shape

During the third year
Compose and decompose 2D shapes using the attributes of shapes (e.g., lines of symmetry), other shapes, side lengths, and angles

Big Ideas

Two- and three-dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.

Suggested Learning Outcomes

Visualise the components of a composite shape.

Draw/ make a composite shape through trial and error.

Use geometric language to describe a shape.

Mathematical Language

Centre, left, right, above, below, shape names (square, triangle, circle etc) rotate, turn, flip, slide, translate.

Tangrams 1

Can you make this chicken? Can you make this fish?

Materials: 1x tangram set per 2 students

Teacher Notes

The purpose of this activity is to support the development of students spatial reasoning abilities through the manipulation of shapes. It is the teacher's role to press for students to use positional and geometric language.

Instructions:

Display the tangram image.

Students to explore making the target image with tangram pieces through trial and error (in partners).

Notice how students are manipulating the shapes (turning, flipping, sliding). Make these transformations explicit i.e say: Emily flipped a triangle to ensure it was the correct way etc.

Call on students to explain/ show how they made the target shape (e.g., "First we put the little yellow triangle at the bottom centre. Then we put the big red triangle on top and did a ¼ turn").

Other Examples

Repeat this task with different images, there are plenty of tangram ideas online.

Set this up for students to create their own image for their peers to copy.

This can be set up as an independent activity.

Curriculum Links

During the first six months
Compose by trial and error a target shape using smaller shapes, and decompose a shape into smaller shapes

During the first year
Anticipate which smaller shapes might be used to compose a target shape, and then check by making the shape

During the second year
Anticipate which smaller shapes might be used to compose and decompose a target shape,
and then check by making the shape

During the third year
Compose and decompose 2D shapes using the attributes of shapes (e.g., lines of symmetry), other shapes, side lengths, and angles

Big Ideas

Shapes can be described in terms of their location in a plane or space.

Suggested Learning Outcomes

Compose by trial and error an outlined target shape using smaller shapes

Visualise and anticipate which smaller shapes might compose a target shape, and then check by making the shape

Mathematical Language

Up, down, left, right, centre, on top, below, above, triangle, square, parallelogram, ¼ turn, ½ turn flip, rotate, slide.

Tangrams Silhouette

Can you make this silhouette using the tangram pieces.

Materials: 1x tangram set per 2 students

Teacher Notes

The purpose of this activity is to support the development of students spatial reasoning abilities through the manipulation of shapes. It is the teacher's role to press for students to use positional and geometric language.

Instructions:

Display the silhouette (or you may like to print this off, so each pair has a copy to overlay their pieces on)..

In pairs, students to explore making the target outline with tangram pieces through trial and error.

Notice how students are manipulating the shapes (turning, flipping, sliding). Make these transformations explicit i.e say: Emily flipped a triangle to ensure it was the correct way etc.

Call on students to explain/ show how they made the target shape (e.g., "First we put the little yellow triangle at the bottom centre. Then we put the big red triangle on top and did a ¼ turn").

Other Examples

Repeat this task with different images, there are plenty of tangram ideas online.

Set this up for students to create their own image for their peers to copy.

This can be set up as an independent activity.

Curriculum Links

During the first six months
Compose by trial and error a target shape using smaller shapes, and decompose a shape into smaller shapes

During the first year
Anticipate which smaller shapes might be used to compose a target shape, and then check by making the shape

During the second year
Anticipate which smaller shapes might be used to compose and decompose a target shape,
and then check by making the shape

During the third year
Compose and decompose 2D shapes using the attributes of shapes (e.g., lines of symmetry), other shapes, side lengths, and angles

Big Ideas

Shapes can be described in terms of their location in a plane or space.

Suggested Learning Outcomes

Compose by trial and error an outlined target shape using smaller shapes

Visualise and anticipate which smaller shapes might compose a target shape, and then check by making the shape

Mathematical Language

Up, down, left, right, centre, on top, below, above, triangle, square, parallelogram, ¼ turn, ½ turn flip, rotate, slide.

Left or Right

Follow instructions to move to a location

Move forward three steps and turn left.

Teacher Notes

Ensure you and your students are familiar with the directional words as above before beginning.

Instructions:

Students to stand.

Give one instruction at a time.

Teacher continues to direct students, moving them in different directions.

Notice students who are able to turn directionally and respond to the correct number of steps.

Model reasoning, "I agree, you turned left" "I disagree I think you should be facing the wall because...."

Other Examples

Students could give simple instructions to a friend.

This could be repeating with an end location in mind e.g. the craft table.

This activity cdan then be transferred onto grid paper - moving counters or toy figures in directions.

This can be set up as an independent activity.

Curriculum Links

During the first six months
follow instructions to move to a familiar location or locate an object.

During the first year
follow and give instructions to move to a familiar location or locate an object.

During the second year
Follow and give instructions to move people or objects to a different location, using direction, distances (e.g., number of steps), and half and quarter turns

During the third year
Follow and create a sequence of step-by-step instructions (an algorithm) for moving people or objects to a different location

Big Ideas

Shapes can be described in terms of their location in a plane or space.

Suggested Learming Outcomes

Follow simple instructions

Move forwards, backwards, left and right.

Mathematical Language

Half turn, quarter turn, left, right, maui (left), matau (right), turn, full turn,

Half and Quarter Turns

Follow instructions to turn different directions.

Quarter turn left.

Teacher Notes

· *This activity encourages students to explore and identify quarter and half turns.*

Instructions:

Students to stand.

Give one instruction at a time.

Teacher instructs students to move e.g. to quarter turn to the left

Teacher instructs students to turn quarter or half turns and step forward number of steps leading them all to a point in the space.

Model reasoning, "I agree, you turned left" "I disagree I think you should be facing the wall because...."

Other Examples

Students could give simple instructions to a friend.

This activity cdan then be transferred onto grid paper - moving counters or toy figures in directions.

This can be set up as an independent activity.

Curriculum Links

During the first six months
follow instructions to move to a familiar location or locate an object.

During the first year
follow and give instructions to move to a familiar location or locate an object.

During the second year
Follow and give instructions to move people or objects to a different location, using direction, distances (e.g., number of steps), and half and quarter turns

During the third year
Follow and create a sequence of step-by-step instructions (an algorithm) for moving people or objects to a different location

Big Ideas

Shapes can be described in terms of their location in a plane or space.

Suggested Learning Outcomes

Follow simple instructions

Turn in different directions.

Mathematical Language

Half turn, quarter turn, left, right, maui (left), matau (right), turn, full turn,

Maps

What do you notice about this map?
What questions do you have about this map?
Materials: Choose a map from your local area
Credit: Auckland Zoo

Teacher Notes

The purpose of this activity is for students to talk about what they notice on the map and to ask any questions they may be wondering about. Some common things students might notice are symbols or landmarks, the key/legend, compass, pathways, scale.

Instructions:

Allow students time to view the map and think about what they notice.

Ask students to turn and talk to a buddy. Then select students to share what they notice. Annotate on a copy of the map if possible.

Ensure you develop students' positional language. E.g., Student "I see a picture of a giraffe here". Teacher "Thats right, on a map we call this a landmark."

Ask students "are there any questions you have about this map?"

Other Examples

Repeat this activity with any map that will interest your students. You may wish to select one that also has a compass, coordinate system or a scale. To extend this activity ask students to explain how they could travel from one landmark to another using positional language.

Curriculum Links

During the first year
Use pictures, diagrams, or stories to describe the positions of objects and places.

During the second year
Interpret diagrams to describe the positions of objects and places in relation to other objects and places.

During the third year
Interpret, draw, and use simple maps to locate objects and places relative to other objects and places.

Big Ideas

Maps are two-dimensional representations of places in the world. They use symbols to show locations and landmarks.

Suggested Learning Outcomes

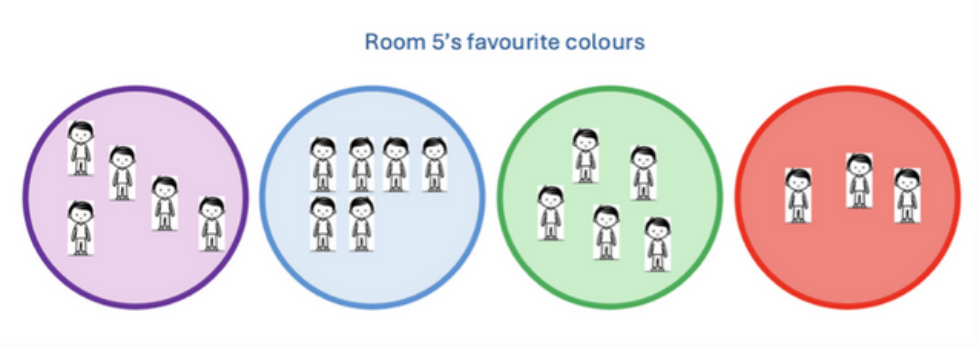
Notice features and landmarks on simple maps

Ask a question about a simple map

Mathematical Language

Map, landmark, key, title, pathway, left, right, up, down

Statistical Statements



Do you agree or disagree with these statements?

Room 5's favourite colour is red.
6 children like blue.
Purple is more popular than red.
Blue and green each had 5 votes.

Teacher Notes

Instructions:

Display the graph and give students a short time to talk about what they notice.

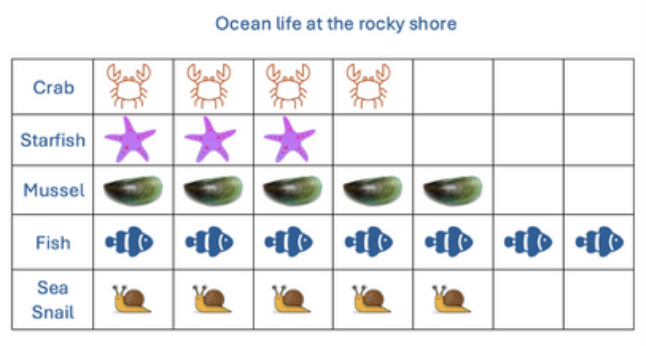
Read the first statement. Ask students to indicate if they agree/ or disagree, and then to tell a partner why.

Facilitate a short conversation focused on students reasoning. "We disagree with this because..."

Repeat for the other three statements. Expect a valid reason for why students agree or disagree.

Other Examples

This activity can be repeated with a range of different graphs (bar, pictograph, set diagram, pie graph etc). The statements also should include those that require comparison between variables.



Curriculum Links

During the first year
Agree or disagree with others' statements about simple data visualisations (e.g., pictures, graphs, dot plots).

During the second year
Match statements made by others with features in simple data visualisations, and agree or disagree with the statements.

During the third year
identify relevant features in others' data visualisations, connect these to descriptive statements, agree or disagree with the statements, and suggest improvements to them.

Big Ideas

Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.

Suggested Learning Outcomes

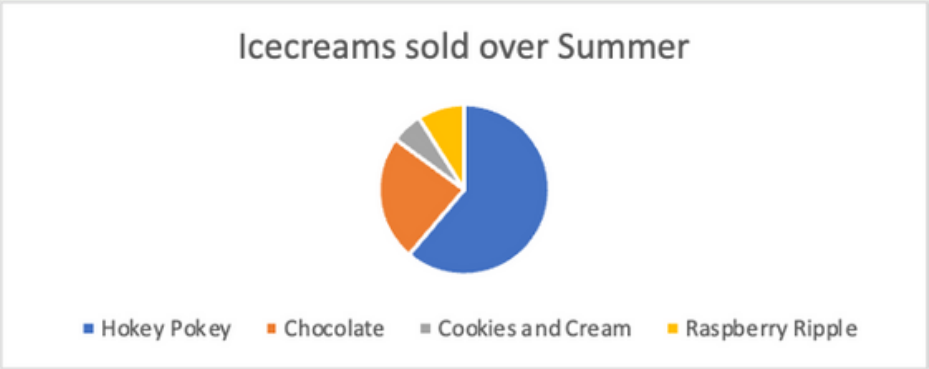
Agree or disagree with statements made by others using evidence.

Gain information from a simple graph.

Mathematical Language

Agree, disagree, graph, data, more, less, popular, total, equal

Making Statements about Pie Graphs



What do you notice?
What flavour is most popular?
What flavour is least popular?

Teacher Notes

Instructions:

Display the graph and give students a short time to talk about what they notice.

Ask the students the questions: What flavour is most popular? What flavour is least popular?

Facilitate a short conversation focused on students reasoning. "We disagree with this because..."

Encourage students to make other statements about the graphs

Other Examples

This activity can be repeated with a range of different graphs (bar, pictograph, set diagram, pie graph etc).

This starter is the opportunity for students to explore different graphs and make statements based on least or most popular.

Curriculum Links

During the first year
Agree or disagree with others' statements about simple data visualisations (e.g., pictures, graphs, dot plots).

During the second year
Match statements made by others with features in simple data visualisations, and agree or disagree with the statements.

During the third year
identify relevant features in others' data visualisations, connect these to descriptive statements, agree or disagree with the statements, and suggest improvements to them.

Big Ideas

Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.

Suggested Learning Outcomes

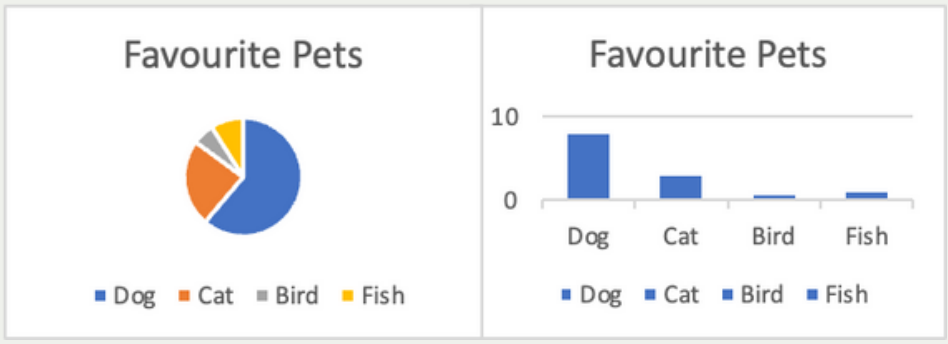
Agree or disagree with statements made by others using evidence.

Gain information from a simple graph.

Mathematical Language

Agree, disagree, graph, data, more, less, popular, total, equal, pie graph, least popular, most popular.

Comparing Graphs



The two graphs are displaying the same information. What do you notice?

Teacher Notes

Instructions:

Display the graph and give students a short time to talk about what they notice.

Ask the students the questions: What do you notice? What graph is easier to read? Do both graphs give us the same information?

Facilitate a short conversation focused on students reasoning always encouraging the students to explain why.

Encourage students to make other statements about the graphs.

Other Examples

This activity can be repeated with a range of different graphs (bar, pictograph, set diagram, pie graph etc).

This starter is the opportunity for students to explore different graphs and make statements based on least or most popular.

Curriculum Links

During the first year
Agree or disagree with others' statements about simple data visualisations (e.g., pictures, graphs, dot plots).

During the second year
Match statements made by others with features in simple data visualisations, and agree or disagree with the statements.

During the third year
identify relevant features in others' data visualisations, connect these to descriptive statements, agree or disagree with the statements, and suggest improvements to them.

Big Ideas

Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.

Suggested Learning Outcomes

Agree or disagree with statements made by others using evidence.

Gain information from a simple graph.

Mathematical Language

Agree, disagree, graph, data, more, less, popular, total, equal, pie graph, least popular, most popular.

Probability

Where would you place this event on the likelihood line?

Teacher Notes

Students may draw on their own lived experiences and personal likes/dislikes to make conclusions about the chance of something occurring. E.g., a student may say it is possible for a dog to fly because they saw a flying dog on the TV. Different responses are to be expected and should be validated.

Instructions:

Turn and talk to a partner, where would you put this event on the likelihood line? Remember to provide a reason.

Randomly call on a pair to place the event on the likelihood line. Expect them to state a reason using "because".

Ask students "would anyone put it at a different place?" "why?"

Drawing on all students reasoning come to a group consensus about where to place the event.

Reinforce the meaning of impossible, unlikely, likely and certain. Repeat task with other events as below.

Other Examples

I will have chicken for dinner.

Tomorrow will be Wednesday.

I will brush my teeth tonight.

We will live on the moon.

I will read a book today.

The sun will rise tomorrow.

Curriculum Links

During the first year
Engage in stories or games that involve chance-based situations and:

- *– decide if something will happen, won't happen, or might happen*
- *– identify possible and impossible outcomes (e.g., for what might happen next).*

Big Ideas

A chance-based situation has a set of possible outcomes that can be arranged into events. The probability of an event is the chance of it occurring.

Suggested Learming Outcomes

Place an event on a likelihood line to show the chance of it occurring.

Use the language of probability to describe chance events.

Mathematical Language

Likelihood, chance, impossible, unlikely, likely, certain, possible, probability.

Heads or tails

Materials: coin or online coin.

Teacher Notes

Instructions:

Before beginning, explain to students they must either choose heads (put your hands on your head/ mahunga) or tails (put your hands on your hips/ hope). When the coin is tossed, if it lands on the outcome they chose, they stay in. If not, they sit down.

Flip the coin. Record the result on the board. Comment on how many people got out. E.g., "Approximately half of the students or 12/25 sat down".

Repeat the coin toss several times until one child remains. Record a running tally of results on the board e.g., H H T H T H. Ask students "From our results, do you think it is more likely to land on heads or tails?"

Discuss "do we know what the coin is going to land on? Why or why not?

Keep a record of the results. When you repeat this activity on another day you will be able to compare the two sets of results and discuss why these are different.

Other Examples

Using more than one coin at once

Rolling the dice.

Drawing a card out of a pack of cards.

Curriculum Links

During the first year
Engage in stories or games that involve chance-based situations and:
-decide if something will happen, won't happen, or might happen
-identify possible and impossible outcomes (e.g., for what might happen next).

During the second and third year
engage in chance-based investigations about games and everyday situations to:
– anticipate and then identify possible outcomes
– collect and record data
– describe what these visualisations show
– answer the investigative question

Big Ideas

A chance-based situation has a set of possible outcomes that can be arranged into events. The probability of an event is the chance of it occurring.

Suggested Learming Outcomes

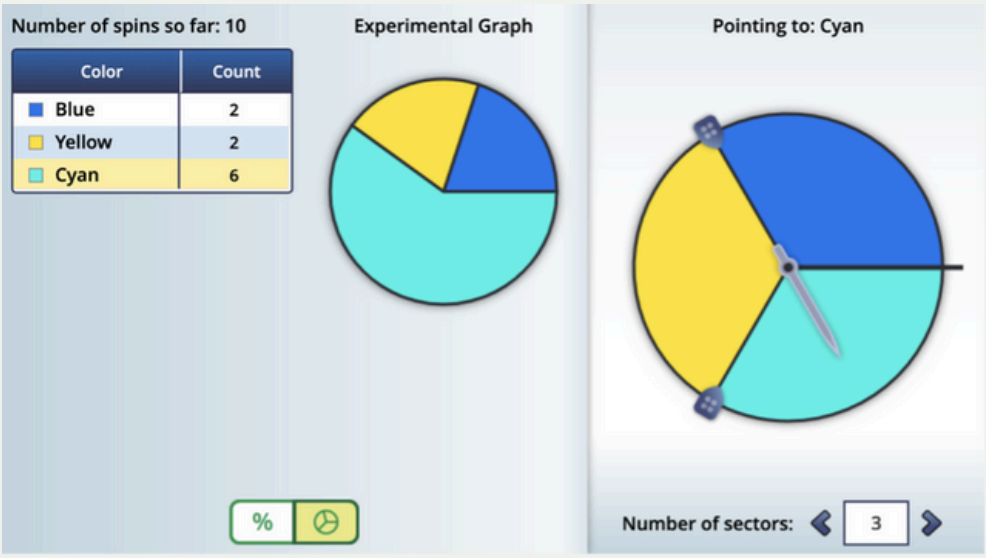
Use the language of probability to describe events and outcomes

Make a prediction about a chance situation

Mathematical Language

Heads, tails, chance, likely, unlikely, outcomes, probability.

Exploring a Spinner



Teacher Notes

An online spinner tool can be found here:
https://www.nctm.org/adjustablespinner/
Explain to students we are exploring experimental probability. We are going to conduct some trials together and talk about what we notice happening.

Instructions:

Explain to students we are going to spin the spinner and predict what it will land on. Give students time to talk to a partner about what it might land on and why.

Discuss there are three possible outcomes: yellow, blue, cyan.

Spin the spinner. Ask students to comment on the first outcome. E.g., "It landed on yellow".

Spin the spinner a total of 5 times. Direct students to the pie chart and tally. Ask students "What do you notice so far?" and "What do you think will happen if we spin another 5 times?". Discuss.

Spin the spinner a total of 10 times. Ask students "What do you notice now?" and "Was it what you expected? Why/why not?".

Discuss that whilst there is an equal chance of it landing on blue, yellow, or cyan our results after 10 spins do not show an equal chance. Ask students "Why do you think this is?"
Ask "what do you think might happen if we spin it another 10 times?". Spin another 10 times and discuss.

Help support students understanding that with experimental probability we never know what the exact outcome will be, and each set of trials will give different results.

Curriculum Links

During the first year
Engage in stories or games that involve chance-based situations and:
-decide if something will happen, won't happen, or might happen
-identify possible and impossible outcomes (e.g., for what might happen next).

During the second and third year
engage in chance-based investigations about games and everyday situations to:
– anticipate and then identify possible outcomes
– collect and record data
– describe what these visualisations show
– answer the investigative question

Big Ideas

A chance-based situation has a set of possible outcomes that can be arranged into events. The probability of an event is the chance of it occurring.

Suggested Learning Outcomes

Use the language of probability to describe events and outcomes

Make a prediction about a chance situation.

Mathematical Language

Possible outcomes, chance, tally, probability, equal chance, more likely, less likely, experimental probability.

Other Examples

Explore this tool multiple times.
-Changing the sectors, number of spins etc.

You could also compare results over multiple days e.g