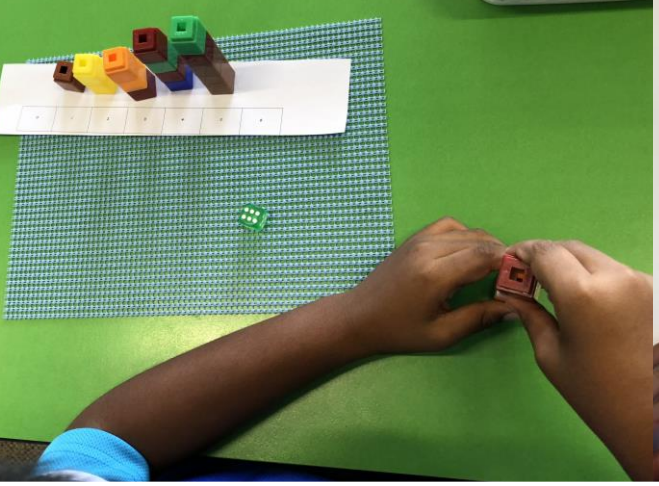
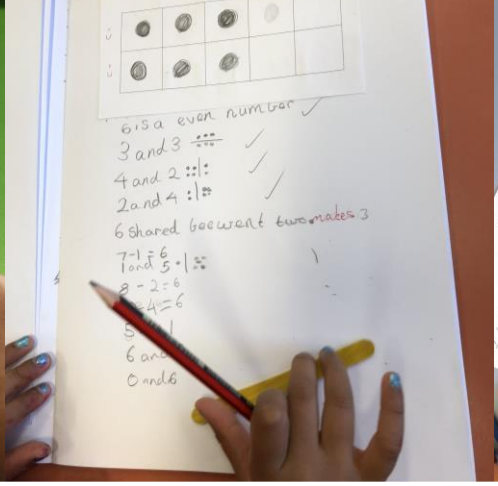
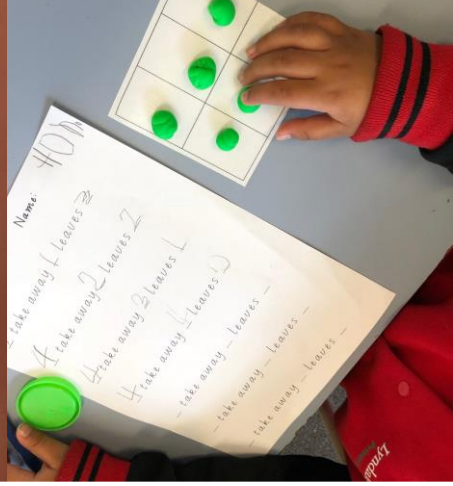

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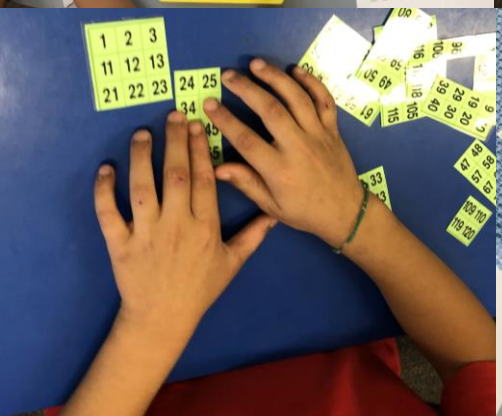
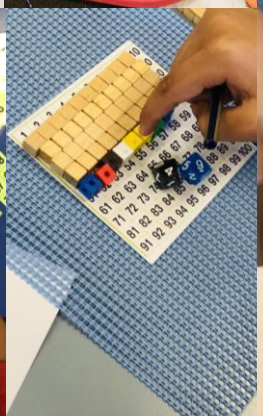



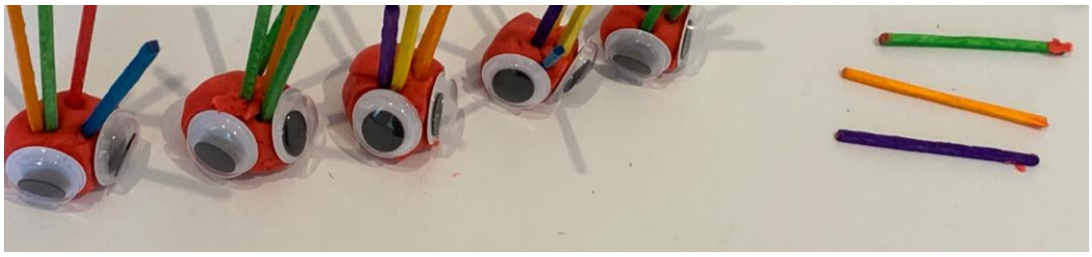
Division Unit 2: Create equal shares with materials

1 of 500 Sequential Lessons for the Early Years

Recommended for Year 2 students (NSW Maths Syllabus links at the start of each unit).

Equal Shares Lesson 9	**Sharing Spikes** **Learning intention: Make equal shares and record matching division sentences, including any remainders.** **Maths vocabulary: shared between ÷, starting number, remainder**
Dreamtime story hook: YouTube clip made by year 9 students about how the echidna got its spikes: https://www.youtube.com/watch?v=ZP4ap0VjNfQ Meet Matilda, an echidna at Healesville Sanctuary, who is allergic to ants: link. **Learn about this amazing native animal:** Short (2 minute) documentary on echidnas: https://www.youtube.com/watch?v=3Qm6O-HG02E	**Lesson summary: Students practise creating equal shares with spikes for echidnas. Students push craft sticks into Play-Doh spheres, ensuring that each echidna has the same number to avoid a jealous joust!** **Materials:** • Small craft sticks or toothpicks, which are very cheap (approximately $3 for class sets of 1000 from Officeworks or craft suppliers). • Play-Doh. • *Shared between* recording templates from this unit's folder. • Ten frames from this unit's folder. *Optional:* Googly eyes. **Best set-up:** Fishbowl model, then students work with their maths buddy. **Modelling:** Model scooping up some spikes with one hand and putting the starting number in the ten frames. Whole-class chant, "When we share, we start with a lot, we end with a little each (emphasise the alliteration of *lot* and *little*)." Just like subtraction, division makes your number smaller and you start with the big number, because you need lots to be able to share it out. However, unlike subtraction, the share must be fair. Always make and record your **starting number** before sharing it out, for example, 24. Now roll out how many echidnas you are going to use. Take a pinch of Play-Doh and rotate it between the palms of your hands. Record your number of echidnas in the template too: 24 shared between 2 gives _ each, before you start sharing out the spikes. Share the 24 spikes onto 2 echidnas. Record the answer to the shared between sentence, *24 shared between 2 gives each echidna 12 spikes*, and the number sentence below it, 24 ÷ (shared between) 2 = (makes/gives to each) 12. Next, try sharing 24 spikes equally between 3 echidnas, then 4 echidnas, then 5.  24 shared between 3 gives 8 to each 24 ÷ 3 = 8

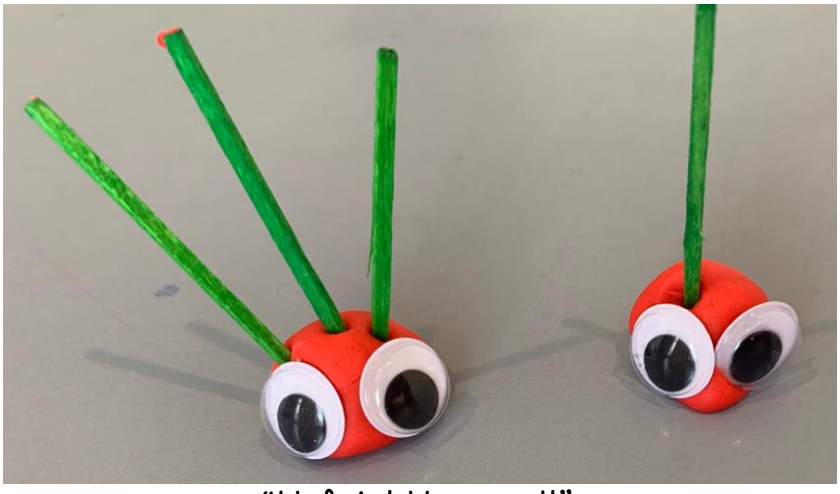
Tip: Encourage students to use the, “One for you, one for you,” strategy. For students who are ready, encourage them to use, “Two for you, two for you,” or 3, 4 or 5 at a time, particularly for sharing larger starting numbers. This scaffolds the next strategy for division – skip-counting to divide.



When students try to share 24 between 5, they will find they can fairly share 4 spikes onto each of their 5 echidnas, then cannot fairly share the final 4 spikes. They may find most echidnas can receive 5, but the final echidna only has 4, which would be unfair. Instruct students to leave these in their ten frame or on the side as leftovers. Maths calls leftovers **remainders**.

Misconception alert: Often, students try to add or subtract from their starting number (changing it to make the share fair), rather than leaving remainders to the side. Emphasise that students are to make their starting number, and then cannot add or subtract from it. To assist with this, keep the starting number consistent for the whole session. For example, figure out all the ways to share 24 spikes, just by changing the number of echidnas.

Emphasise that the shares must be fair, otherwise the echidnas will joust each other like medieval knights with their spikes, or one echidna might look very sad indeed:

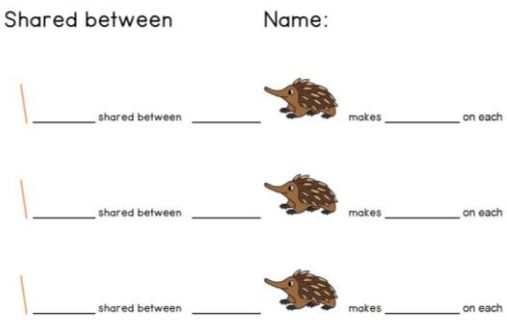


“Unfair! Unequal!”

Questioning:

- Will the number each echidna receives be higher or lower than the starting number? Will it always be lower? How do you know?
- Why can’t we just give the leftover spikes to one of the echidnas and make it an unfair share?
- Can you create a matching ‘groups of’ sentence about what you can see: I see 3 echidnas with 8 spikes each, that makes 24, 3 x 8 = 24

Support 1: Use the visual recording template (shown here), which is similar to the recording templates used throughout the first division unit.

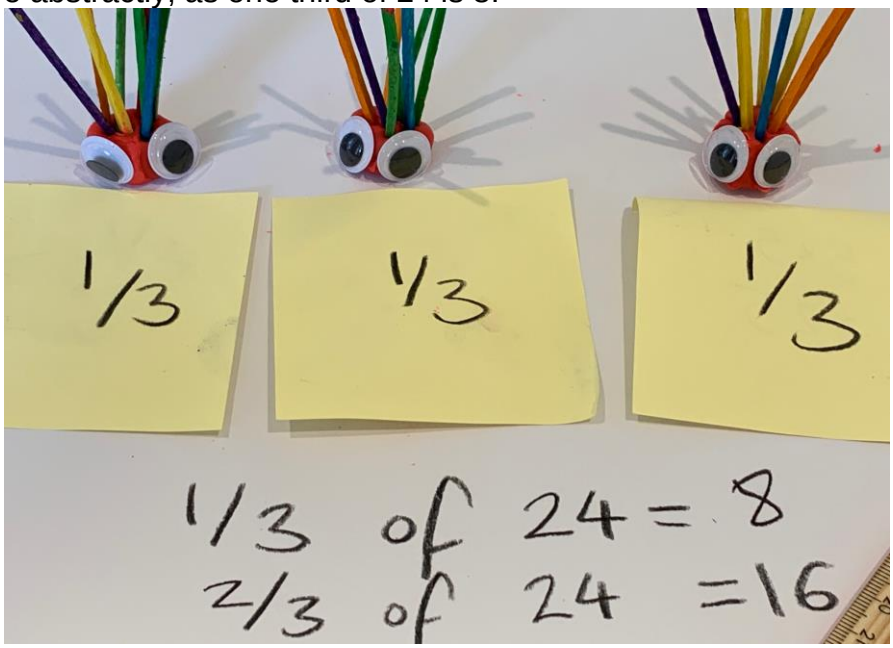


Support 2: Keep the starting number of spikes the same and figure out all the ways to share that same total between varying amounts of echidnas. For example, what are all the ways to share 12? Give these students 12 sticks and remove all other sticks so they cannot add or subtract any from their set starting number.

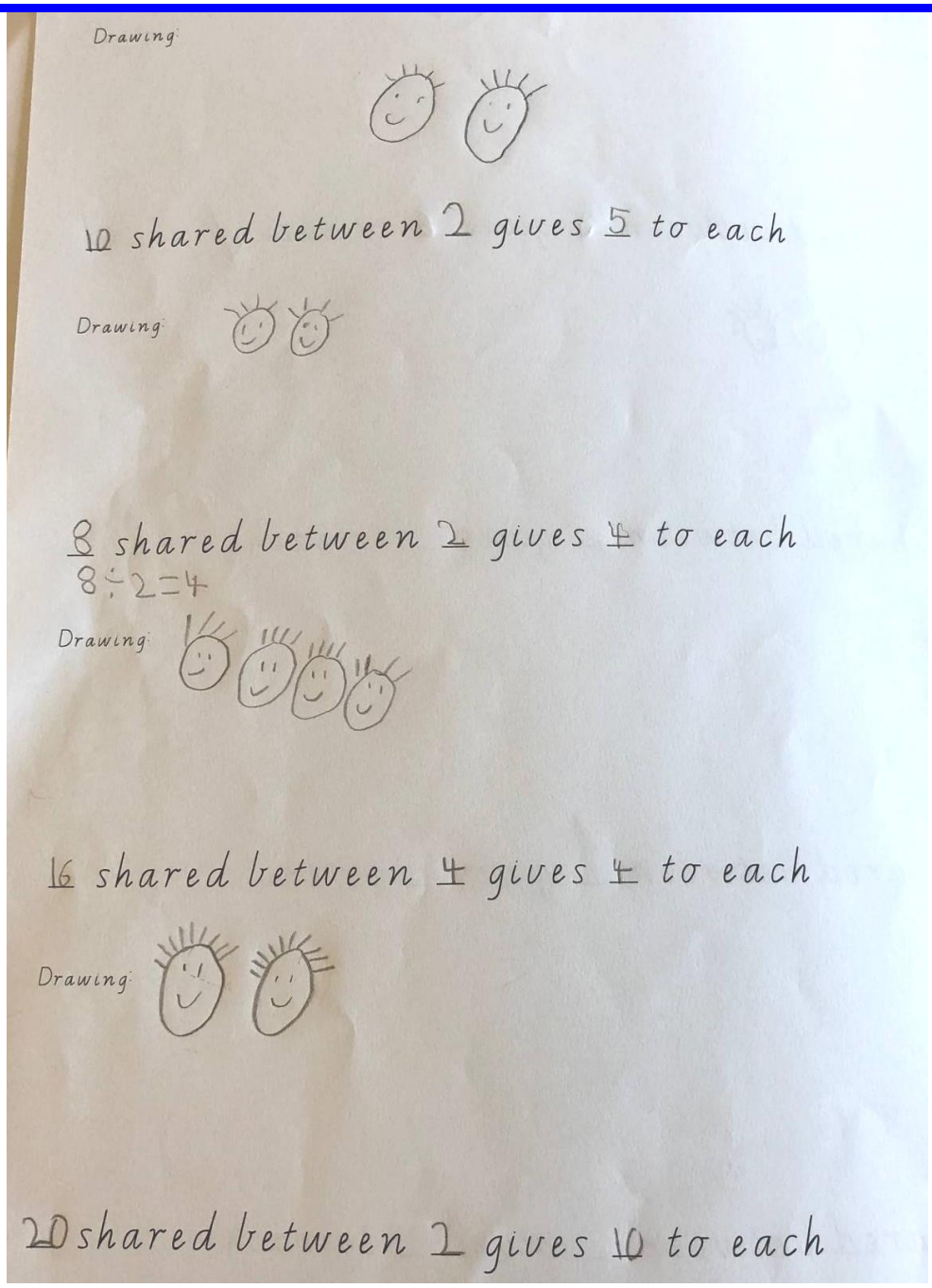
Extreme support: Practise making numbers, rather than sharing them. Roll the 6-sided dice and make that number in spikes. For example, if they roll 6, make a 6-spike echidna.
Later, roll 2 dice and put both numbers on the same echidna to practise addition. For example, rolled 3 on the red dice and 5 on the green dice: 3 red spikes + (and) 5 green spikes = (makes) 8 spikes altogether, 5 + 3 = 8. Record using the _and_makes_ template from Addition Unit 1.

Extension 1: Encourage these students to predict answers using their times tables, before physically sharing out the spikes. For example, for 24, if you know 3 equal groups of 8 is 24 or you know 3 x 8 = 24, you might guess that 24 shared between 3 echidnas will give each echidna 8 spikes. If you don't know the times table, skip-count by 3 to guess the answer (how many times did you need to count by 3 to reach 24). Keep track using your fingers.

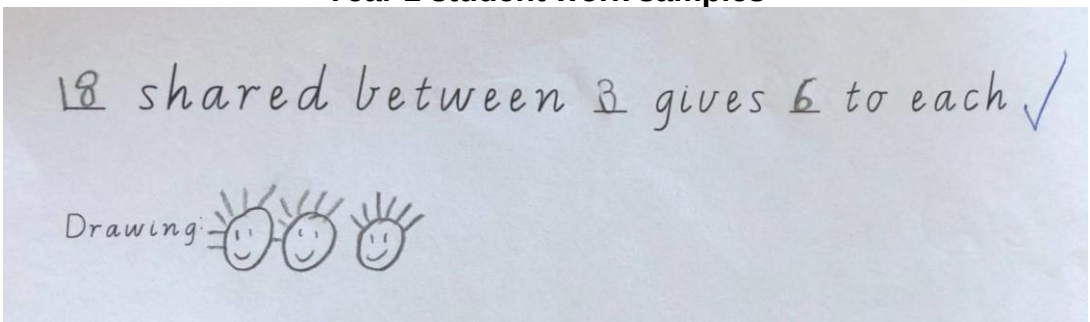
Extension 2: Write the matching fraction fact. For example, 24 ÷ 3 = 8 is the same as saying, 1 out of 3 equal parts of 24 is 8, because this echidna has 1 of the 3 shares of 24 spikes, and so does this one, and so does this one. So, 1/3 of 24 is 8, or 1/3 x 24, again reading this as 1 out of 3 parts of 24 is 8 or, more abstractly, as one third of 24 is 8.



That means 2 out of 3 parts of 24 is 16 (2 out of the 3 echidnas sharing 24 have 16 spikes) and 3/3 of 24 is 24 (the whole collection/all of them).



Year 1 student work samples



Reflection: Refer to the start of this unit – students create worded division problems about this lesson's materials for the final 10 minutes of the session: "I had 20 spears. I saw four echidnas walking along. Each echidna got 5 spikes!"

Subtraction Unit 1: Physical take away actions

1 of 500 Sequential Lessons for the Early Years

Recommended as the very first introduction to subtraction for Kindergarten.
NSW Maths Syllabus links are at the start of each unit plan.

Take Away Lesson 1

Subtraction Squish

Learning intention: Make a starting number, take away/squish part of it and figure out what is left.
Maths vocabulary: starting number, squish, take away, how many are left, sphere

Link to the arts: Today, we are using Play-Doh for maths! Show students this gallery http://www.playdough-activities.com/articles/simple-playdough-creations.html of wonderful yet reasonably simple creations.

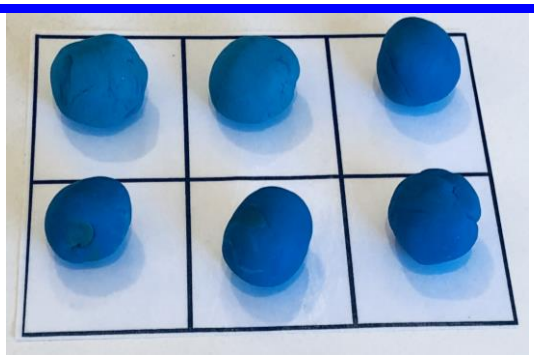
Link to technology: A short stop motion clip that students could try to create their own version of during ICT time: https://www.youtube.com/watch?v=yi1Kt8REHE4

Lesson summary: Students make balls/spheres using Play-Doh. Students place these in a frame, starting with a 4-frame, later working up to 6, 8 and 10 frames. Students then squish some of their Play-Doh balls and figure out how many are left, recording this on the template.

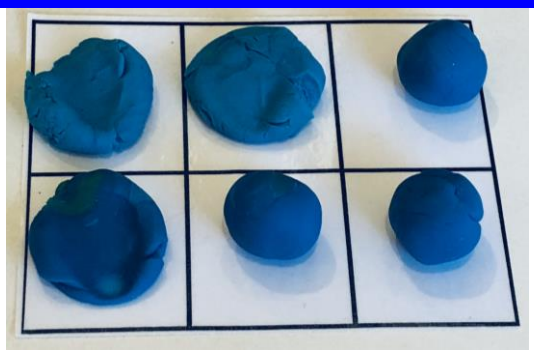
Materials:

- Play-Doh.
- 4, 6, 8 and 10 frames. Print off the ten frame templates from this unit's folder, then slice them into 4, 6 and 8 frames as needed. If possible, laminate each type of frame for durability as these are often used throughout the number units for the early years.
- _take away_ leaves_ recording templates.

Best set-up: Whole-class model balloon pop (*shown above*) from the warm-up section, with students recording using the _ take away _ leaves _ templates. For balloon pop, start with 4 balloons, pop some, all record together on the *take away* recording templates (students sit around the whole-class circle with pencils). Then re-start with another set of 4 balloons. Following balloon pop, model the below lesson with Play-Doh balls around a demonstration desk. Students work independently or in pairs after that.



Make 6



6 squish 3 leaves 3

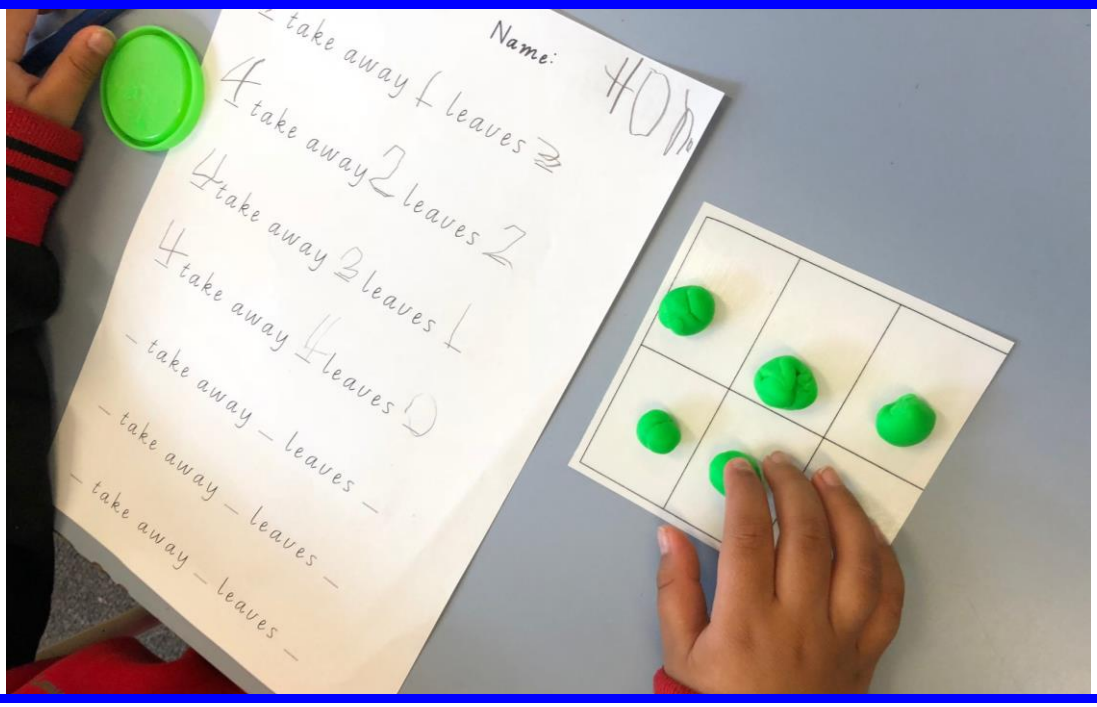
Modelling: Model the actual making of the Play-Doh balls by holding your hand flat (ask the class to chorus the word 'horizontal' three times as they hold their hands flat) and roll the ball under your flat hand against the table. Model recording each step, one at a time, on the _ take away _ leaves_ templates, as you act out each part.

Setting up the session for success and '5 minutes of free create time' at the end: Today is about using the Play-Doh to learn about take away. When we use fun materials for maths, you need to use them sensibly and in the right way. That way, we can keep having fun and doing exciting activities as part of our maths learning! We will have 5 minutes of playtime at the end, BUT if you start using the Play-Doh for something other than maths in the lesson time, I will need to take away the awesome 'free create time.'

For example, after students make the 4 balls in their 4-frame, instruct them to write '4' in the first spot on the recording template as their **starting number.** Chorus the subtraction whole-class chant: "We start with a lot, we end with a little."

When the student **squishes/takes away** balls, model writing down how many they squished in the middle spot of recording template. Ensure that students squish the balls till they are flat, so they can look back and it will be obvious. Mention that, sometimes, they can choose to squish zero.

"How many balls are left?" Encourage students to see how many are left using their maths superhero eyes (subitising), rather than counting them, if possible. Practise using the recording template together as a class, particularly as part of the balloon pop warm-up game (*warm up section*), which can flow straight into this session using the same recording template.



Oral language: Emphasise students whispering as they work:

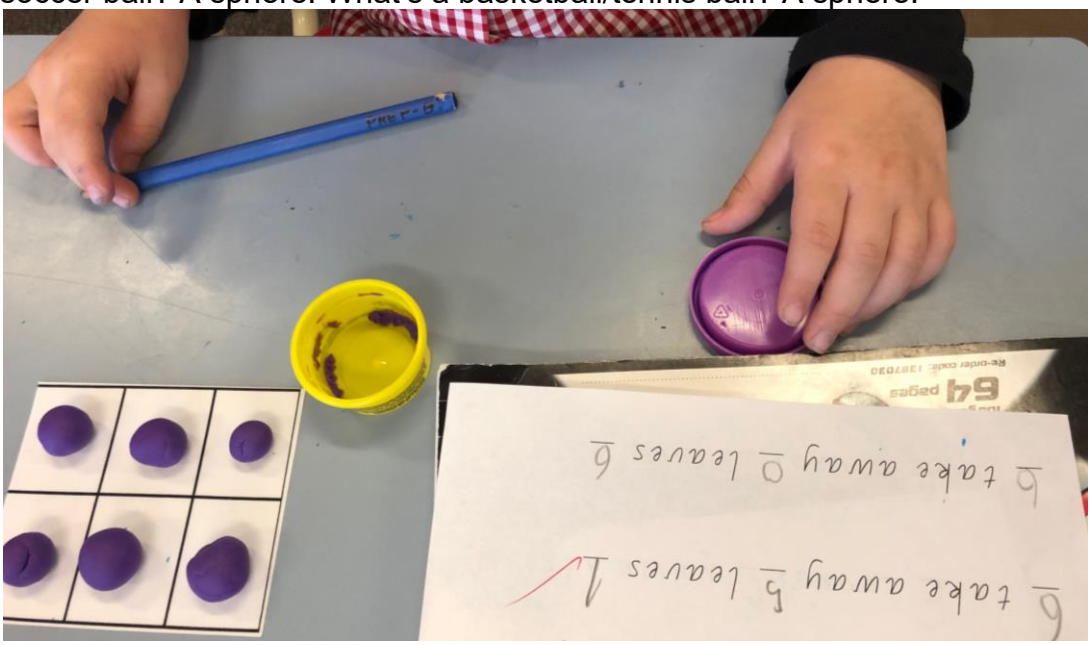
"I have 4."
"I squished 3."
"I have 1 left."

Practise this language with a few examples around a desk as you act it out.

Questioning:

- How many balls/spheres did you start with?
- How many did you squish?
- How many balls/spheres do you have left?
- If you start with 4, could you squish 5?
- What happens if you squish zero?
- What happens if you squish all the balls?
- Do you have more or less than what you started with? Is it always less?

Cross-content vocabulary link: Emphasise that the maths word for balls is **spheres**. Ask the class to chorus the word after you three times. What's a soccer ball? A sphere! What's a basketball/tennis ball? A sphere!



Once a student figures out all the ways to take away from 4, progress them to a 6-frame, then the 8-frame and finally the 10-frame.

Support 1: Start with a 2-frame. Model from the start, for these students, what is and what is not a ball, for example, the flat Play-Doh is not a ball, this round Play-Doh is a ball. This will help when you ask support students, "How many balls are left?" or, "How many balls do we have now?" as otherwise they tend to just say the whole starting number again, without distinguishing between flat and round Play-Doh. Progress to a 3-frame, then a 4-frame, then a 5-frame, and so on as their confidence builds.

Support 2: Fill in the first spot in the template for these students, so that the starting number remains the same for the whole page. This ensures they only need to write what they squished and how many are left (rather than needing to remember their starting number as well).

Extension: Quickly orally assess these students (without the materials) as soon as your class starts work. For example, ask your highest extension student (without the Play-Doh made): "4 take away 2, 4 take away 3, 4 take away 4." If the student can answer accurately and fluently (under 5 seconds thinking time, counting back mentally without materials), give them a frame that represents whichever number started to challenge them.

Very advanced students could start with 2 ten frames, taking away from 20 or teen numbers by rolling a 10 or 20-sided die to determine how many balls to squish. This is so long as that student can fluently take away from all preceding numbers as a known fact, or using the addition fact family, or using another efficient explained strategy.

Drawing strategy: During a second repeat session, students could also draw the materials under their starting number on the recording template. For example, draw 6 circles and cross out the taken away or squished balls, to introduce the drawing strategy as a way to solve subtraction problems.

Place Value Unit 14: Rounding and Estimation

1 of 500 Sequential Lessons for the Early Years

Recommended for Years 2 and 3 (NSW Maths Syllabus links at the start of each unit).

Estimate and Round Lesson 5

Snakes and Ladders Rounding

Learning intention: Round to the nearest ten by seeing which ten you are closer to along a number line.

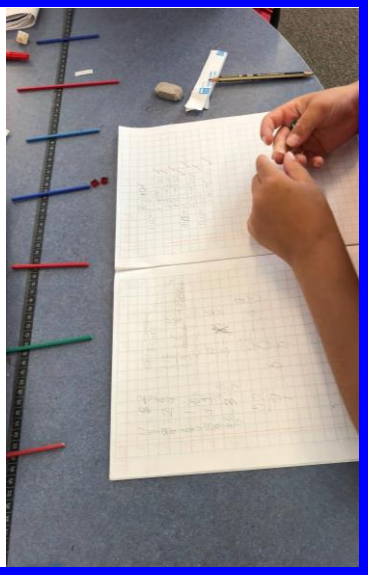
Maths vocabulary: round (which ten are you closer to), nearest ten

Game-based learning: Who has played snakes and ladders before? Today, we are playing the maths version of snakes and ladders! Play an online version with the class during eating time the day prior to this session: https://m.twoplayergames.org/play/snakes-and-ladders.html. Or play on a school gameboard outside during eating time, if one is available like so:

Lesson summary: Students race to 100 along a measuring tape (using it as a number line), moving to the rolled position and then sliding up to the next ten if they roll 5-9 on the 10-sided die, but going back to the previous ten if they roll 0-4. *Do not tell students this – let them figure it out by literally seeing* ***which ten they are closer to*** *as they play the game.*

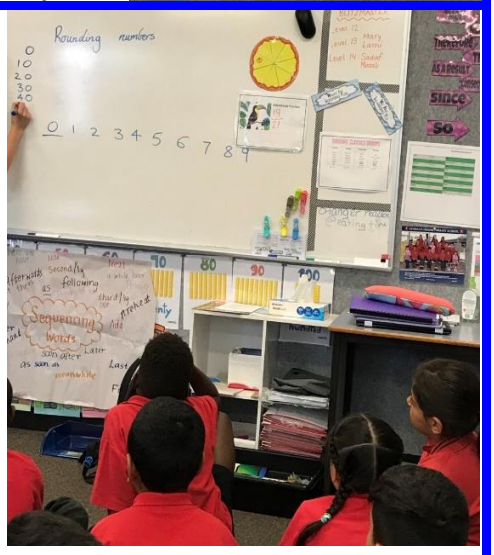
Materials:

- 100 or 150cm measuring tape stuck to each desk with Blu Tack – one per pair.
- Thin bundling sticks (preferable) or popsicle sticks to mark each ten along the measuring tape – put a stick at 0, 10, 20, 30 up to 150.
- Small counters (one per student) to mark their current position, such as a ones place value (MAB) block or other $1cm^3$ counter (it must be 1cm or less in width).
- 10-sided dice – one per pair.



Best set-up: Start with the 'digits vs. numbers' whole-class discussion below. Set up the materials on desks before the at-desk modelling. Then students work with their like-ability maths buddy.

Modelling: Write all of the digits on the board. Make a distinction between digits and numbers. If maths had an alphabet, digits would be the letters, and numbers would be the words. Digits are used to make numbers.

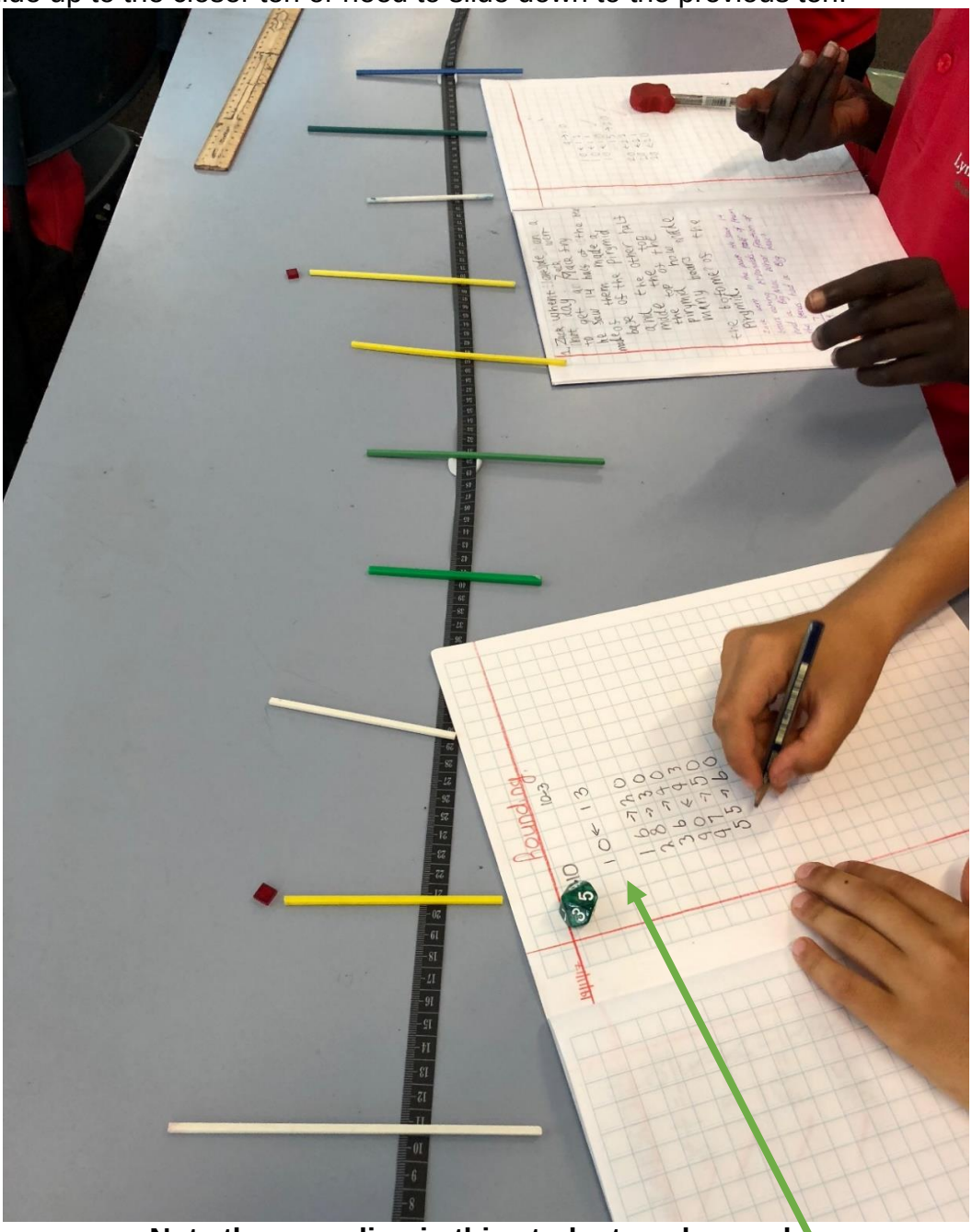


Digits follow certain patterns when we round them to the nearest ten – today your challenge is to figure out the pattern that each digit follows and why. ***Tip:*** Don't give away the gold by telling students straight 'off the bat' that 0-4 stay in the same ten and 5-9 rounds up!

Pointing to all the digits on the board – "Which digit looks the most round?" Some students will say 8 but most will say it is 0. Therefore, all our rounding numbers will end in zero – they will all be tens numbers. Ten is an important number in our place value system for renaming, but for rounding too!

YouTube hook: You wouldn't want to roll down one of these snakes during a game of snakes and ladders! A countdown of some of the world's longest snakes: https://www.youtube.com/watch?v=WViqKHq96mw. Play during an eating time before or after the session since the clip is 6 minutes long.

First, set up an example desk (which could be the desk of your support pair). Stick down the measuring tape with 0 on the left. **Count by tens to place the counting sticks along the line. These sticks are effectively the ladders of the game or the snakes,** depending on whether students get to slide up to the closer ten or need to slide down to the previous ten.



Note the recording in this student work sample.

Modelling (after students have set up desks): Start at 0. Roll the 10-sided die. If you roll 3, move your counter up to '3.' Now, which ten/stick am I closer to? 0 or 10? You can visually see that my counter (on 3) is closer to 0, not 10. So that's a snake – oh no!
Next turn, I roll 7. I'm closer to 10, so I can move to 10 – woohoo!
Next turn, I roll 2, so I move up to 12. Am I closer to 10 or 20? I'm closer to 10, so back I go!

To record, students write the number they landed on in the centre of their page, '3,' then use an arrow to show the tens number they rounded to:

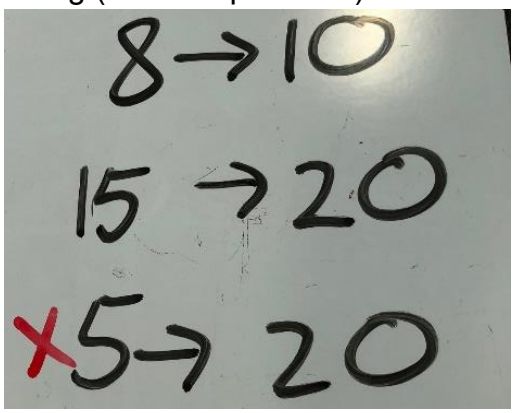
0 ⟵ 3

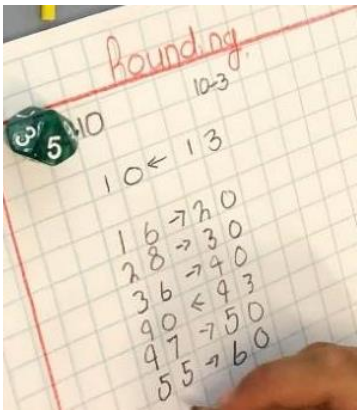
If a student rolled '7' and they were on 30, they would record it like this:

37 ⟶ 40

Misconception alert: Emphasise that students should not record this as '7 to 40,' because 7 does not round to 40! 37 rounds to 40, and you were on 37, not 7. If you record '7,' not '37,' I will have to slide you back to '7' when I see this, which will give your partner a *huge* advantage. This is the most common recording mistake, so model for students to avoid this from the start of the session during your modelling at the desks.

Students must record as they play, but only need to record their own position and rounding (not their partner's):





Questioning:

- What if I rolled 5? Well, it's right in the middle, so of course you are going to choose to use it as a ladder, not a snake. Later in the session, set up a 5-minute challenge based on this question: "Why does 5 round up, even though it is right in the middle of either ten?" Give students time to think and brainstorm reasons. The reason 5 rounds up is due to how many digits there are in our number system. We have 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. So, 5 is part of the 6-9 club to make it an even share of digits that round up to the next ten and those that stay in the same ten.

Support: Use a giant number line along the floor to assist them to use their own bodies to figure out which ten they are closer to, racing to 30 instead of 100, then restarting back at zero once either player reaches 30.

Extreme support: Play an actual game of snakes and ladders to focus on one-to-one correspondence, rather than rounding. Use this context to practise counting to 100 (saying each number they land on) and also subitising (using **maths superhero eyes** to see the number they rolled on the dice, without needing to count the dots one-by-one). If needed, slice off the gameboard so it ends at 20, 30 or 40, close to that pair's upper counting limit. A printable *snakes and ladders gameboard* is in this unit's folder.

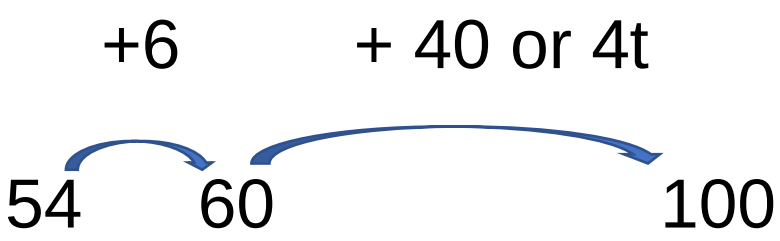
Reflection: Which digits were the snakes (kept you in the same ten)? Which digits were the ladders (always went up to the next ten, rounded up)?

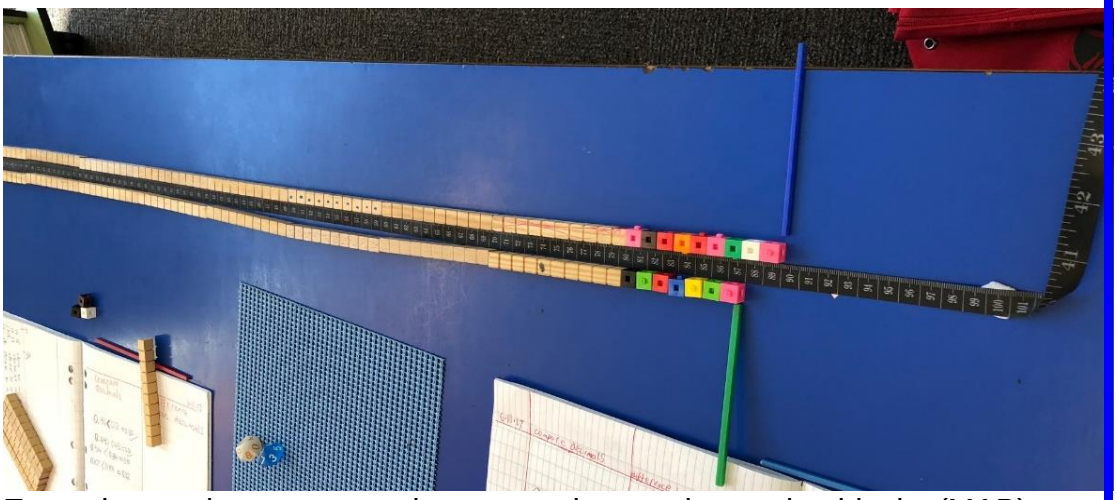
Extension 1 – Partition 100: Figure out how much more you would need to reach 100 from your current position. For example, if you are on 54, how many more spots to go until you reach 100? Well, you could add 6 to get to 60. Then 4 more tens to get to 100. So, it's 46 to go.

Misconception alert: It is not 54 + 56, because that would get you to 110! Many students just use their 10 facts, without accounting for the ones creating an additional ten. For example, many students will believe that 73 + 37 makes 100, rather than 73 + 27.

The way to address this misconception is to show students its flaw using the place value blocks (MAB) along the measuring tape. Make 7 tens and 3 ones. Then add another 2 more tens blocks and 7 ones. You are at 100! When you add 3 tens and 7 ones to 73, you cannot actually fit it within the 100, it actually makes 110!

This is essentially a jump strategy and can be recorded like this by extension students, using a second column of their grid book (while playing the regular version of the game and recording that on the other half of their page):





Extension students can use the tens and ones place value blocks (MAB) from their current position, placing these along the measuring tape for assistance to figure out 'how many more to make 100?'

Alternatively, try it mentally by getting to the next ten by adding ones (use your 10 facts), then use the 10cm counting sticks to figure out how many more tens there are to go to reach the full 100.

Extension 2: Use the measuring tape as a decimal number line. 1m is the target or whole. The tens sticks are tenths (one out of ten parts) and students round to the nearest tenth each turn.

Extension modelling – continuation of the fishbowl while other students begin work: How many centimetres are in one metre? So each centimetre is one out of 100 parts or one hundred*th*. Each 10cm is one out of 10 parts of the whole metre – each 10cm is one ten*th* of the way. This is very clear with the sticks set up at each ten mark, because students can see that one ten is one out of ten parts of the way towards one metre, 2 tens is 2 out of 10 or two tenths of the way, and so on.

As you play, record where you land as a decimal – a part of one whole metre. For example, if you landed on 76, it would be 0.76m (0 whole metres and 76 parts of one metre), or 76/100 (76 out of 100 centimetres). You can see from the counting sticks placed at each tenth, 76/100 is closest to 0.80m or 8/10m (8 out of 10 parts of one metre) or 80/100m (80 out of 100 parts of one metre).

Recording would look like this, but can also show the fraction notation:

0.30m ⟸ 0.34m 30/100 ⟸ 34/100

3/10 ⟸ 3/10 + 4/100

Questioning:

- What's worth more, the tenths or the hundredths? Is this the same as our non-decimal place value system, or reversed? Why? Because ten*th* means 1 out of 10 parts of the whole, whereas hundred*th* means 1 out of 100 parts of the whole.
- Where do you think 0.50 is on the measuring tape (5 tenths, 0 hundredths)? Is 0.5 (5 tenths, no hundredths) the same or different to 0.50? Where is 0.05 (0 tenths, 5 hundredths)? Which position is better, if you are racing to one whole metre, 0.5m or 0.05m?

Extension 3: Instead of placing the sticks at every tenth, place them at every fifth by splitting the 100cm or one whole metre into five equal parts. First, figure out where the sticks should go (at 20, 40, 60, 80 and 100). Now roll a 20-sided die and round to the nearest fifth. This is also the percentage, 1/5 = 20% or 0.20 or 20/100 or 2/10, because percentages are always out of 100, so 1/5 is just splitting 100 into 5 equal parts. 2/5 is 40% or 40cm or 0.40, and so on.

Invent new versions of the game by changing the fractions you are rounding to and setting up the new number line (essentially figuring out the percentage and decimal conversions). Choose dice that make each new version of the game progress at a fair pace (not too fast and not too slow), depending on the location of the sticks that show the fraction to decimal to percentage conversion.

Fractions Unit 1: Understand fractions as 'out of'

1 of 500 Sequential Lessons for the Early Years

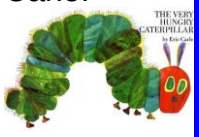
Recommended for Year 1 and Year 2 (NSW Syllabus links at the start of each unit).

Out of Lesson 2

Fraction Caterpillars

Learning intention: Say and write 'out of' sentences. Understand fractions using 'out of' language (not just as halves, quarters and eighths).
Maths vocabulary: out of, fraction (parts of a whole or parts of a collection), numerator (how many of that colour you have), denominator (how many parts it has altogether), spheres, circles

Literacy Link – Numeracy Picture Book: Read *The Very Hungry Caterpillar* by Eric Carle.



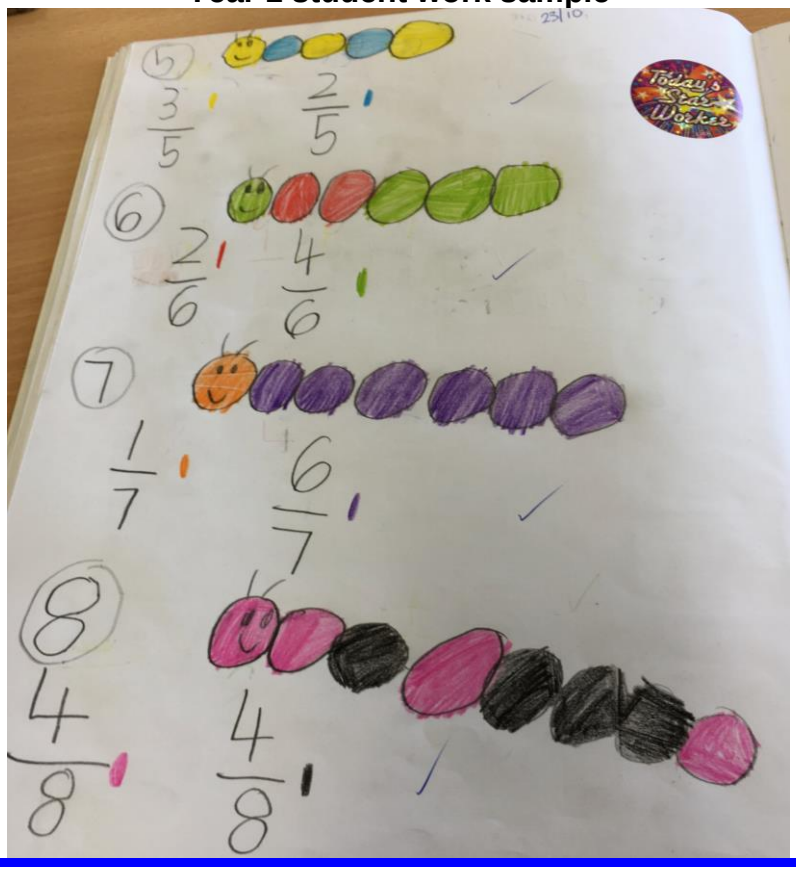
Real-life hook: Have you heard of towel animals? Show students this link. Well, today, we are going to make something equally fun and crazy: fraction pompom animals!

Lesson summary: Students say and write 'out of' sentences about pompom fraction caterpillars, then other evolved creatures. When ready, students also record the fractions using numbers and words.

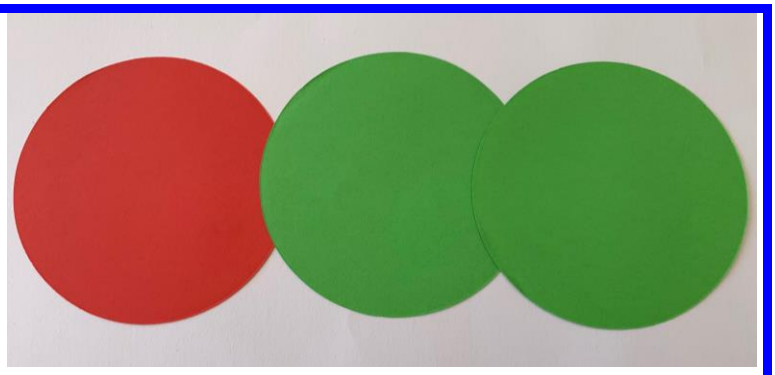
Materials: Pompoms and post-it notes.
Giant teacher modelling materials: Kinder circles to make giant caterpillars around a whole-class circle or desk.

Best set-up: Whole-class circle model with kinder circles, followed by a short at-desk demonstration with pompoms.
Then students work independently, making their own animals and progressing to new fractions when they are confident in naming their current creature. Creatures 'evolve' according to the anchor chart on pages 18-19. This encourages students to master each fraction to upgrade to the next creature.

Year 1 student work sample



Modelling: Whole-class model around a circle, making your own fraction caterpillar using kinder circles.
How many parts of my caterpillar are red?
"1 **out of** 3!"



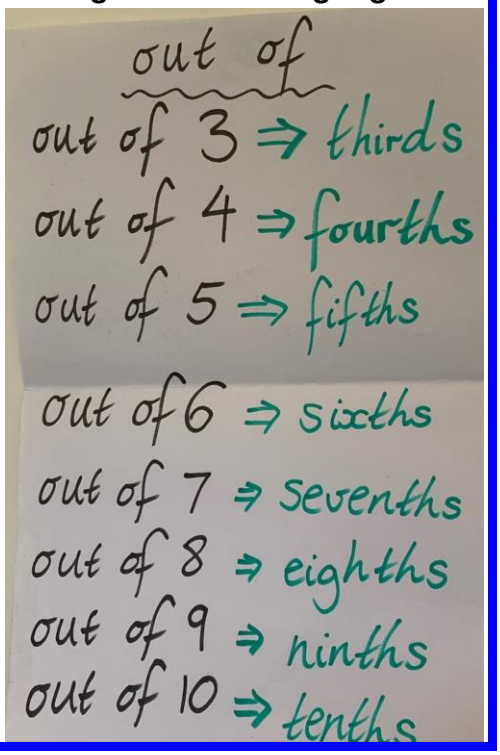
Misconception alert:
Tell students it is not 1 out of 2, it is 1 (circling your finger around the red part) out of 3 (circling your fingers around the whole body/all the parts).

Instruct students to use these fingers movements throughout the lesson as well (circle around the parts, then circle around it all). The last number is how many parts there are altogether. It's not 1 *versus* 2, it's 1 **out of** 3 (the whole caterpillar, all of its body parts).
How many parts of my caterpillar are green? 2 out of 3!
The **numerator** is the *num*ber of parts I am interested in, it goes on top.
The **denominator** is how many parts it has altogether, it's the 'out of' number, it goes on the bottom. De*nom* bo*ttom* (emphasise the rhyme).

Students can keep their caterpillar at only three parts for some time, just changing the colours and attempting to record this in all three ways:

"1 out of 3" $\frac{1}{3}$ one *third* (say it like in caterpillar story, on the *third* day)
(say it like you came it in a race – I came 3, I came *third*!)
Read the vinculum (line between the numerator and denominator) as '**out of**'

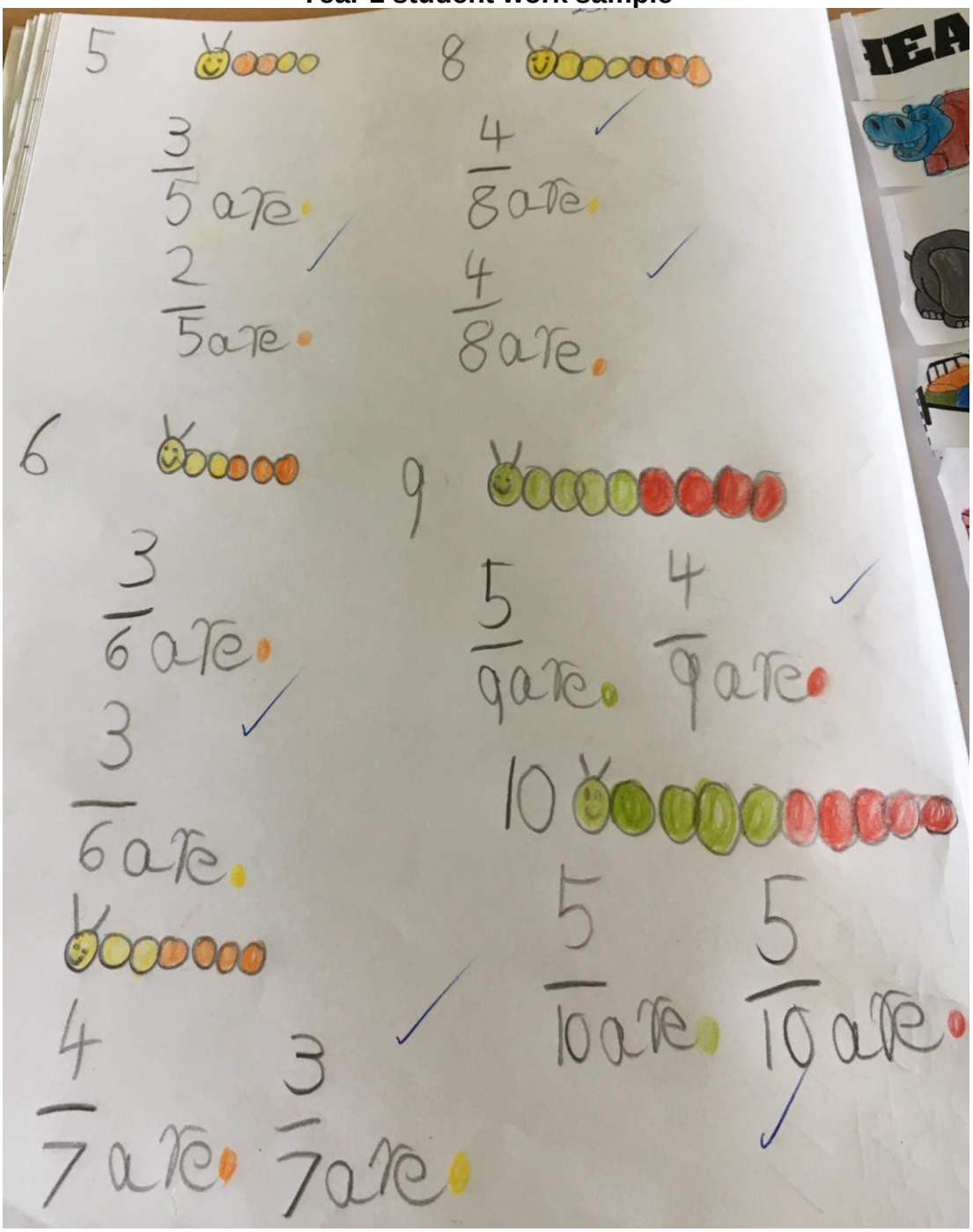
Anchor chart to support to name fractions using the same language pattern as ordinal numbers for the denominator.



Questioning:

- What fraction of your caterpillar is red/blue/green?
- If it had two of the same colour, what would we call that? TWO thirds!
- What if all the parts were the same colour? THREE thirds. How else could we say that? The WHOLE caterpillar is pink!
- What if 2 out of 4 parts of your butterfly are yellow? How much of the butterfly is that? (Put your hand down the middle of it so it literally looks like half of the butterfly).

Year 1 student work sample



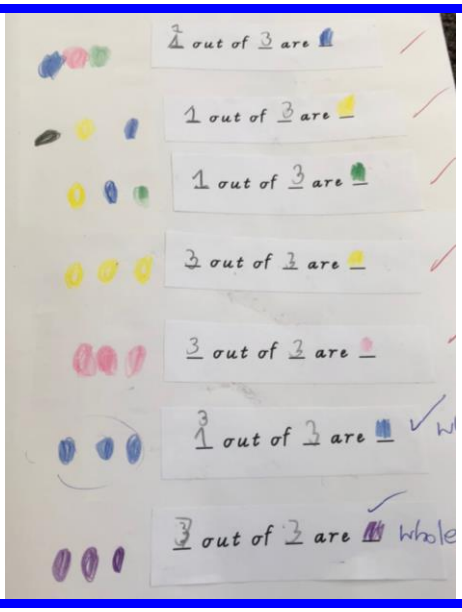
Cross-content link – 2D and 3D shapes: What shape are the pompoms? Spheres – all balls (soccer balls, basketballs) are spheres! When you draw them flat in your book, what do they look like? Circles.

Class numeracy wall display and 10 minute exit ticket for formative assessment: Students make a display of their favourite caterpillar using 3 kinder circles that they stick down to an A4 piece of paper. Record their fraction in as many ways as possible on their end-of-session poster, which can function as an exit ticket and formative assessment piece. Allow students to use more than 3 kinder circles if they wish to show a more impressive fraction – "Show me the fraction creature that challenged you the most."

Support: Use just 3 parts for the whole session, constantly varying the colours of these.

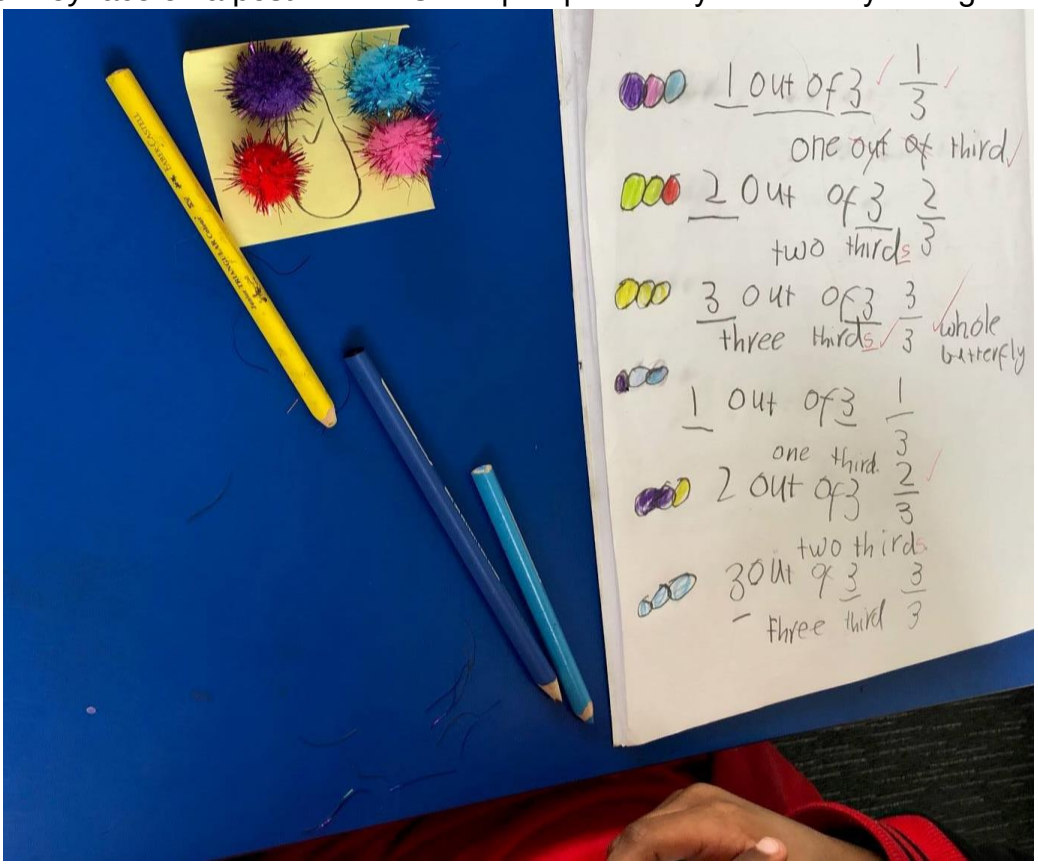
Record using pre-sliced '_out of_' templates from this unit's folder. These remove any literacy barriers from the recording.

Focus entirely on the 'out of' recording (1 out of 3), not recording the fraction in words or numbers.



Extension 1: Your caterpillar grew overnight – just like in *The Very Hungry Caterpillar* story! Use 4 parts, out of 4, fourths/quarters. 5 parts, out of 5, fifths, and so on towards 10 parts, out of ten, tenths, 11 parts, out of eleven, elevenths, 12 parts, out of twelve, twelfths – you could go on forever!

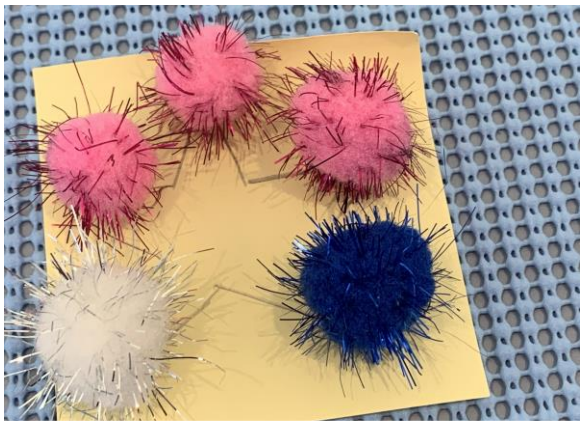
Creature evolutions for the following sessions (or within that same session for students who grow confident at 'out of 3'): What if the caterpillar had 4 parts? Turn it into a butterfly by drawing a butterfly body with a smiley face on a post-it note. Use 4 pompoms as your butterfly's wings!



Year 1 butterfly version in action and recording for their caterpillar work

Progressions for students who show readiness:

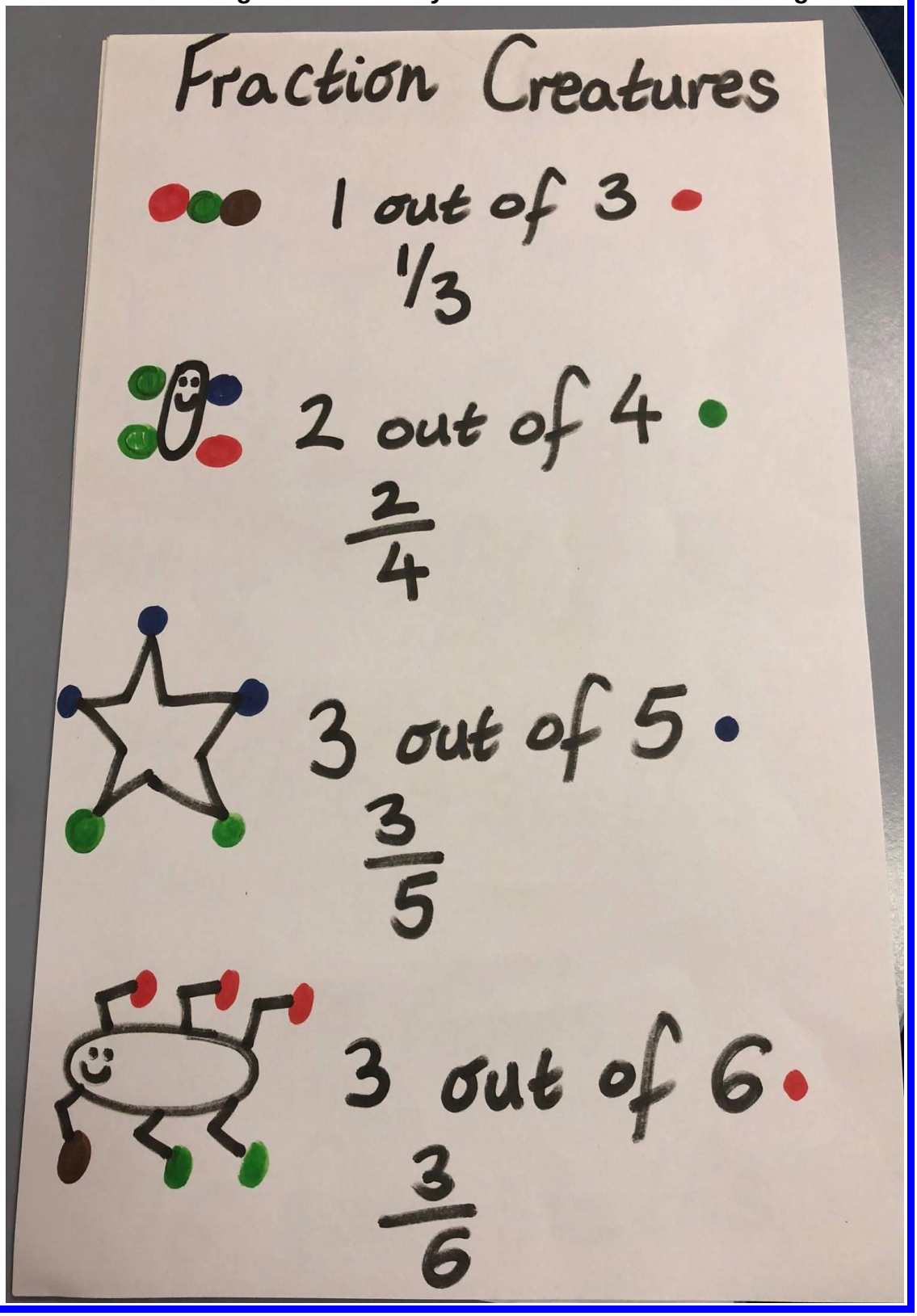
- It becomes a starfish, with 5 pointy ends. Out of 5 (5 as a race number, fifths):



- It's a bug, with 6 icky legs! Out of 6, sixths:

- Now it has turned into a spider with a smiley face for the head and eight legs! Out of 8, eighths:

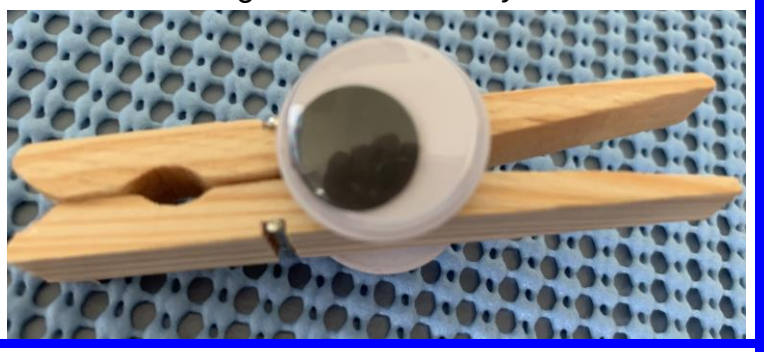
Create an anchor chart so that students know the progression and how their caterpillar can evolve throughout the session (after checking their progress with you). Roam to question and check in with students, formatively assessing readiness to progress to the next fraction from both their recording and their orally demonstrated understanding:



Interesting fact:
Ground feeding birds are more attracted to camouflage colours, such as brown, grey or green.

Extension 2: Compare the two fractions/colours in their creature and decide which is the largest and smallest fraction. If a bird was diving down from the sky to eat your spider, would it aim at the red or green part? The green because it is 6/8 versus 2/8, so draw 6/8 **>** 2/8 like a bird's mouth about to eat the larger fraction of your spider.
This 'bird's mouth' is what maths calls the greater/less than symbol.

Extension students can make a greater/less than sign bird mouth using two popsicle sticks, or even just a peg with a googly eye stuck on both sides.

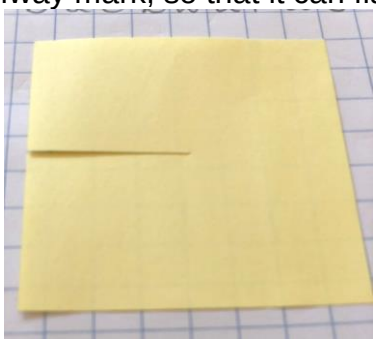
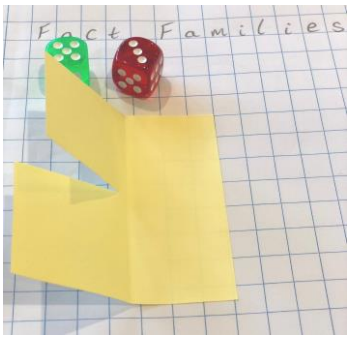
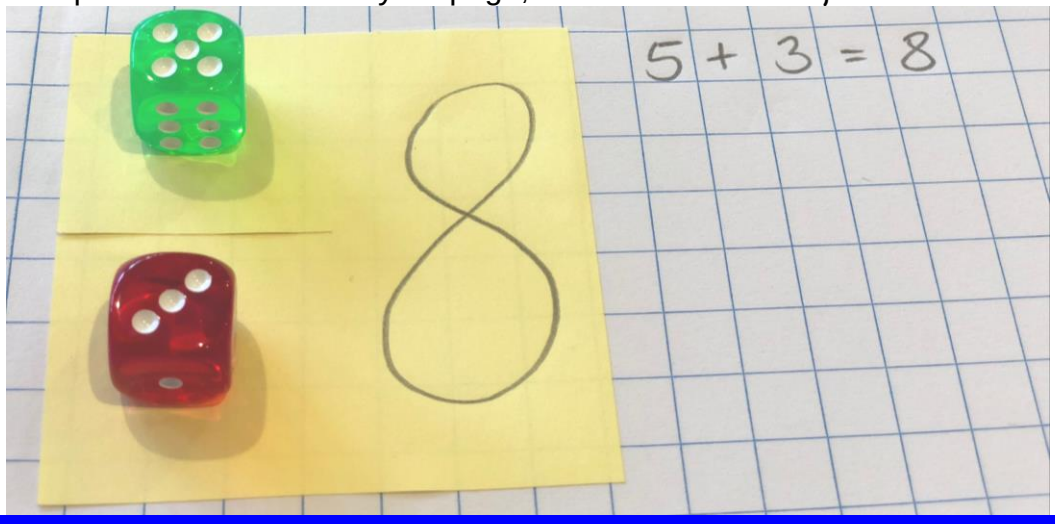


Extension 3: Identify whether each fraction is more or less than half. Is 3/4 (3 out of 4) more or less than half of your butterfly? More, because half of 4 is 2, so 2/4 is half and 3/4 is more than half. Is 2 out of 6 more or less than half? Less than 1/2, because 3/6 would be equal or equivalent to half.

Subtraction Unit 7: Use Fact Families to Subtract

1 of 500 Sequential Lessons for the Early Years

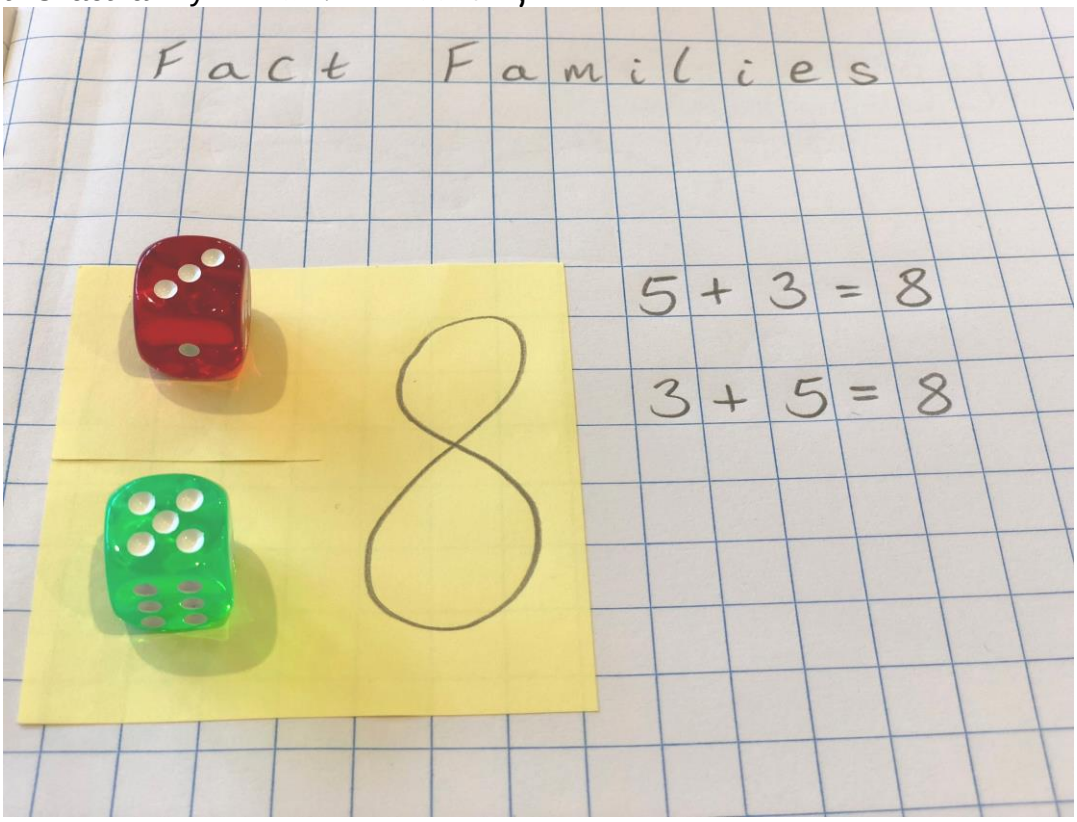
Recommended for Year 2 and Year 3 students (NSW Maths Syllabus links at the start of each unit).

Fact Families Lesson 2	**Post-it Note Fact Families** **Learning intention: Use addition to help you solve subtractions.** **Maths vocabulary: fact family, turnaround fact, addition number sentence, subtraction number sentence, horizontal, halfway mark**
History and growth-mindset link: Read the following Wonderopolis article with students https://wonderopolis.org/wonder/who-invented-sticky-notes. The inventor of post-it notes invented them by mistake! He was trying to invent a super strong glue, but he invented a very weak one by mistake! He essentially failed. That mistake he made was *so good* that he invented one of the world's most popular products! That shows mistakes are great opportunities! So, to celebrate	**Lesson summary: Students use post-it notes to create fact families.** **Materials:** • Post-it notes distributed in small piles to the middle of group desks. • Two 6-sided dice per student. **Best set-up:** Fishbowl model with A3 yellow paper as your giant post-it note examples, followed by a normal-sized example in a support student's maths book. **Tip:** Always use support students' maths books for your modelling so the examples are at the top of their page. Students then work independently. **Modelling:** Create a few A3-sized examples together around a modelling desk. First fold the post-it vertically in half, then unfold and slice horizontally to its halfway mark, so that it can flap like so:   Stick the post-it on the left-hand side of your page. Roll two 6-sided dice. Put the dice on the two flaps and write the total on the other side of the post-it note. These are the 3 numbers that live in your **fact family!** Write the equation on the side of your page, "5 and 3 makes 8," 5 + 3 = 8 

taking a risk and the great things that can happen when you are brave enough to make mistakes, we are doing post-it note maths today!

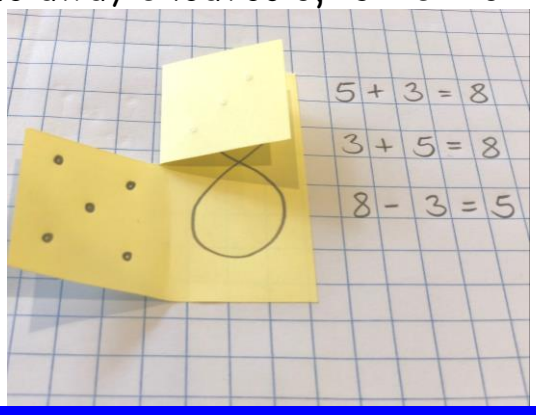
Now switch the position of the dice. Students could use the catchphrase, "Change places!" from a hook experienced in the previous addition unit to build their understanding of **turnaround facts** (https://www.youtube.com/watch?v=8tYXfssLOSM).

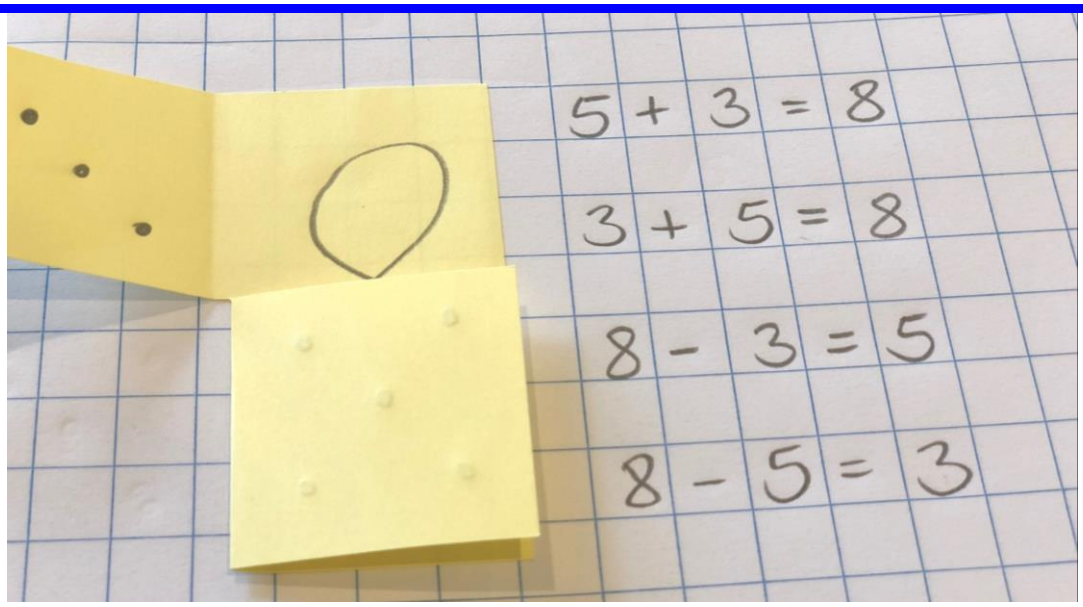
Switch the dice to write the other **addition number sentence** that lives in this fact family: "3 and 5 makes 8," 3 + 5 = 8



As you remove the dice, draw the dots on the flaps.

For subtraction, **start with the total (8) and fold over one of the flaps.** Say the sentence as you do it, "8 take away 3 leaves 5," 8 – 3 = 5





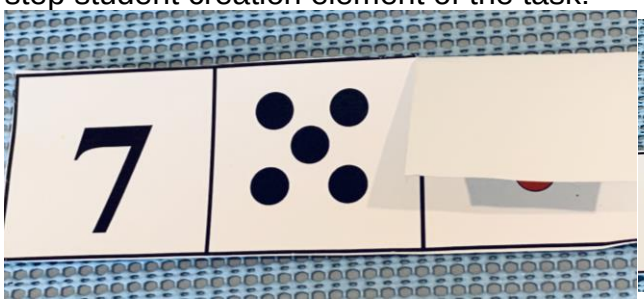
For the final subtraction fact, start with the whole again (8) and cover it with the other part (5).

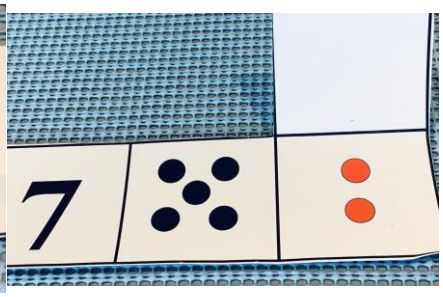
Say it as you do it, "8 take away 5 leaves 3," 8 – 5 = 3

Questioning:

- What does 2 and 5 make? If you know 2 and 5 makes 7, do you know 7 take away 2? Do you know 7 take away 5?
  Encourage students to use a **fact family/think addition strategy** to solve subtractions, moving on and progressing from a counting back strategy, particularly if they are still reliant on their fingers to subtract (Subtraction Unit 3). Use the wording: For 7 take away 5, think *5 and what* makes 7? If particular students are struggling this with concept, return to tasks from Subtraction Unit 4 (counting on/difference between concept) and Addition Unit 4 (partitioning the numbers 3-9).

Support 1: ***Play fact family hide-and-seek instead with a like-ability partner:*** If the instructions to create the post-it note flaps are too much for these students, use the *Missing Part Cards* (shown below) from this unit's folder. These are similar to the post-it note flaps, but remove the step-by-step student creation element of the task:





"What's hiding?" Write the matching addition and subtraction sentence for that hide-and-seek card:

5 + 2 = 7 7 – 2 = 5

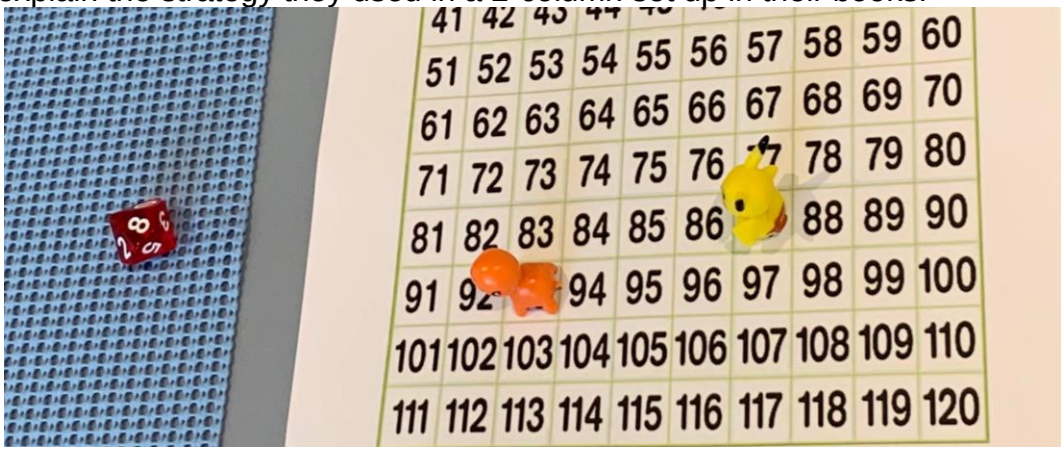
Support 2: Use 3-dot dice (with 1 on two sides, 2 on two sides and 3 on two sides) to keep their fact families within 6. If unavailable, adapt any dice you can write numbers onto to create 3-dot dice.

Before further extension: First, orally assess these students to ensure that they are consistently using a fact family strategy to subtract. For example, “What’s 9 take away 6?” Does the student say 3 straight away *and* can they explain how they did it – ‘I know 6 and 3 is 9 so I know 9 take away 6 will be 3’ – or did they just count back very quickly: 8, 7, 6, 5, 4, 3.

Students need to be able to fluently and rapidly solve subtractions from numbers up to 10, then 20, within 3-5 seconds of thinking time, before moving to extension options. Students also need to know how to explain their strategies, including how they used difference between/count on (Unit 4), backwards 10 facts (Unit 5), backwards doubles (Unit 6) or a fact family/think addition strategy (this unit) to solve a subtraction. This ability to explain is critical in order for students to apply these strategies to more complex equations later, and still be able to show their working out.

Extension 1: Change the type of dice in use to generate the first two numbers in the fact family. Use two 10-sided dice, then two 20-sided. Use place value tens dice as well (dice that show 10, 20, 30, and so on). For example, if you know 3 + 4 = 7, you also know 30 + 40 = 70, 70 – 30 = 40 and so on.

Extension 2: Play a race back to 1 game to apply their knowledge of fact families to subtraction from two-digit numbers and show their strategies. Start their counter at 120. Roll a 10-sided or 20-sided die and race against a like-ability partner to be the first to reach 1. Each time they subtract, explain the strategy they used in a 2-column set up in their books.



For example:

Subtraction equation	Strategy
120 – 6 = 114	I used backwards 10 facts 10 – 6 = 4 so 120 – 6 = 114
114 – 7 = 107	I used backwards doubles 14 – 7 = 7 so 114 – 7 = 107
107 – 3 = 104	I used fact families 3 + 4 = 7 so 107 – 3 = 104

Place Value Unit 6: Subitise (flexible formats)

1 of 500 Sequential Lessons for the Early Years

Throughout Kindergarten as a maths warm-up to build and consolidate subitising.
NSW Maths Syllabus links at the start of each unit.

Subitise Lesson 8

Maths Superhero Eyes!

Learning intention: See numbers in different ways (without counting).
Key vocabulary: maths superhero eyes (subitise), "I see...I see...I see...," parts, total (altogether), combinations (ways to make), rotate

Superhero hook: If you were a superhero, what superpower would you want? Invite student suggestions which often include flying, super speed and invisibility. Well, I think x-ray vision is really cool because you can see anything! Do you know that you can have a maths super power? Maths superhero eyes! Everyone can learn this super power through practice, by seeing numbers,

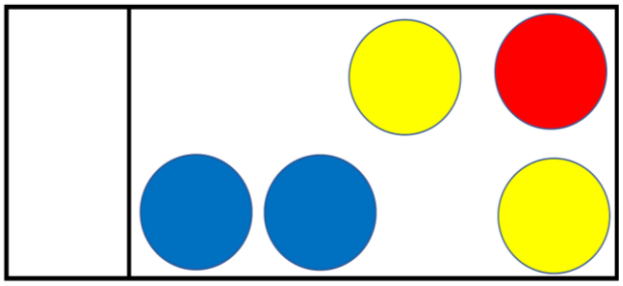
Lesson summary: Students show and explain to their partner how they saw each number. Students use their fingers to circle around each part of the plate, then listen to how their partner saw the same collection.

Note the strategic arrangements that make use of colour. Plates can show numbers in their regular formats (like on 6-sided dice), but should also show lots of irregular formats (numbers that are not in their usual dice format):

not counting 1, 2, 3, but just seeing 3! Let's practise it! Everyone put on your superhero eyes! Students can motion to their eyes and use their fingers to create mini 'goggles.' Consider bringing in your own real goggles as an extra prop for effect; for example, skiing or swimming goggles.

Materials:

- Plates, approximately 10 per pair of students, 100 in total.
- Sticker dots in different colours, ideal for visual learners in particular. **Alternatively, printable versions of dot cards are in the unit folder:**



- *I see, I see, I see* recording template from this unit's folder.
- *Optional extra prop for the hook:* Superhero goggles of some sort – ski mask or swimming goggles to excite students about 'superhero eyes.'

Creating the plates tip: When creating the plates, aim to create some that look similar to dice arrangements, but most that do not. For example, show 7 as 4 black dots in the corners and 3 in the middle, or a long line of 5 red dots and two black dots, or 6 in black dots like on dice with 1 extra red on the side. **See the photographs from the first page and following pages for multiple examples.**

Creating the plates tip: In the extension/support below, it indicates how you may wish to make some plates easier or harder by varying the number of dots in a set. Make differentiated sets using different coloured plates (for example, mid-level plates are green, support plates are pink and extension are blue).

Creating the plates tip: If possible, create these plates as a team or using education support officers for assistance, so that you can reduce the workload and maximise their use in warm-ups throughout the year by rotating the materials from class to class. The plates are very durable, lasting for years.

Modelling: Emphasise seeing numbers over counting them. You don't need to count 1, 2, 3, 4 if you can see 3 and see 1, then see 4 altogether. Show students how to do the finger movements, moving their pointer finger around the 3, saying, **"I see 3,"** then moving their finger around the 1, saying, **"I see 1."** Finally, move their finger around the whole plate/total/circumference, saying, **"I see 4!"** Student A does this as student B watches.

Next, student B can do the same plate, showing their partner how they could see the number differently. **"I see 2, I see 2, I see 4!"** always using the **finger movements.** If student B is struggling to see it another way, try twisting or **rotating** the plate.

Use the word **combinations** to describe this: 4 can be made using 3 and 1, or 2 and 2. It can be made using different combinations. This part (3) and this part (1) make the **total** 4. This part (2) and this part (2) also make the total 4. There are lots of ways or combinations that make the same number! Students record what they see using the 'I see, I see, I see' template in this unit's folder.


Use your super hero maths eyes! Name:

I see...	I see...	I see...

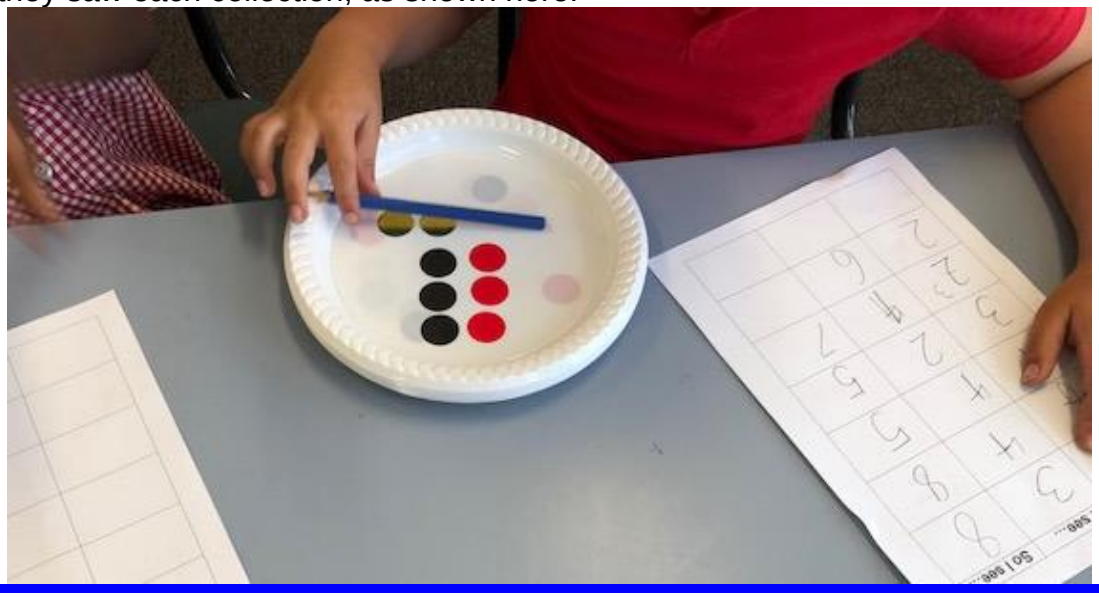
Best set-up: Model with a student partner at a demonstration desk, **particularly emphasising the finger movements.** Students practise with their regular maths buddy. Consider also using a *Subitising PowerPoint* from this unit's folder as a quick maths superhero eyes warm-up for the whole-class.

Questioning:

- How did you see that plate? What parts did you see?
- Can you show me your "I see…I see…I see…?"
- Emphasise for partners to try to see the number differently to their friend. Did you see it another way? Can you? What if I **rotate** it like this?

Class management tip: When students finish a set, ask them to return it to a pile in the middle of the room and collect a new pile. If you have colour-coded the plates by difficulty level, you can simply ask students to ensure they collect a pile that is the same colour. As students show they are improving or struggling, you can fluidly change the challenge level for them by altering the colour plates they are working on with their like-ability maths buddy.

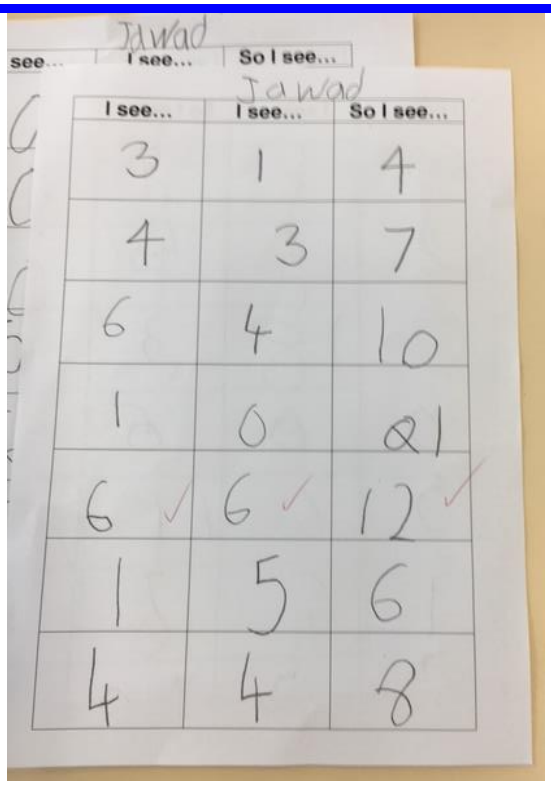
Some students prefer using a pencil, rather than their finger, to show how they saw each collection, as shown here:



Most students complete 2 or 3 double-sided pages of the recording template, working on this for about 30 minutes of the session.

Use your super hero maths eyes! Name:

I see...	I see...	I see...

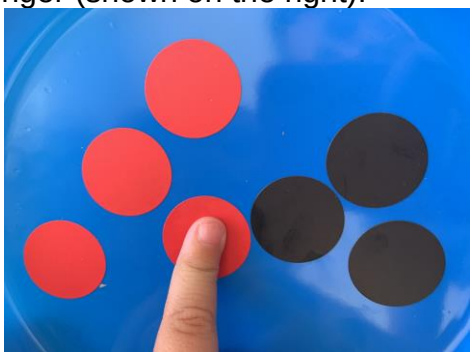


"I see 4,
I see 4,
I see 8!"

Encourage students to see the collection using large parts. For example, avoid students saying, "I see 2, I see 2, I see 2, I see 2, I see 8," as this is not an efficient way to see 8. Instead, encourage the student to see 4 and 4. If this is not possible, the student may need to work on smaller plates, until they become confident at subitising 4 as a set of 2 and 2, before making the leap to subitising 4 twice and seeing this as 8.

This provides a much deeper, richer understanding of the numbers to 10, far beyond just learning single-digit addition equations by rote. This is because students start to authentically trust and, after consistent warm-up practice at subitising over two terms, instinctively know that 4 and 4 makes 8. It builds the foundations for partitioning the numbers 3 to 9, doubles and the 10 facts. It also greatly assists with subtraction, particularly the later developmental step of fact families. For example, if you trust that 3 and 5 makes 8, then you can more easily form the connection that 8 take away 3 makes 5, and 8 take away 5 makes 3.

Follow on option: The next day, focus on one more with students identifying the number on the plate, then adding an extra dot as a counter (shown on the left). Later, focus on one less, with students identifying the number on the plate, then covering one dot with their finger (shown on the right).



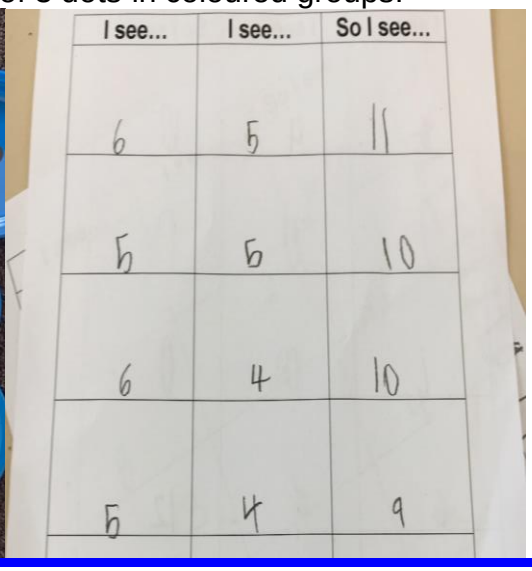
Record using the *one more and one less box recording templates* from the Place Value Unit 8 folder, which are colour-coded for students.

Support 1: Continue to play Bingo using the templates from Subitising Unit 5**.** Roll 3 dot-dice or 6-sided dice (depending on their current progress) to continue to practise subitising with regular dice formats up to 3 or up to 6.

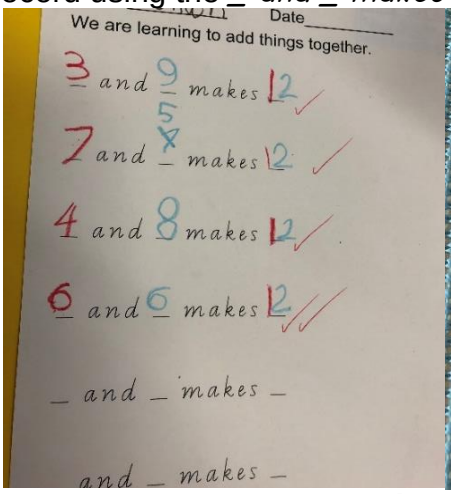
Support 2: When making the plates with your team, create a support set that only goes up to 4 dots and includes plates with just a single dot (in mixed positions, not just the centre), and plates with just two dots (a gold and a black one, or just two gold, or two black).

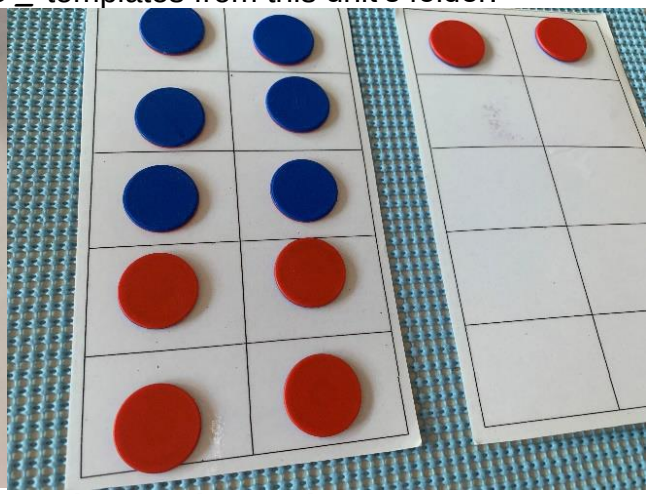
For recording, if these students cannot yet use digits for quantities, draw what they see as coloured dots in the boxes of the *I see* template.

Extension 1: When making the extension plates, create sets with up to 12 dots in mixed arrangements, including combinations with three colours. Also include some multiplicative thinking; for example, 12 as 2 sets of 6 with 1 set in red and 1 set in black, or 12 as 4 sets of 3 dots in coloured groups.



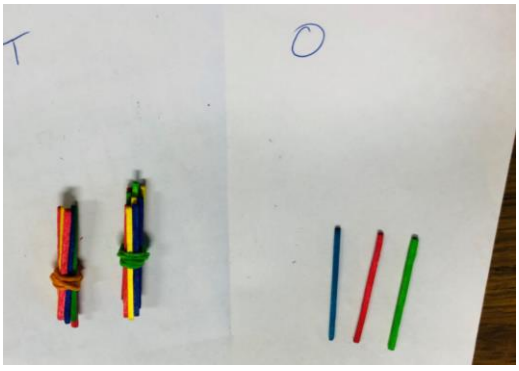
Extension 2: Use two ten frames and two-sided counters to investigate all the ways to make a teen number, such as 12. Change the colours by flipping the counters, creating many different combinations that make 12.
Record using the _ *and* _ *makes* _ templates from this unit's folder.





Extension student work sample

Extension 3: Grab a handful of craft sticks and place these on a blank page. Both partners estimate the total, then bundle them into groups of 10 with rubber bands in a T-O chart, to make the total easy to subitise.
Use the finger movements to show how they saw it, "I see 2 tens, I see 3 ones, altogether I see twenty-three."
Use the *number spelling assistance chart* to record in its worded form too.
Extra challenge: How far off was your estimate from the total?



Place Value Unit 4: Digit Formation

1 of 500 Sequential Lessons for the Early Years

Throughout Kindergarten to build muscle memory and avoid reversals.

Digit Formation Lesson 1	**Digit Roads** **Learning intention: Correctly form digits from top-to-bottom and learn the song for each digit to write it correctly.** **Maths vocabulary: digit, top-to-bottom**

Excite the students: Who likes cars? Well today you are going to drive around the digits! Plus, if you work really hard, I have a set of toy cars that you can drive around the digits for the final part of the lesson.

Note: It is best not to use toy cars at the start, as these are harder to manipulate (students need to reverse, go sideways). Use their pointer finger on top of a green counter to start with for each digit.

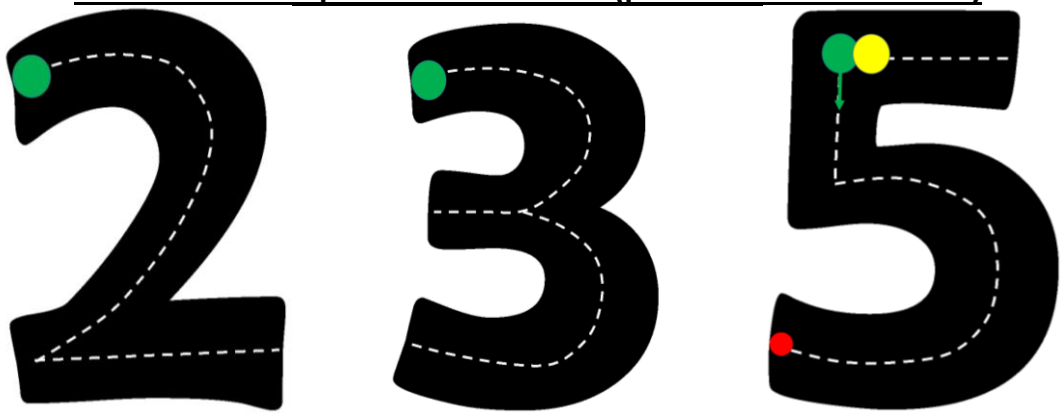
Lesson summary: Students trace a green counter around each digit road (templates are in this unit's folder) while singing each digit's song.

Materials: Use for maths warm-ups and warm-downs throughout the year:

- ***Digit Formation Songs PowerPoint*** – **There is a short, easy-to-remember song for each digit.** Many schools publish these in transition to school packs for parents, and make them consistent across teams to combat digit reversals school-wide.
- ***Digit Road Templates* from this unit's folder** – Focus on each digit for at least three days in a row. **Use these consistently throughout the first year of school; every day during term one and at least twice a week throughout the rest of the year based on whole-class or small group points-of-need, building long-lasting muscle memories.**
- Green counters for students to start from the green traffic lights.
- *Optional:* Set of toy cars for celebration.

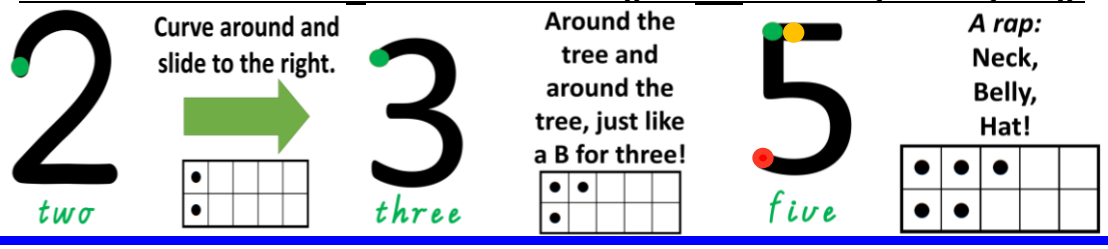
Best set-up: Students sing and practise around a whole-class circle.

Digit Road Templates – A4 full-size versions printable from this unit's folder with extra practice at the back (print each double-sided)



For all digits: Start at the top – at the green light!
For '4' and '5': Start at green. Stop and lift at red. Restart slowly at yellow.

Digit Formation Songs – PowerPoint in this unit's folder, sing one around a whole-class circle. Students trace their digit road of the day as they sing:



YouTube hook: Cars cartoon movie trailer https://www.youtube.com/watch?v=SbXIj2T-_uk.

Modelling: Students sit on the floor with their digit roads and green counter. Model starting the counter from the green dot on each digit template. **Sing together as a whole class.** The teacher can model with an A3 version at the front, leading the 'digit choir.'

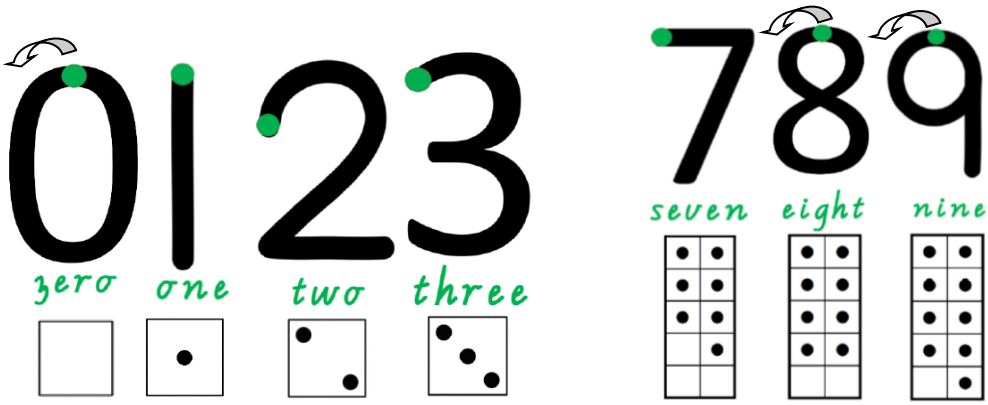
Ask students to join in the song after you have sung it through a few times. Watch students as they make their way around the digit in sync with the class (lifting the green counter and putting it back to the starting dot on your, "Go!"). **Do not allow students to slide backwards up the digit – they must lift their counter to restart!**

Students then return to their desks with the digit, whisper singing the song to themselves as they trace the entire back page using pencil. Teacher modelling YouTube for the tune of the songs: https://www.youtube.com/watch?v=BOThXyG_svk

Top-to-bottom formation: Did this digit start at the top or the bottom? When you are riding your bike, is it more fun to start from the top of the hill or the bottom? The top! ALL digits are the same – they all like being at the top of the hill and riding their bike down! Where do you put food in your body? The top or the bottom? Digits are the same, don't feed your digit from its bottom!

Traffic lights show where to start: Explain that the dots are like traffic lights. Green means go. Red means stop and lift your pencil. Yellow means slowly, so you slowly start with your pencil again. For the digit 4, green is the starting point, red is where you lift your pencil, yellow is where you draw the last part of the digit.

Tip: The digits that are most often reversed (2, 3, 5, 7) all move to the right first, so should be taught together in close sequence.



Recommended desks charts are available in this unit's folder.

Common misconception: The digit 'I' should be a straight line, it does not wear a 'hat' or 'shoes' – **not 1.** I is 'naked,' just one movement for I. Often, this error is perpetuated by student desk charts that show digits incorrectly.

Questioning:

- Does this digit have straight lines, curved lines or a bit of both? Are the straight lines horizontal, vertical or diagonal?

Vertical

Horizontal

Diagonal

Model this language using your bodies as a whole-class maths vocabulary dance:

- Students stand up straight like a soldier when you say 'vertical.'
- Students put their arms out sideways like a plane flying along the horizon for 'horizontal.'
- Students make ninja fighting arms for 'diagonal.'

This lays great foundations for the language of angles and transformations.

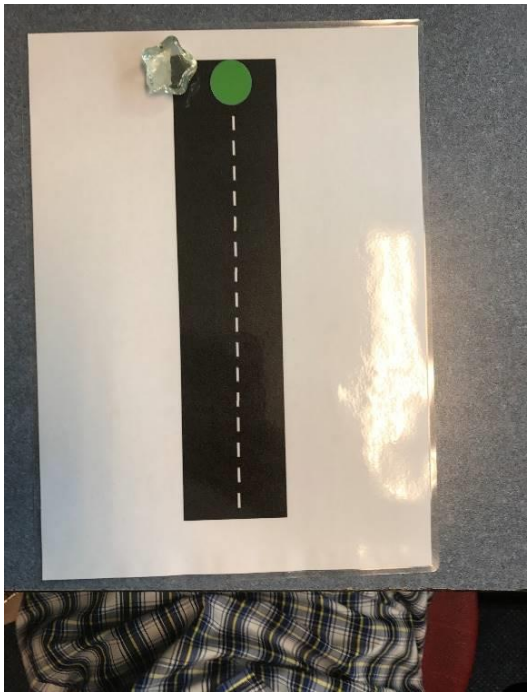
Support 1: Move any students who are struggling (or any who you anticipate may struggle) closest to you in the whole-class circle, so that you can model to them one-to-one and keep them focused as you continue to sing to the class.

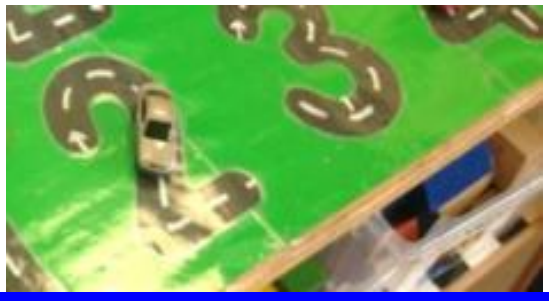
Support 2: Print extra copies for further practice at home with parents and for when they run out of stamina towards the end of the main maths lesson throughout the year, focusing particularly on any point-of-need digits that these students are often reversing.

Extension 1: Make patterns using two or more digits. For example, 3 3 3 7 3 3 3 7. Ask a like-ability partner to continue their pattern and explain its rule.

Extension 2: Become a secret agent by solving skip-counting mission code sticks. Use a 120 chart to help solve these, placing transparent counters on the numbers that are on the stick to try to decipher the missing numbers in the pattern.

Lesson in action and celebration/reflection with toys cars at the end

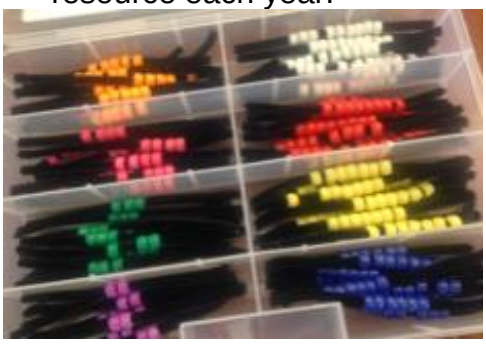




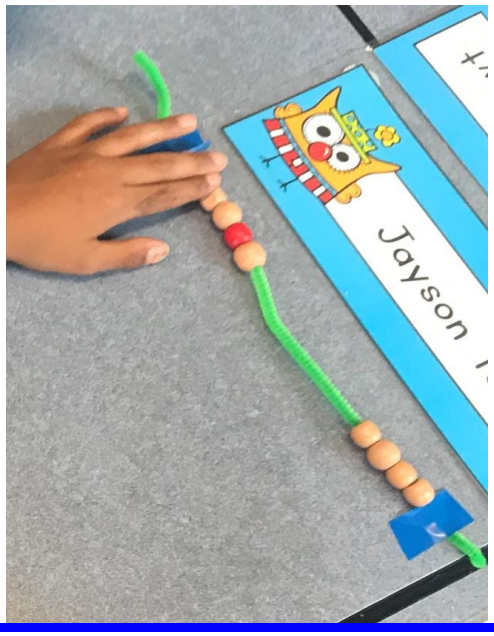
Addition Unit 4: Partition the Numbers 3 to 9

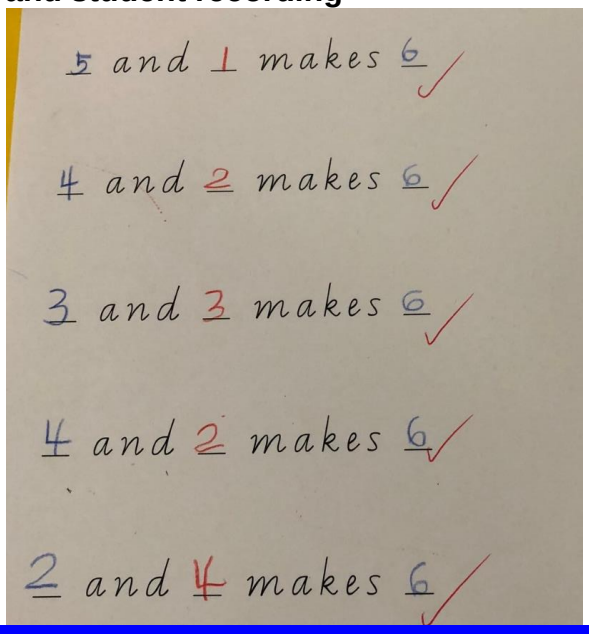
1 of 500 Sequential Lessons for the Early Years

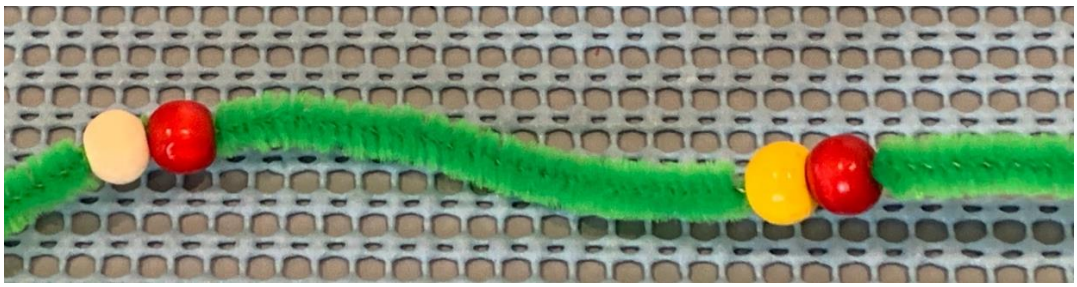
Recommended for Kindergarten (NSW Maths Syllabus links at the start of each unit).

Partition Lesson 1	**Number Sliders** **Learning intention: Work out all the combinations or ways to make the same total.** **Maths vocabulary: ways to make (combinations), parts, total (all/altogether), turnaround (halfway turn, 180 degrees), left, right**
Crafts maths: Who likes arts and crafts? Who would like to make numbers using craft materials, like beads? At the end of this series of sessions, allow students to take their bead number slider home, with a photocopy of their best work. Students can continue to use the bead sliders at home to practise creating different combinations that make the same number.	**Lesson summary: Students use a bead number slider to discover all the ways to break apart a number and make its total.** *Teacher note:* Partition means to break a number into parts (not necessarily equal parts). **Materials:** • Beads. • Pipe cleaners or dowel rods. Pipe cleaners are the easiest to source and can be sent home for continued practice as an expendable resource each year:   • _ and _ makes _ recording template from this unit's folder. **Best set-up:** Model at a demonstration desk, then students work independently to be able to progress to each new total at their own pace. **Modelling:** Model your own example number slider, focusing on all the combinations you can discover that make one total. Put 5 beads on the slider. Push some to the **right** and some to the **left**. "4 and 1 makes 5." **Turnaround** the slider (a halfway turn or 180 degrees) so that now 1 and 4 makes 5. That's the turnaround fact! Push the beads back to the centre and create another way or **combination** that makes 5 – "3 to the left, 2 to the right makes 5." Turn the slider around – "2 and 3 makes 5." Instruct students to make as many combinations as they can before upgrading to a new total. Don't forget about 0! 0 and 5 makes 5. Turn it around: 5 and 0 makes 5. **Questioning:** • Can you make it another way? What's a new combination? • Can you see a pattern? 8 and 1 makes 9, 7 and 2 makes 9, 6 and 3 makes 9, 5 and 4 makes 9, 4 and 5 makes 9, 3 and 6 makes 9. Some students will describe this as: "I can see that every time one side loses a bead, the other has an extra bead, and it's still the same number." This is a great foundation for later compensation strategies, used mostly for addition, subtraction and multiplication in years 3-6.

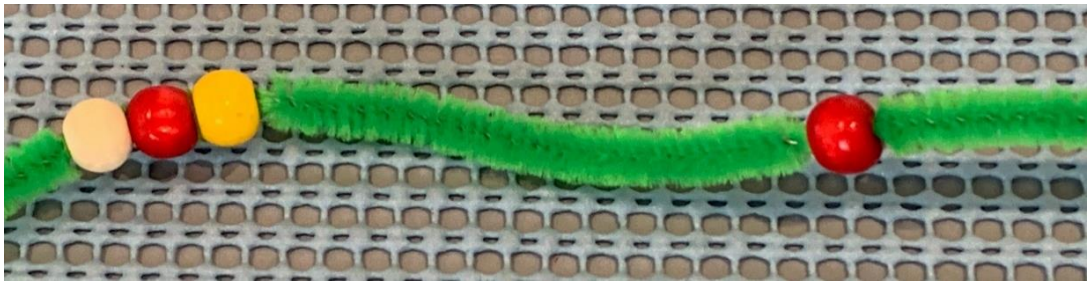
Lesson in action and student recording



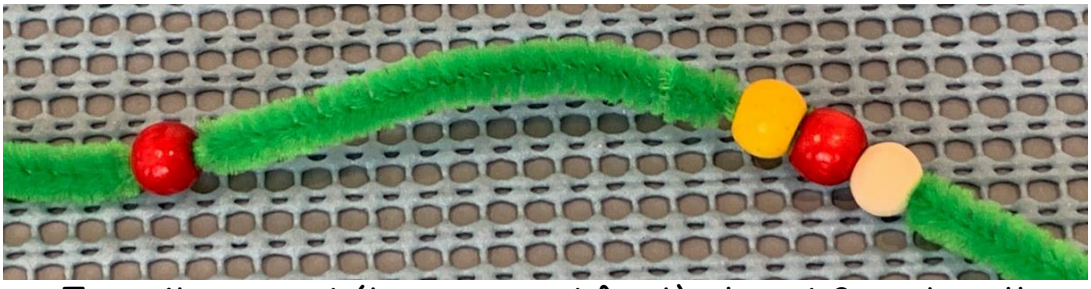




2 and 2 makes 4



3 and 1 makes 4



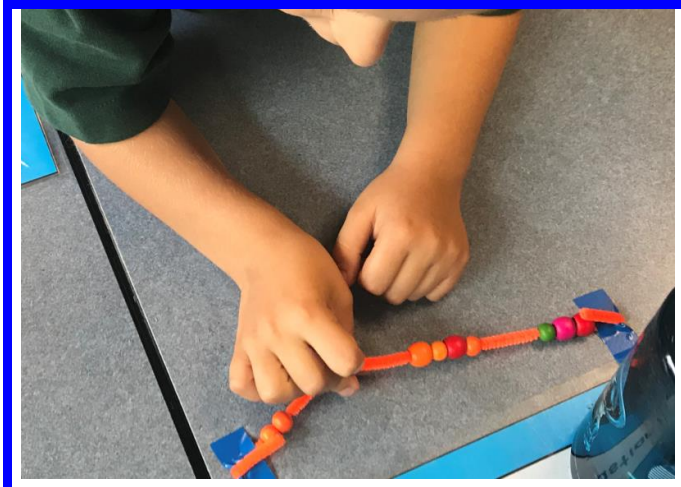
Turn it around (turnaround fact): 1 and 3 makes 4

Quick formative tip: Allocate students starting numbers based on their points-of-need, for example, support students might start with just 3 beads. Mid-level students can mostly start from 5, but will progress quite quickly as they find all the combinations that make each total and earn an extra bead.

Extension students may start with 8, but only if they can already tell you all the combinations that make 5, 6 and 7 fluently and without materials. As students begin, do a quick oral formative check on extension students: “Can you tell me all the ways to make 5?” If they cannot give lots of combinations, start them at 5. “How can you make 6?” and so on until there is a number that they cannot provide quick combinations for orally (without materials).

After students finish a number, having found all the ways to make it, add an extra bead to their slider and find all the ways to make the new total. Set this up as a challenge – see what level you can reach before the end of the lesson!

Support: If students cannot subitise (instantly see) the parts on either side, encourage them to count the beads one-by-one using the touch and say counting strategy. For this reason, keep their starting total very small (3 or 4).



3 + 4 + 1 + 2 = 10

Extension 1: Model breaking the number into 3 or 4 distinct parts along the length of the line, for example, 3 and 4 and 1 and 2 makes 10:

Extension 2: Model creating equal groups with the beads, for example, 2 and 2 and 2 makes 6, so 3 groups of 2 makes 6

2 + 2 + 2 = 6 and 3 x 2 = 6

Extension 3: Use a few bead sliders at a time, all with equal totals, essentially creating arrays to practise the times tables:

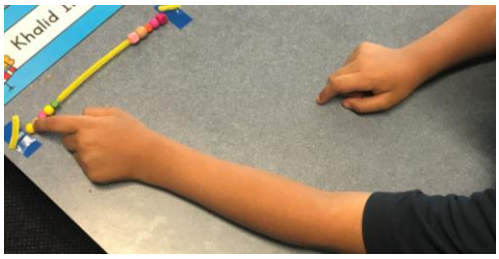
7 + 7 + 7 = 21

3 groups of 7 makes 21, 3 x 7 = 21

Think about the best strategy to solve it: double 7 and another 7

14 + 7 = 21

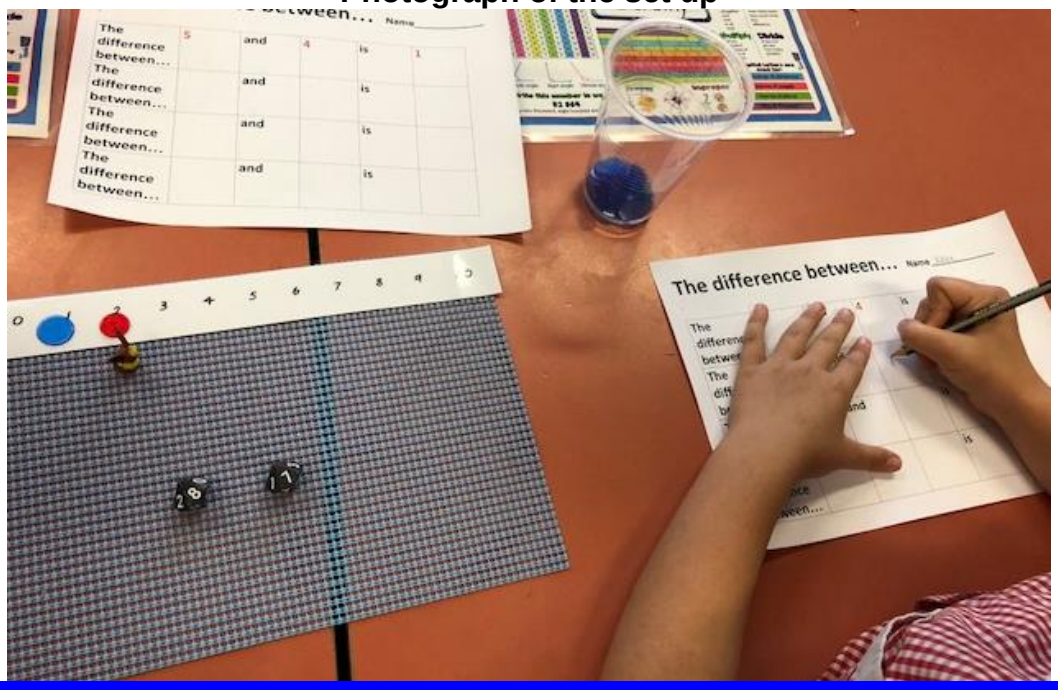
Lesson in action



Subtraction Unit 4: Difference between

1 of 500 Sequential Lessons for the Early Years

Recommended for Year 2 students (NSW Maths Syllabus links at the start of each unit).

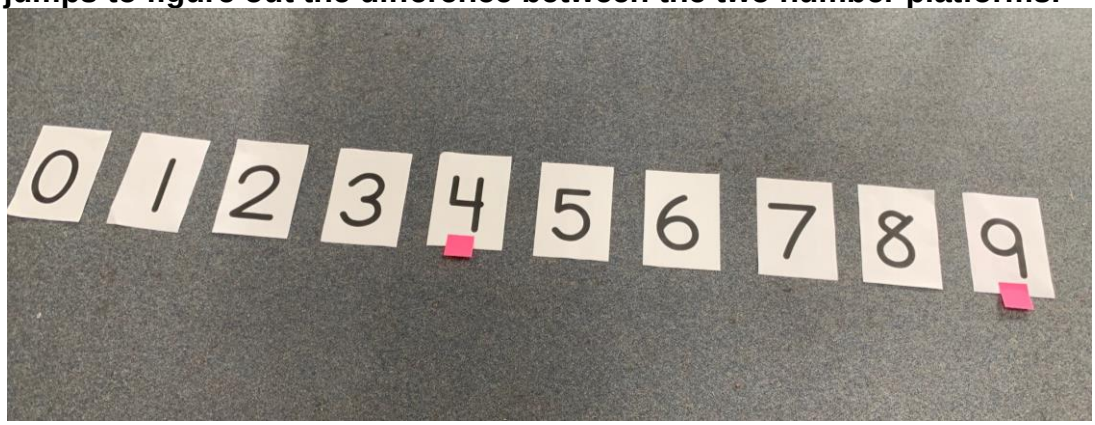
Difference Between Lesson 1	**Super Mario – Count on to solve difference between** **Learning intention: Figure out the difference between two numbers (subtraction) by counting on from the smaller number.** **Maths vocabulary: difference between, subtraction number sentence**
YouTube hook: Relate difference between to video games like Super Mario where characters need to jump between one platform and another, accurately figuring out how far forward they need to jump or the 'difference between' the platforms to avoid going back to the first level. Use this link https://www.youtube.com/watch?v=WMUuEdSmxCE to watch a YouTube of a Super Mario game where he jumps between platforms, then transforms into a Pokémon.	**Lesson summary: Students figure out the difference between single-digit numbers by jumping their figurine from one number/platform to the next. Count the number of jumps they had to make to land safely.** **Photograph of the set up**  **Materials:** • Two 10-sided dice per pair. • Two transparent counters per pair. • Two figurines per pair (mini Pokémon to mirror the first YouTube where Mario transformed into a Pokémon) *or* any animal counter. • 0 to 10 number line from this unit's folder – one per pair, laminated. • *Difference between recording* template from this unit's folder. • *For whole-class modelling: A4 number line* templates are available in this unit's folder, laminate and connect with string to make a large durable number line for all future whole-class number line modelling. **Best set-up:** Model using a giant number line with students, then model at a desk. Students work with their regular like-ability maths buddy. **Modelling:** Model the concept on a giant number line at the front of the room. Students roll two giant dice. For example, the students roll 4 and 9. Student A puts a kinder circle or post-it note on 4. Student B puts a kinder circle on 9. These are the 'platforms' or numbers in the subtraction number sentence. "What's the difference between 9 and 4?"

This is a very similar, longer clip so you could just choose your favourite few minutes, where Mario needs to be very careful to accurately figure out the distance between each platform, particularly in the fire section: https://www.youtube.com/watch?v=o4CfkUZ6N20.

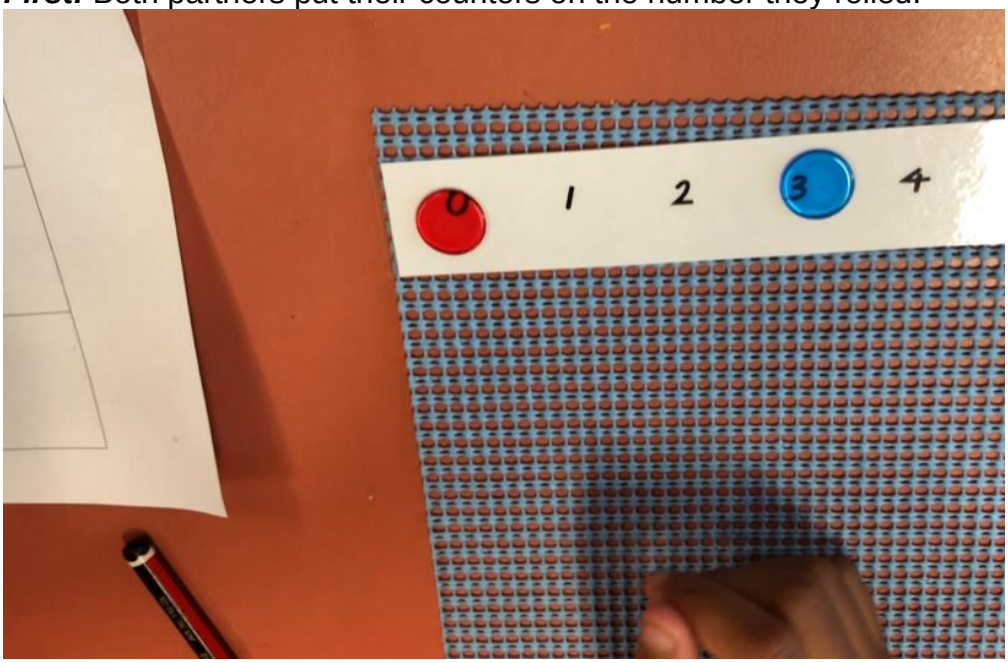
In this extra YouTube hook option, a video game designer has created an augmented reality version of Super Mario, bringing it to life in a park: https://www.youtube.com/watch?v=QN95nNDtxjo.

With a subtraction number sentence, you always record the larger number first, for example, **9** – 4. However, to figure out the answer, you can start your character from the smaller number and just count forwards.

Now we want to figure out how far you need to jump to get from one platform to the other, or the difference between the numbers. **Students literally do jumps to figure out the difference between the two number platforms.**



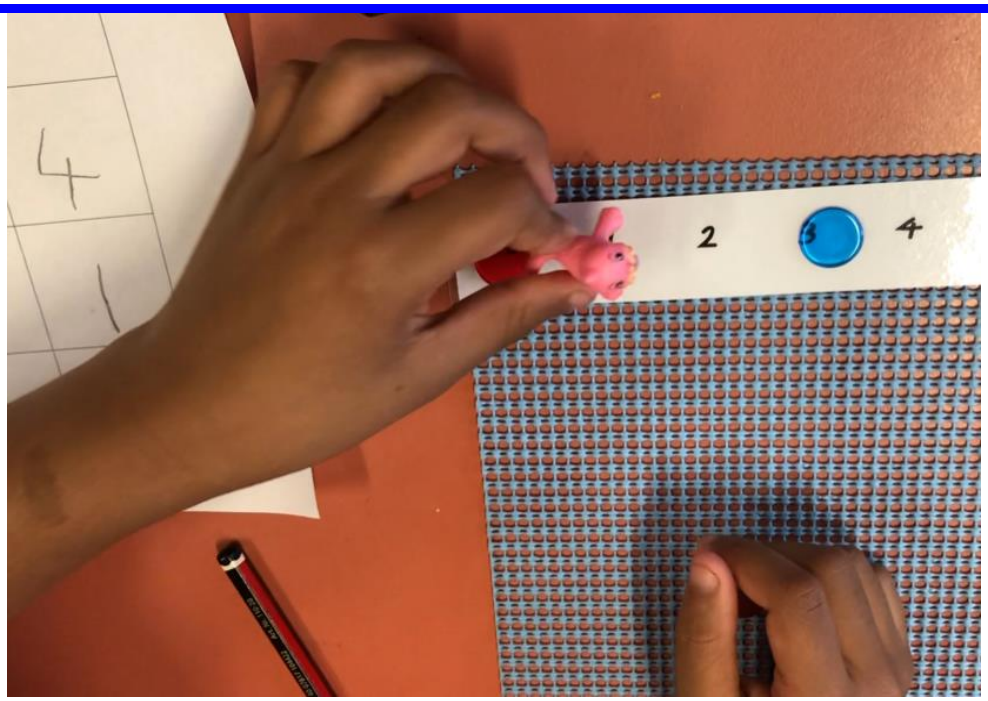
After this, model at a desk using student materials.
First: Both partners put their counters on the number they rolled.



Second: Write the two numbers in the template, recording the bigger number first, since subtraction always starts with a lot and ends with a little.

Third: Jump your character from the smaller number to the bigger number, counting each jump. If the student was solving the difference between 7 and 4, they would start at 4, then say, “1, 2, 3” until they land on the 7 platform.

Alternative hook: Street parkour video clip to emphasise the 'jump the difference' strategy: https://www.youtube.com/watch?v=2vfoyY9lshI. Don't do this at home!



Fourth: Read the number sentence back to your partner from your recording sheet, using 'difference between' vocabulary: "The difference between 3 and 0 is 3."

See the video in this unit's folder of the lesson in action.

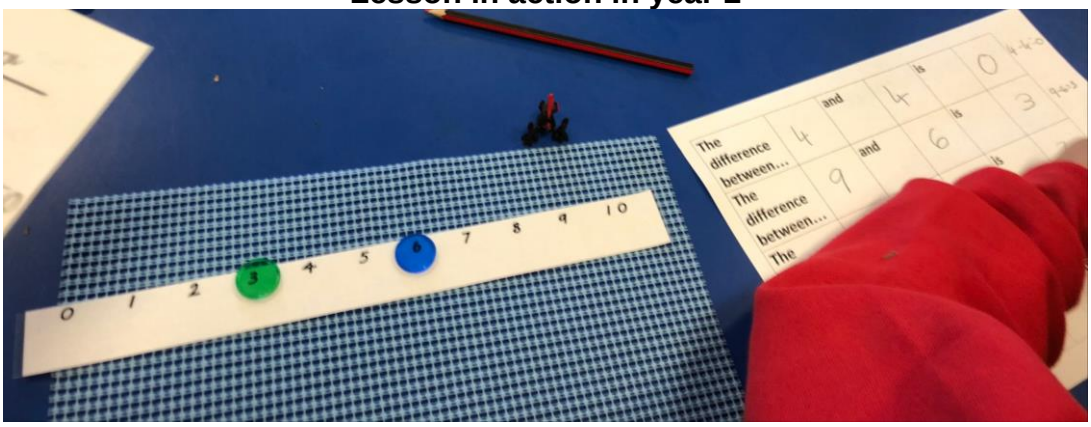
Common misconception 1: Point out that you cannot just look at the number of spaces between the numbers because that will end up 1 short and your player will not make it all the way to the platform. For example, the difference between 6 and 3 is not 2, even though you can see there are 2 numbers (4 and 5) between them. You need to make it all the way to the 6 from the 3, so it's 3 jumps for your character, or 3 counts forward.

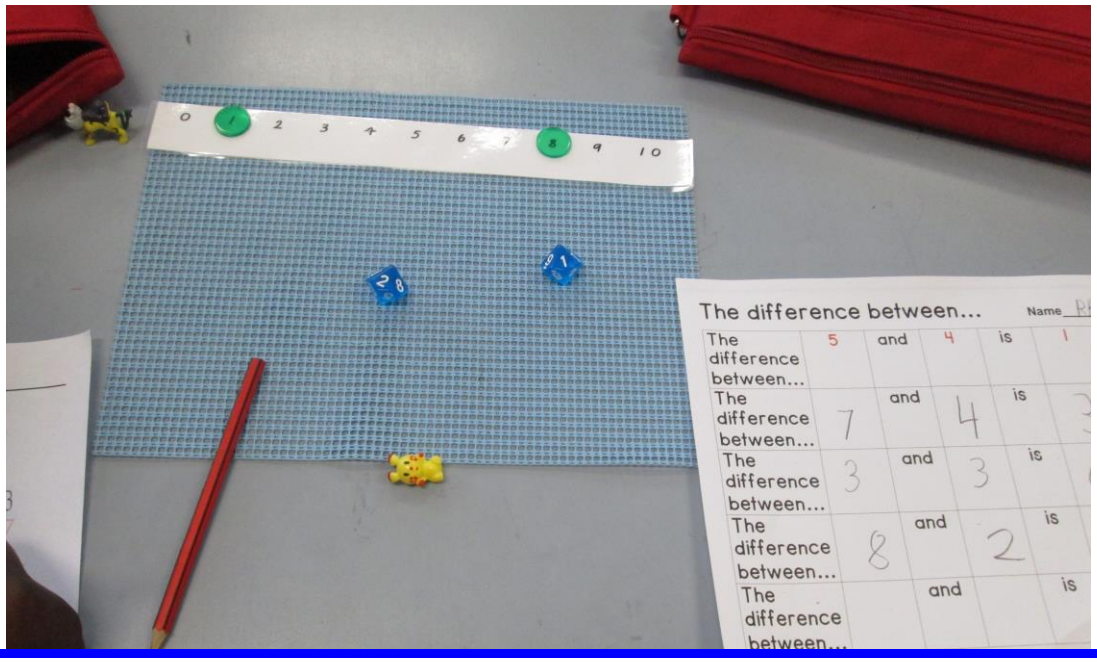
Common misconception 2: Another common misconception is that students tend to start counting from the first number/platform, before they do a jump. Students sometimes even jump their character up in the air and count 1 on the starting number. Does Mario just jump up and stay where he is? Or does he jump forward? You don't need to start counting on your current platform, because that's your starting point. You start counting from the first jump forward that your character does.

Questioning:

- If you both roll 4, what is the difference between your numbers?
- Does it matter whether you start from the bigger number and count back, or start from the smaller number and count forward?
- Without the number lines, is it easier to count back or count forward? Most students will prefer counting forward as that is their first learned counting sequence. The aim of this unit is to ensure students can use the strategy of counting forward to solve difference between situations, rather than only seeing subtractions as 'take away' scenarios that can be solved using counting back alone.

Lesson in action in year 2





End-of-session oral language: For the final few minutes of the session, ask students to pause their work and read back all their 'difference between' sentences to one another.
Swap partners so that they are reading different equations and take turns reading the sentences they have created. Students could then write the matching number sentences on the side of the template, 6 – 5 = 1, but read it as a 'difference between' scenario: "The difference between 6 and 5 is 1."

Support 1: Work on the large number line for longer, using their bodies as support. Students will enjoy this added kinesthetic element to the session.

Support 2: Use 6-sided rather than 10-sided dice in like-ability pairs to keep the difference between the numbers small, for example, the difference between 6 and 4.

Extension check: Ensure that extension students can read subtraction equations as 'difference between' sentences, not just 'minus' or 'take away' sentences, as otherwise this will limit more advanced strategies for subtraction in their middle years. For example, write down 8 – 6 = 2. Ask your extension students to read this to you. Many may read this as, "8 take away 6 is 2." This 'take away' language is ideal for the first element of

subtraction. If an extension student can *only* read this number sentence as, “8 minus 6 equals 2,” or, “8 subtract 6 equals 2,” they only know the abstract language and not the real-life language. Only when an extension student can read 8 – 6 = 2 as, “8 take away 6 leaves 2,” *and* as, “The difference between 8 and 6 is 2,” are they then ready for further extension.

Extension: Roll two 6-sided dice each in like-ability pairs to make two 2-digit numbers. Students place their counters on a 120 chart (instead of a number line). Figure out the difference between their two numbers by counting forward in tens first (jumping the tens rows), then ones.

For example, for the difference between 56 and 32:

Start at 32.

Jump forward 2 tens.

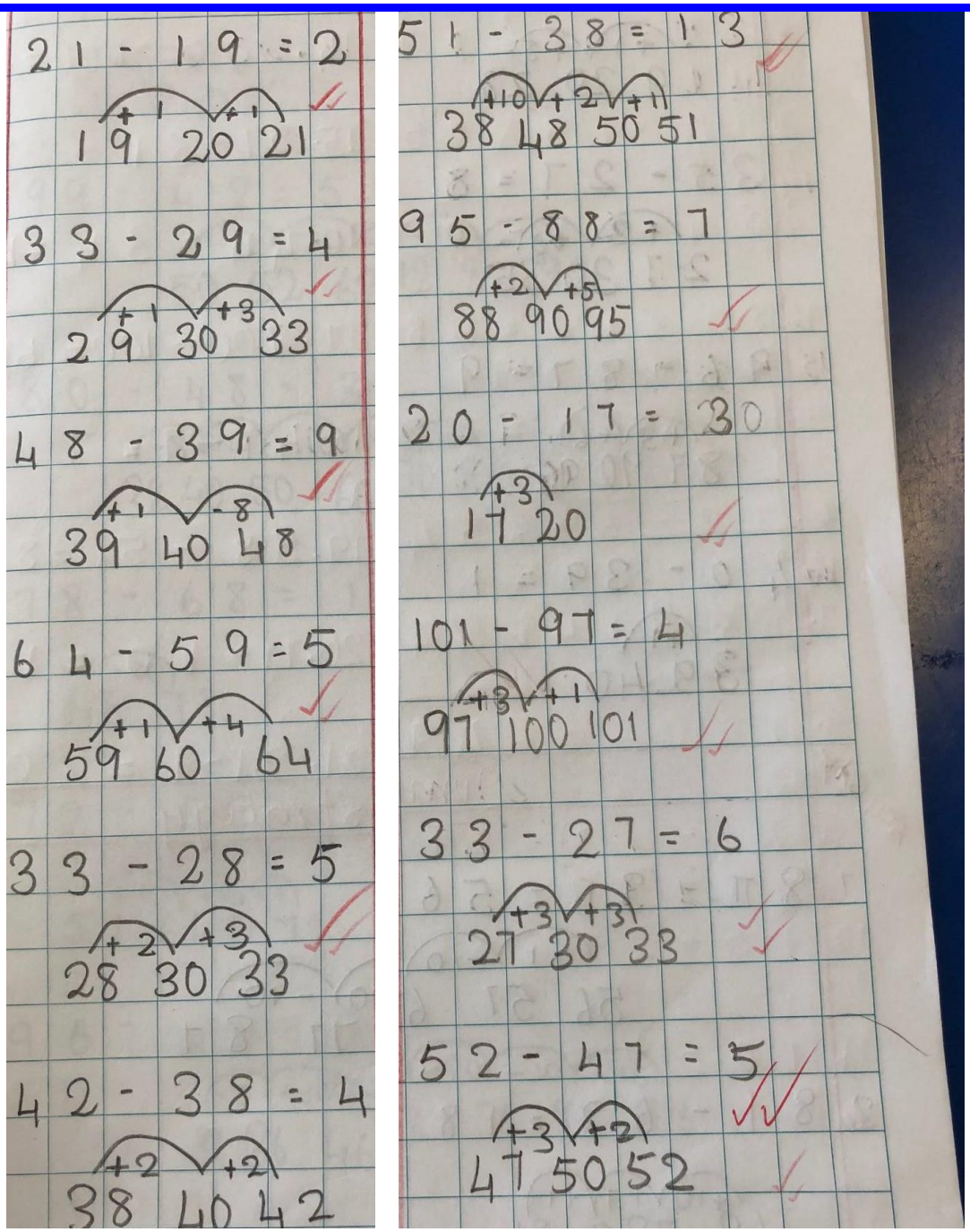
Then step forward by 4 ones. The difference is 2t 4ones, 56 – 32 = 24

The difference between 56 and 32

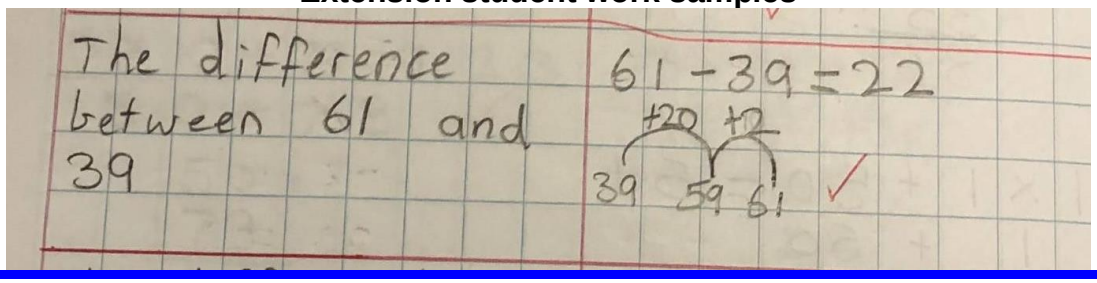
The difference is 2 tens

and 4 ones, so 56 – 32 = 24

Start at 32 and count on/jump forward!



Extension student work samples



This can become quite challenging for numbers such as 62 and 45. For example, the students may jump their character 2 tens forward (from 45 to 65), but they are now beyond the target number/final platform.

2 tens forward

3 back, so the difference is 20 – 3 or 17

Model for extension students to use a 'jump forward tens, step back ones' strategy for these type of problems. Ultimately, the goal is for students to do this without the 120 chart. Accordingly, remove the chart when students are ready to attempt this **jump the difference strategy** in their heads. Mentally, the aim would be to think: Start at 45. 2 tens forward, 65, 3 ones back 62! So I did 20 – 3 = 17 was the difference!

This provides students with better strategy options than always thinking of subtraction only as 'take away.' For most students, it would be a worse option to solve this particular problem using a **jump back strategy**, by starting at 62, then jumping 4 tens back, then another 5 ones back to take away the entire 45. **Therefore, the difference between/jump the gap strategy is ideal when the two numbers are fairly close together.**

Teaching Tips at the Start of Every Unit

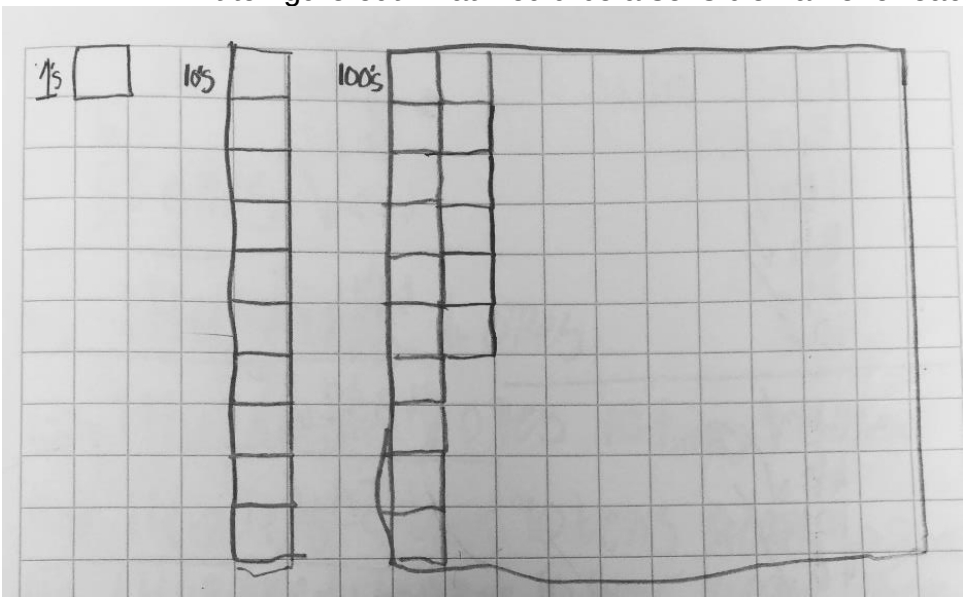
Place Value Unit 15 – Three-Digit Numbers Teaching Tips and Unit Launch

Recommended for Year 2 (linked content descriptors are at the start of each unit).

Whole-school language tip: For students, call the MAB/base-ten resources **'place value blocks.'** This language provides a direct link to the content (each block represents a place value) and avoids using the far more abstract commercial name (MAB – multi-attribute blocks).

Begin by introducing each block, particularly the hundred block, as this may be the first time many students have seen these.

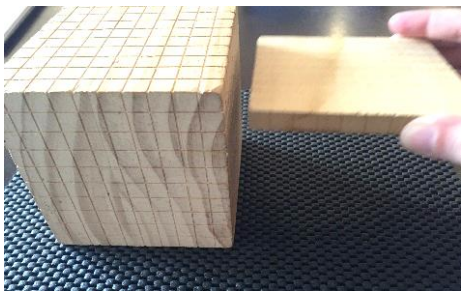
- What would you name each of these blocks? Do not tell students the names of each block, simply give them one of each and ask them to come up with a 'maths nickname' for each block in 5 minutes. You could trace around the block using your grid page, or try to count what's in it to figure out what would be a sensible name for each block:



This student was starting to count the hundred block by ones, then changed strategies and started counting how many tens it had.

Questioning:

- How many ones are in a ten?
- How many tens are in one hundred? How many ones are in one hundred? (It may surprise you how many students need considerable thinking time for this question).
- How many hundreds do you think are in one thousand? Collect a thousand block and check. **Misconception alert:** Students sometimes think there are 6 hundreds in one thousand because there are 6 faces in the cube. Avoid this by counting with a hundreds block horizontally up its layers, as shown:



Definitions of the forms in which students may be requested to represent numbers

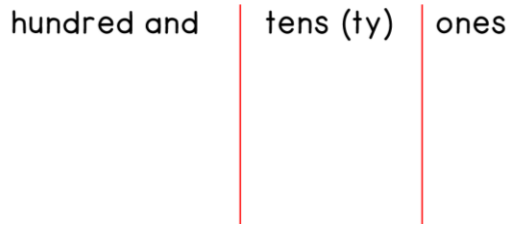
Standard form: The number is written in digits, for example, 45. For numbers in the ten thousands or above, it is the Australian convention to use a space: 10 005 (not a comma).

Worded form: The number is written in words, for example, forty-five. The grammatical convention is to use the hyphen for two-digit numbers in words: forty-five as opposed to forty five.

Often, some of the most challenging difficulties are with recording and reading two-digit numbers in words. These are more challenging than the three-digit counterparts, in that some of the tens numbers do not follow a logical pattern:

- 40, 60, 70, 80 and 90 follow the 'ty' pattern where seven*ty* is simply seven and 'ty' for tens at the end
- 30 and 50, thir*ty* fif*ty* follow the ordinal form
- twenty and the teens follow neither, although twenty stands for (*two* *ten*s).

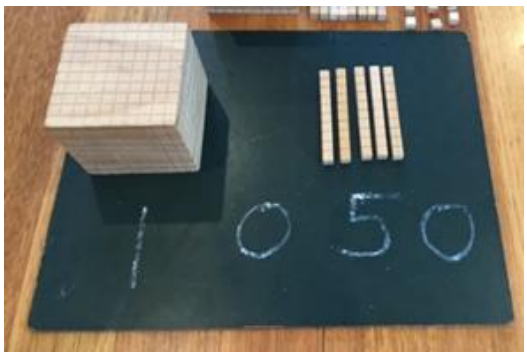
In this sense, the hundreds is more straightforward, because three hundred is literally said as 'three hundred' in English, not 'threedy' or the like. However, the hundreds has 'and' said after it, which is why we highly recommend using *'hundreds and-tens (ty) – ones charts'* (as shown here), rather than just h-t-o charts. Writing 'and' after the hundreds helps students members to say it while reading back numbers to their partner, particularly for ESL students.



Also check that students have maintained their understanding of the teens numbers, for example, by asking a student to make 417, then 471, using the place value blocks to show the difference between these two numbers.

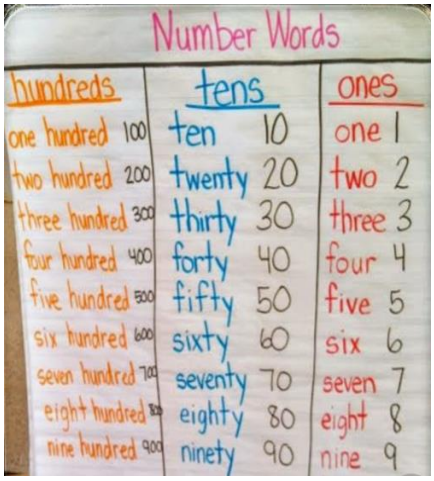
Expanded form: The number is written in a way that highlights its place value composition, for example, 40 + 5, or 4 tens + 5 ones. It is important for students to understand two- and three-digit numbers such as 576 as 5 hundreds **and** 7 tens and 6 ones. This is significant because it means that, when asked, "What is 576 + 10?" a student can think 7 tens + 1 ten = 8 tens, so it's 586, rather than counting forward by 10 ones.

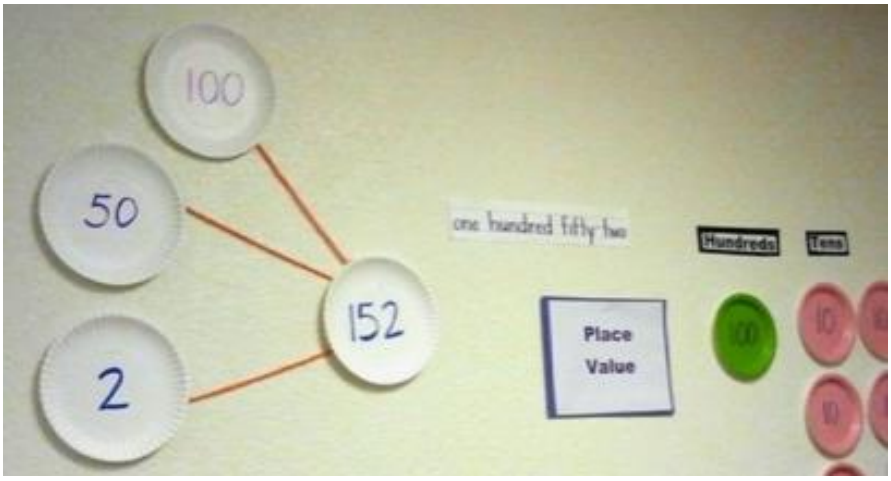
Internal zeroes: Three and four-digit numbers give rise to internal zeroes; for many students, this is their first encounter with this concept. Ensure that students understand the meaning of an internal zero – that there is zero of that place value (in the photo, zero hundreds and zero ones). Zero is the way we show that there are none of that place value. A few experts, such as Dianne Siemon, also describe zero as a 'place value holder.' However, showing students that there are zero of that place with materials is an even stronger and more visual explanation.

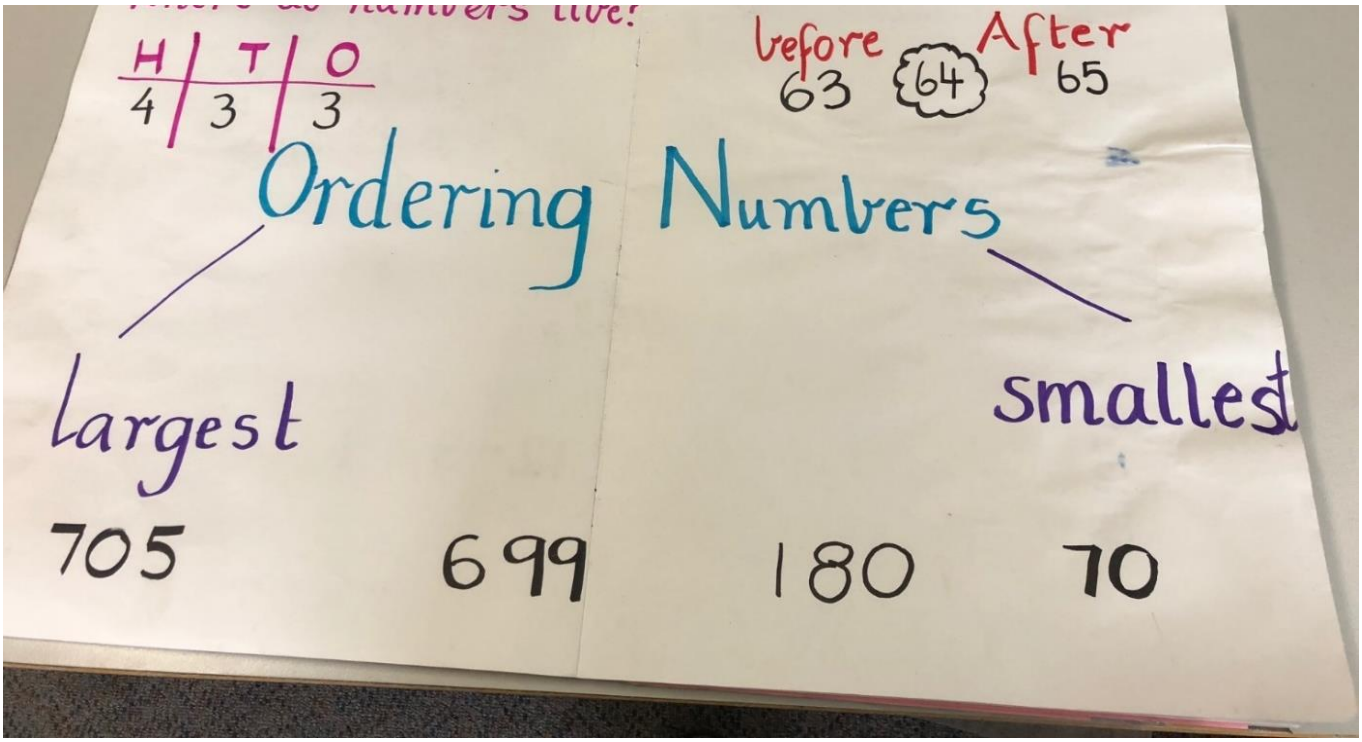


A renaming focus follows this unit (Unit 16), which encourages students to develop more flexibility in the sense that 1050 can be made using ten hundreds (not zero).

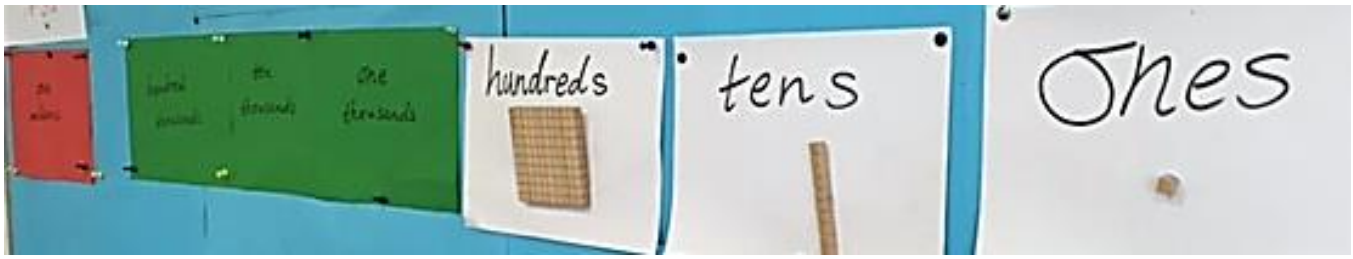
Anchor Charts and Classroom Numeracy Walls





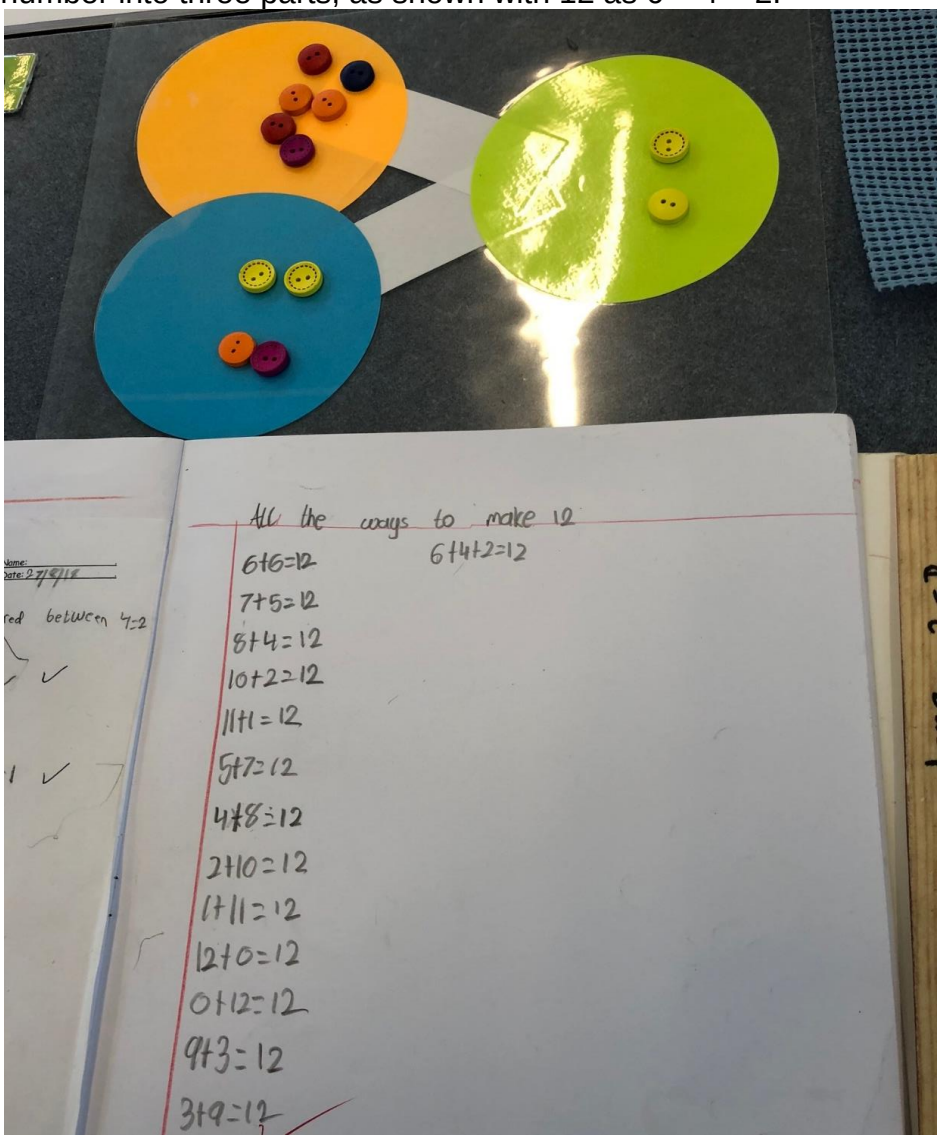


Show students how the hundreds, tens and ones pattern continues in the thousands and millions family. Otherwise, many students form the misconception that the place value system is ‘ones, tens, hundreds, thousands, millions,’ instead of ‘ones, tens, hundreds; one thousands, ten thousands, hundred thousands; one millions, tens millions,’ and so on:



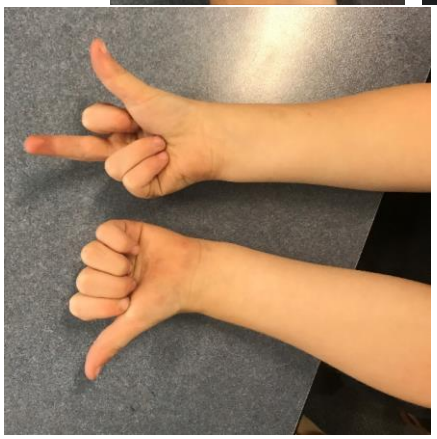
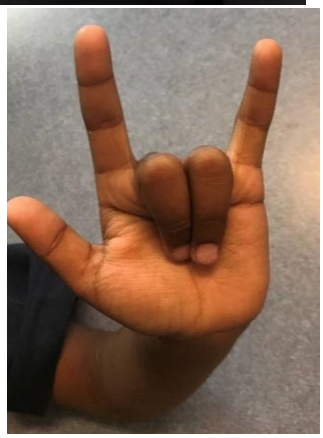
Warm-up Games – 1 of 100+ warm-ups

Specifically linked to each skill within sequential units, front-loading new content and building mental fluency in preceding developmental steps

Warm-Up	One of the Warm-up Games to revise skills needed for Addition Unit 8 – Building to 10
All the ways to make the numbers 3 to 9	Use number bond templates (3 laminated kinder circles as shown in the photo) to revise all the ways to make the numbers 3 to 9. Start with the total in the single circle, then push a few counters to the top circle and the rest to the bottom. 8 is made of 2 and 6. Restart the 8 in the centre circle and repeat, but with a different combination that makes 8. Later, use the three circles to break the number into three parts, as shown with 12 as 6 + 4 + 2:  **Year 1 student work sample for a 10-minute warm-up**

Warm-Up Games – 1 of 100+ warm-ups

Specifically linked to each skill within sequential units

Partitioning	One of the Warm-Up Games in Addition Unit 4
Last Hands Standing!	**Students verse each other at proposing different ways to make the number of the day using their fingers.** For example, the teacher says the number of the day is 6. Student A: Pulls out 3 fingers on their right hand and 3 on their left hand, making 6 fingers altogether. Both students record this using the _ and _ makes _ template from this unit's folder: 3 and 3 makes 6, 3 + 3 = 6 Student B: Pulls out 2 fingers on their right hand and 4 on their left hand. Both students record in the template. The game continues until both players run out of ideas. *Rule 1:* Students cannot repeat a combination that has already been recorded. *Rule 2:* Commutative (turnaround) rules are accepted. Student B proposed 2 fingers on the right hand and 4 on the left, student A can then propose 4 on the right and 2 on the left to make 6. This will encourage students to take advantage of these 'freebie' maths facts. The last player to propose an accurate combination wins – the last hands standing! **Warm-up in action – all the ways to show 3**     This is excellent subitising practice with other objects (fingers), to avoid students only becoming accustomed to practising subitising using dot dice or the like.