

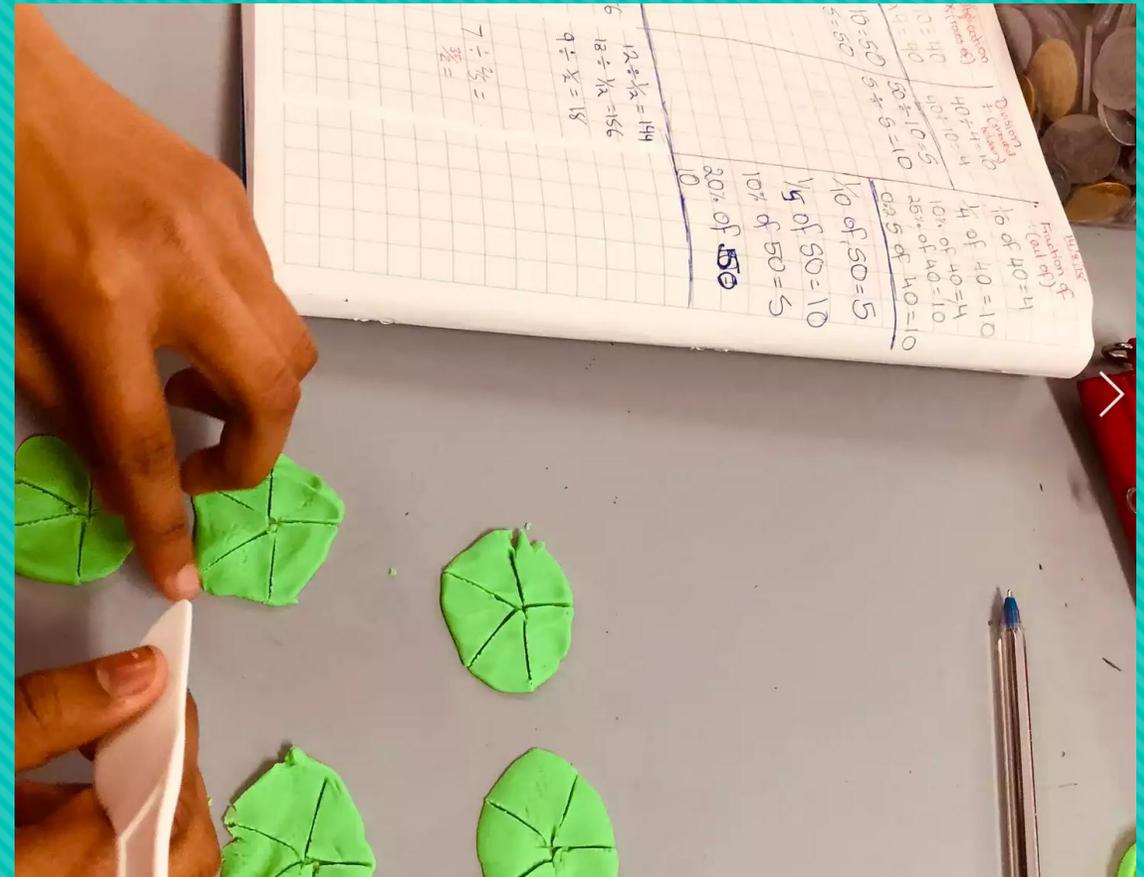
# 10P

**Growing mathematicians**

**Hands-on Maths**

**Created by Australian teachers and maths leaders**

Top Ten was founded by teachers and numeracy leaders (and is still wholly-owned by primary teachers) to provide sequential hands-on units to support us with our maths planning. We wanted something that teachers could pick up and use to teach maths in a meaningful, exciting and high-impact way, without having to resort to worksheets or one-dimensional technology due to the time-poor nature of our profession.



# About Top Ten

All units use materials, with highly visual and active learning for maths sessions, including links to literacy and the arts as well. The lessons were tried-and-tested in our own classrooms, as well as separate pilot schools, a minimum of five times, with the aim of creating a master pack of the best 900 hands-on lessons (500 new lessons for the early years 3-6 and 400 lessons for years 3-6). This resource is dedicated to bringing the power and joy of materials-based mathematics to life in every Australian classroom and to make it workable for you and every teacher in your team. We have put ten years of work into the package, so we sincerely hope you find it useful, and that it complements your existing practice and the resources you already use, to deliver an excellent and enjoyable year of maths for your students.

**Ten years of development in schools**

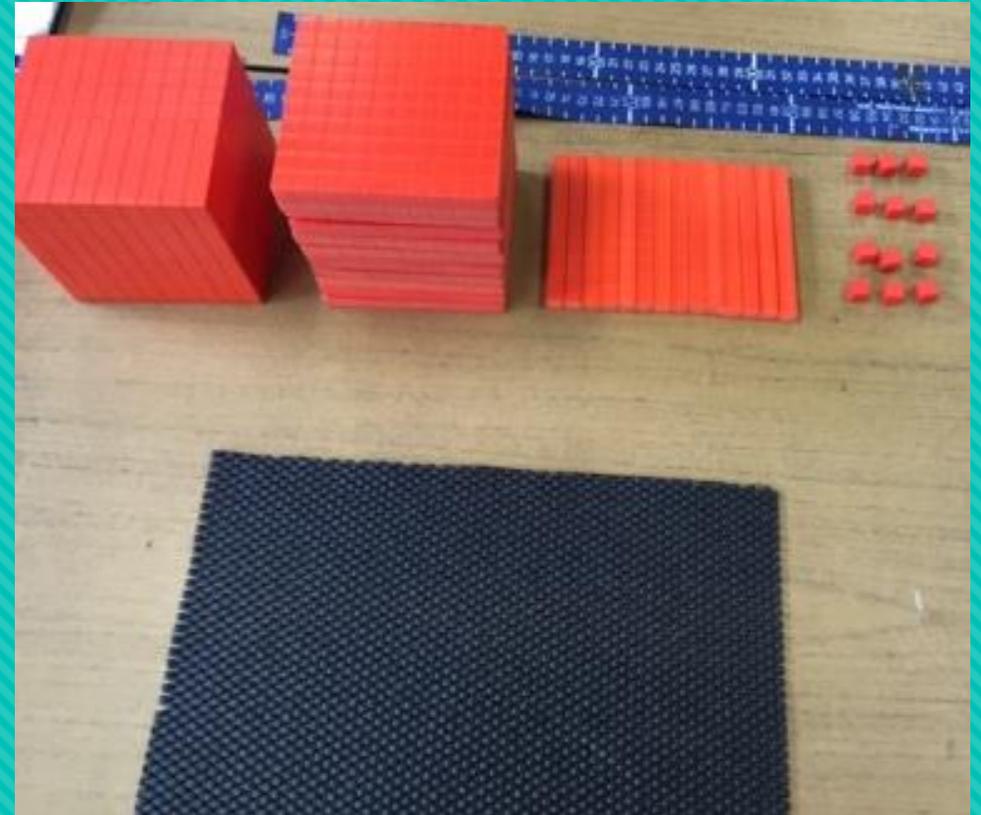
# Tip One: Use Materials

If it doesn't involve materials,  
it's not primary maths...



We always tell graduate teachers, when you need to teach a concept and you're not sure how, instead of searching the internet for a worksheet, search the maths cupboard for a material.

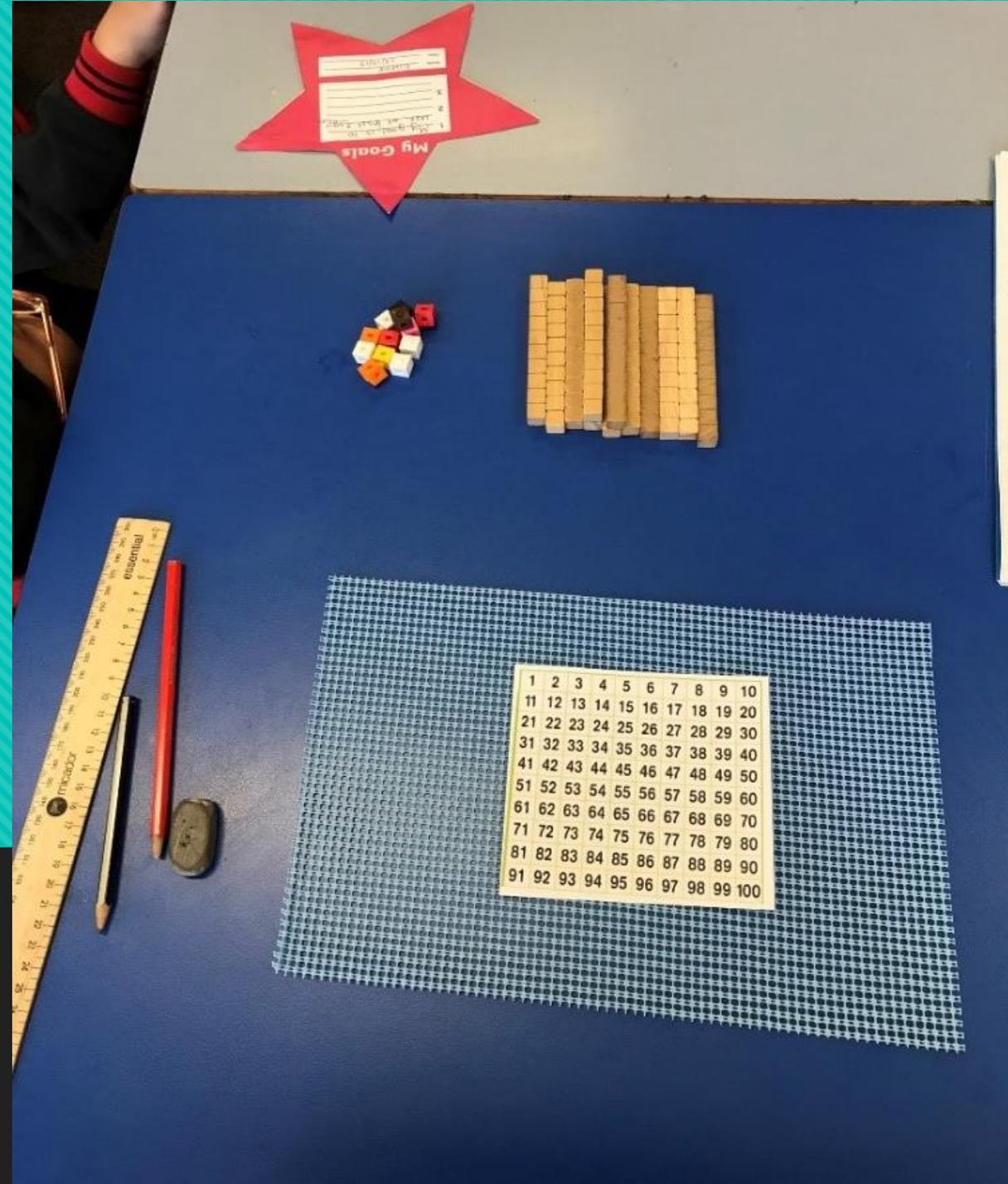
# Tip Two: Use Procedures



Materials-based maths is harder to manage and will always look messier and noisier than worksheet-based maths (despite that it will be working noise). Maths is not independent reading; it will never be silent! However, with a solid bank of classroom procedures, it can actually involve less preparation. Most importantly, one materials-based session is worth 100 worksheets.

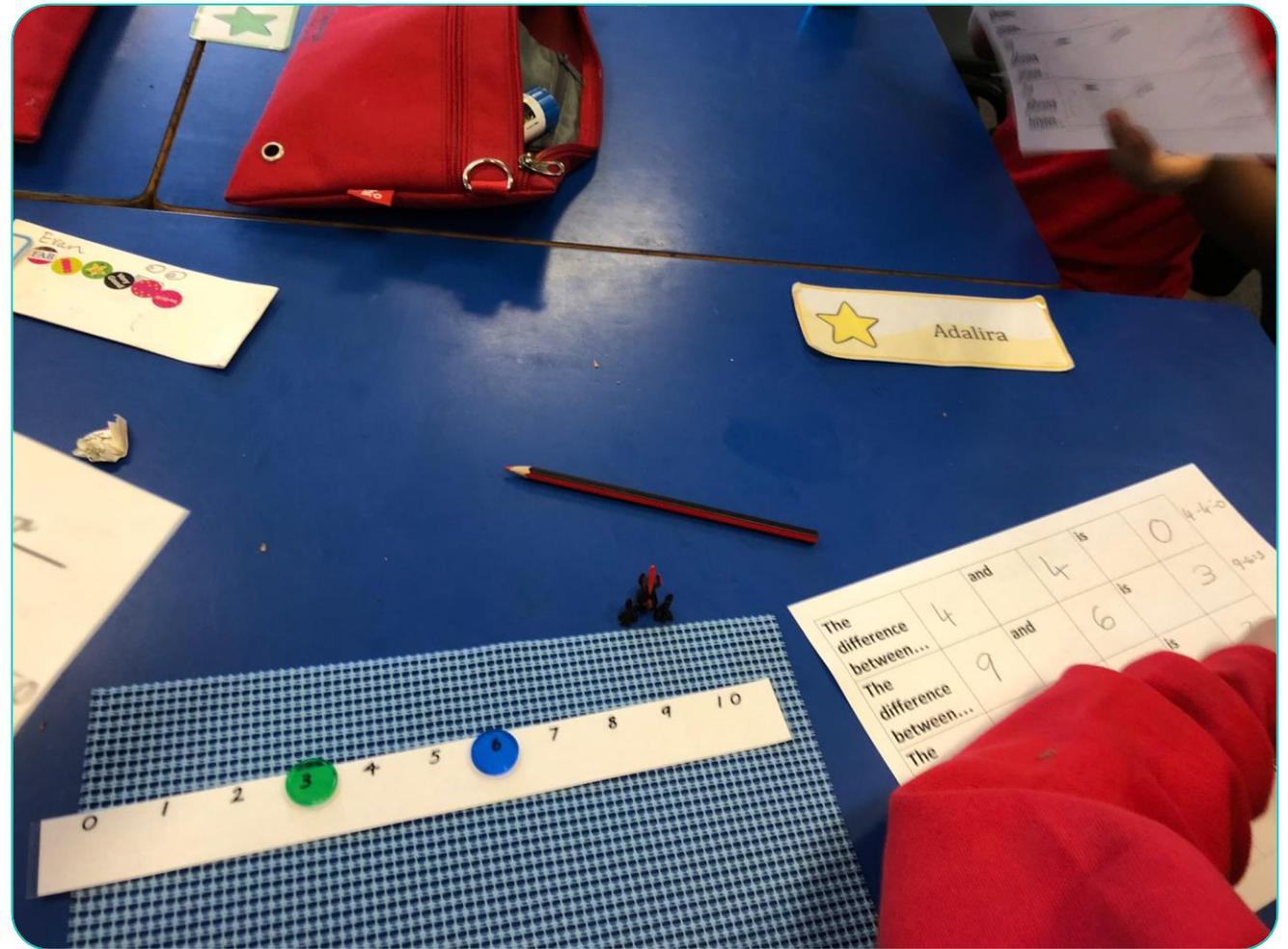
Students know this means remove all pencil cases, novels/readers, water bottles and anything not maths related. Materials-based sessions need all the desk space they can get, and this also provides mental space for students without all the clutter. Students keep one grey-lead, one red pencil, an eraser and ruler at their desk, plus their maths book or the recording template for that session.

“Clear the desks”

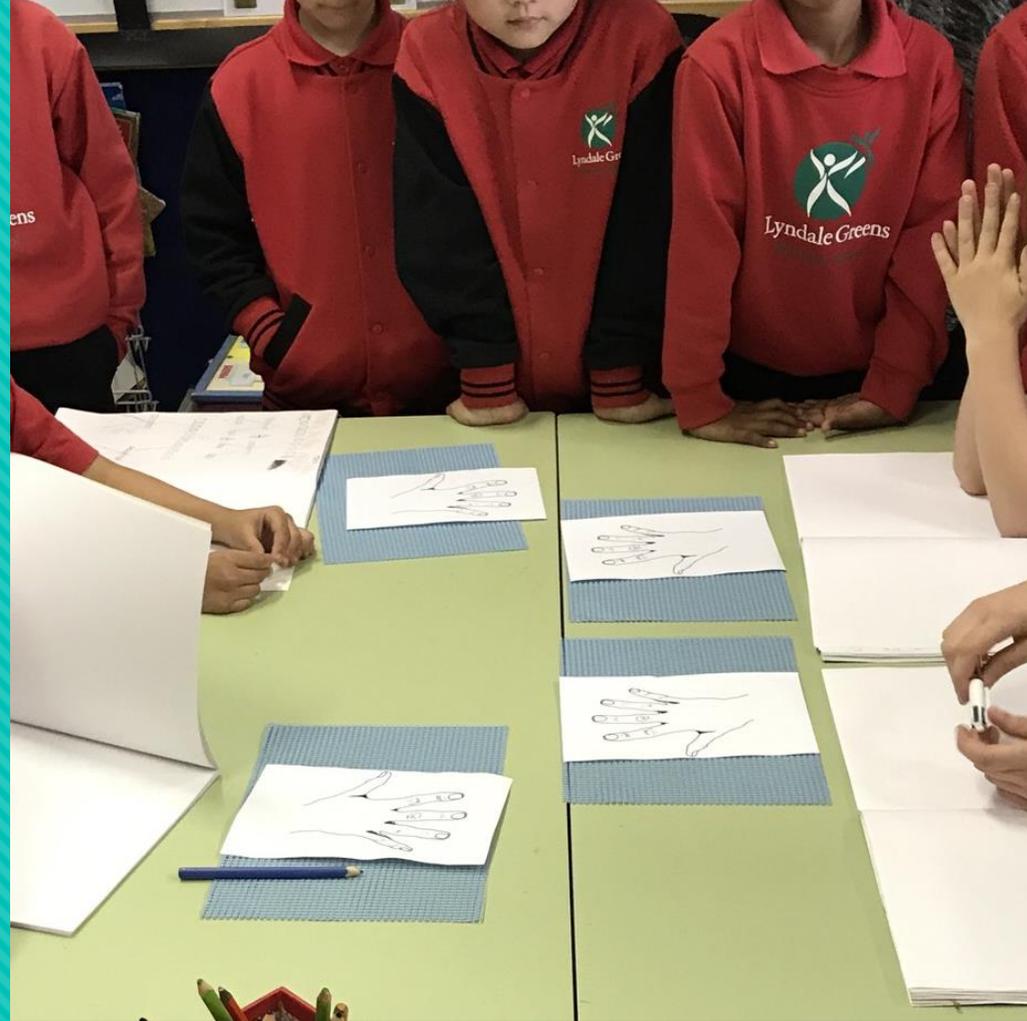


Set up an example desk showing students how you want all materials to look – don't use an interactive example, use an actual desk with the real materials. This way, there is no transfer of instructions from screen to real-life – students can literally see the real-life version of the set-up they are being asked to recreate. As you set up that desk, show students where they will be collecting the materials.

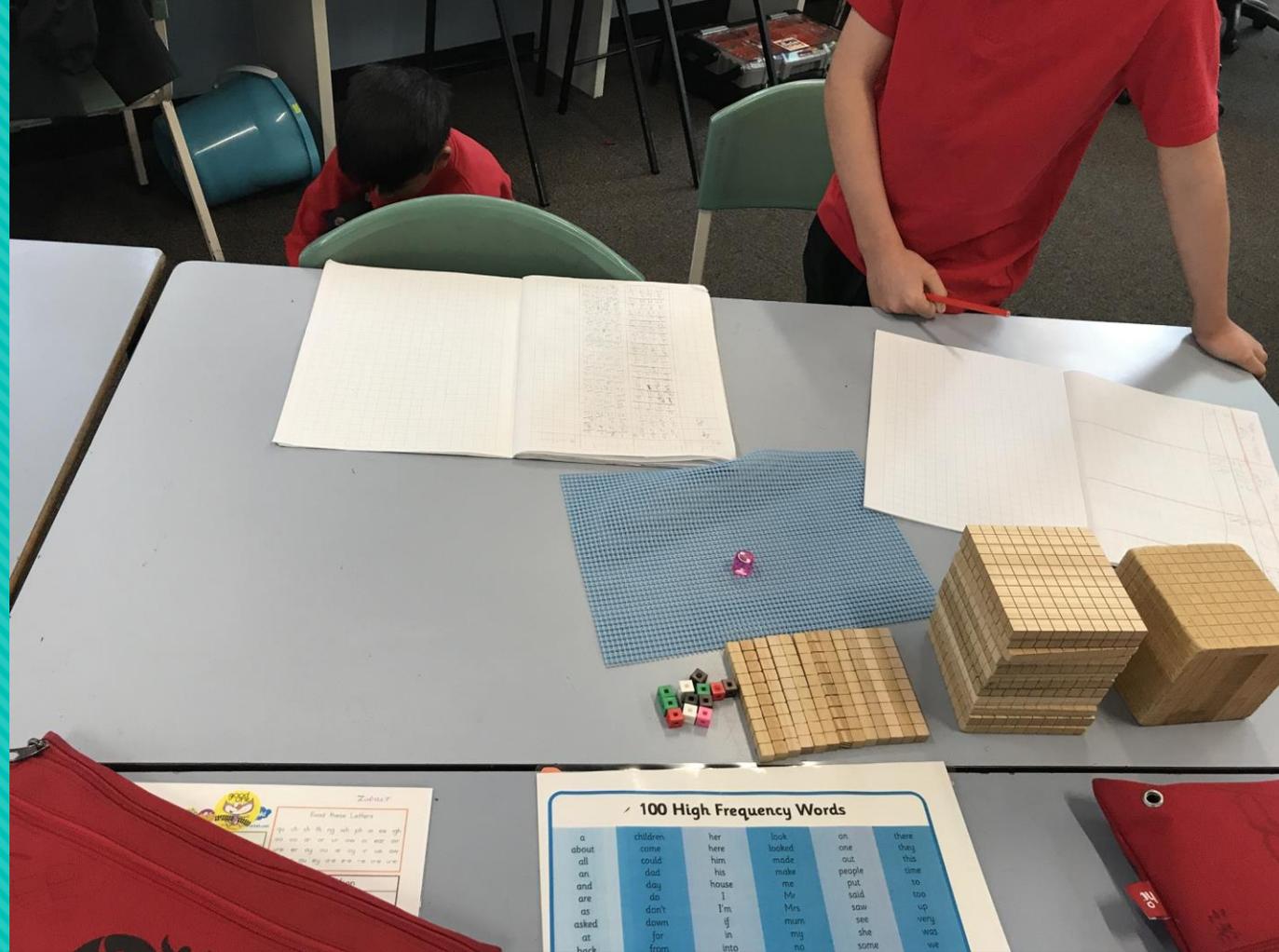
Put tubs of the materials in the four corners of the room to avoid traffic jams (or make a half-half collection area for girls v. boys). This way, if students forget, they know to just go to one of the corners and can always check back to see how your example desk looks.



Always make your example desk on the actual desk of one of your support pairs, but vary this between a few support students so they still practise setting up at least every second session.



**Always set up desks, then model around a desk using the materials. This reduces working memory issues, since students only deal with one set of instructions at a time.**



Also set up the workbook columns/headings before the modelling for that lesson (prior to the fishbowl, during the materials set up). This way, once students have participated in the modelling, they will be able to return to their desks with the materials and grid books already set up. If you do the modelling, then set up the desks, students can be overwhelmed by receiving and having to act on both instructions at once.



**Place value block collection stations or pre-counted sets**



**Put your place value blocks in easy-to-collect tubs for each group desk, or in mesh bags with mini 'place value banks' that contain 1 thousand, 12 hundreds, 12 tens and 12 ones.**



Use pre-organised cups to make the distribution of small materials or materials that need to be in certain colours or quantities much quicker. For example, for this lesson students needed two colours of cubes, so the teacher organised these for 10 minutes that morning, because the learning intention of the session was not 'sort cubes into two colours.' This can also be a great way to limit the supply of materials where you want to keep students working with numbers below 10 or with a set number (figuring out all the ways to share 12). A pack of cups is your best friend!

## Pre-counted cups

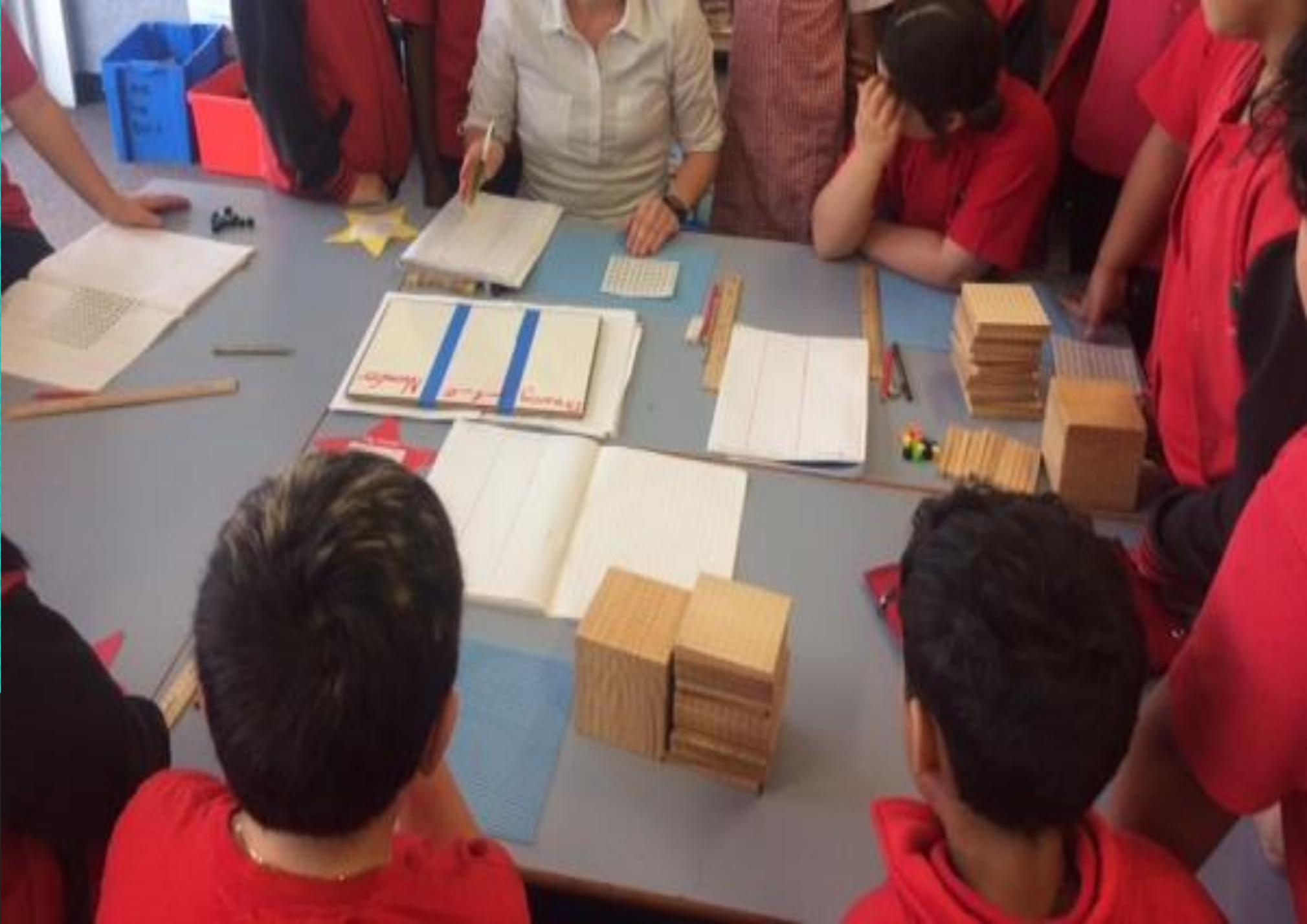


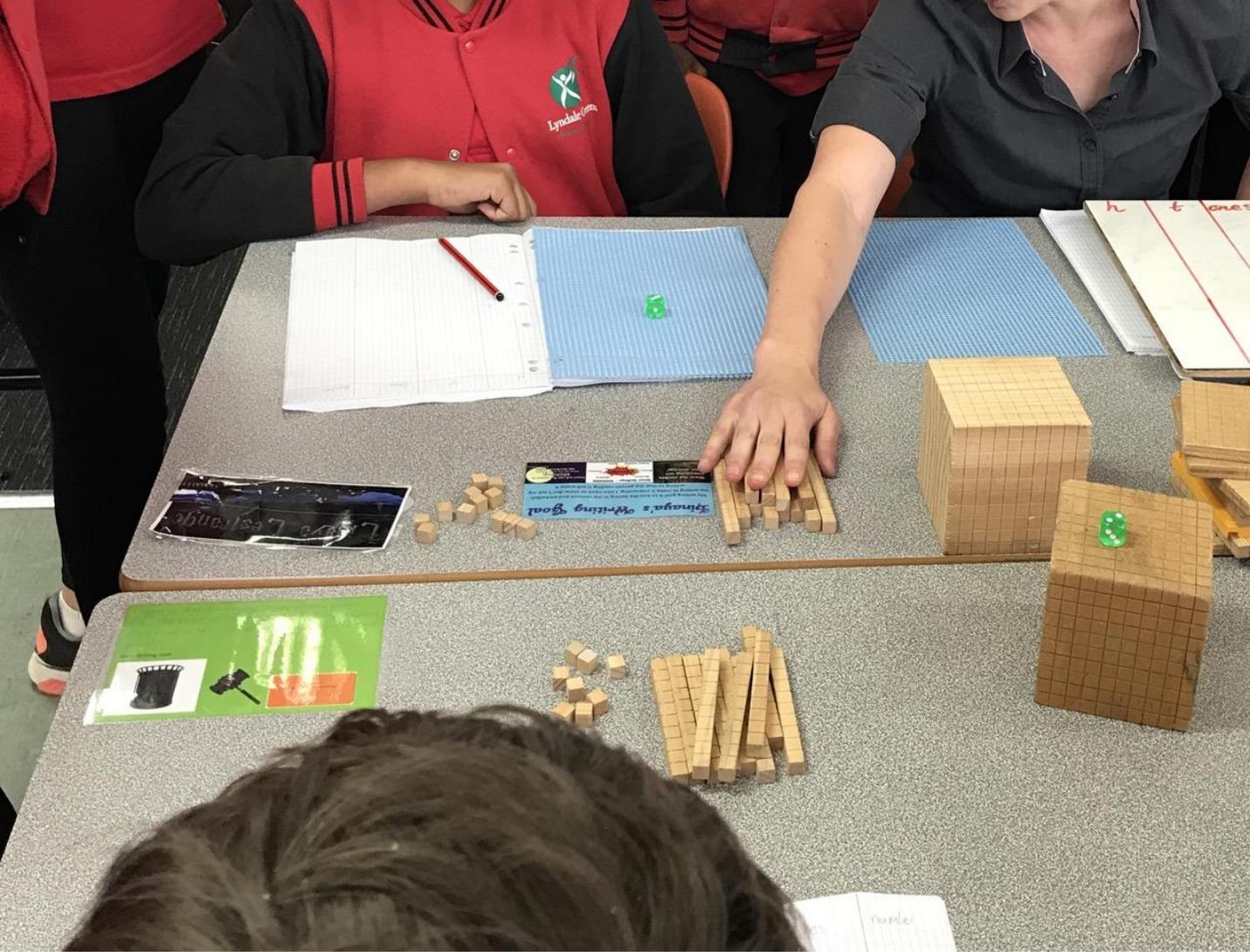
# Teacher Modelling

- If students will be working at their desks, the task should be modelled at a desk. This is called the 'fishbowl,' where students gather around a group desk (some sitting and others standing) to form a fishbowl-like structure to listen, participate and question. Students are then expected to get to work within one minute of the conclusion of the fishbowl.
- Sometimes, particularly during the first two years of school, students may be working as part of a whole-class circle for the session, recording each whole-class example on templates (photos to follow).
- If students will be working on the front whiteboard, the task should be modelled on the front whiteboard – basically never!

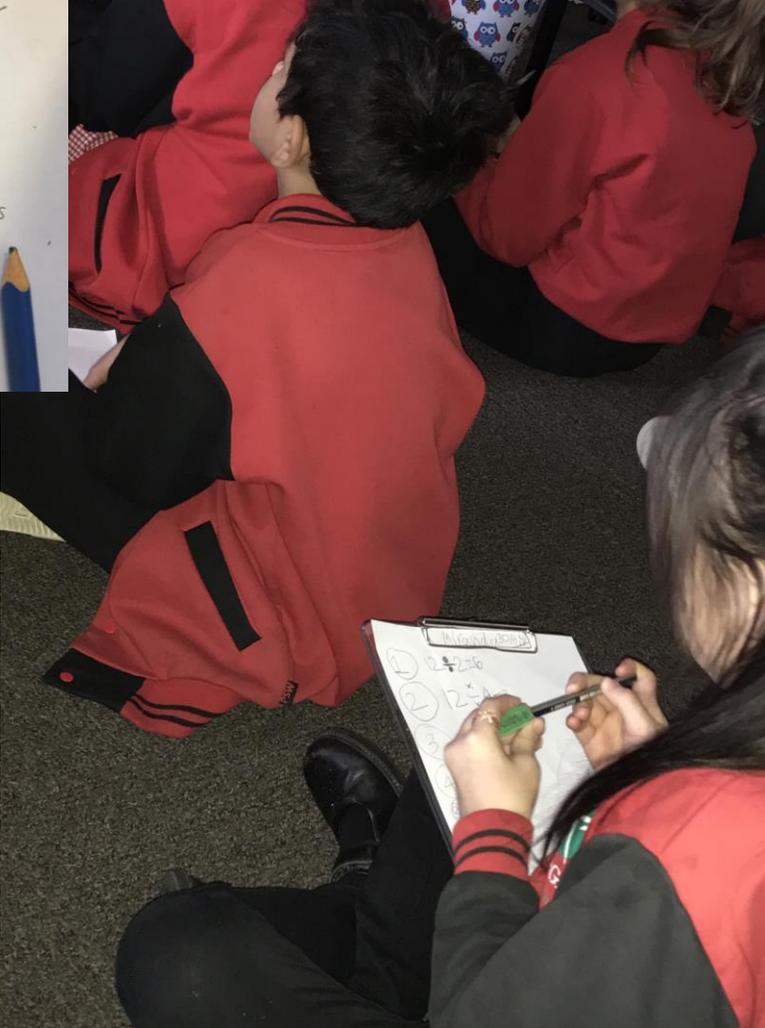
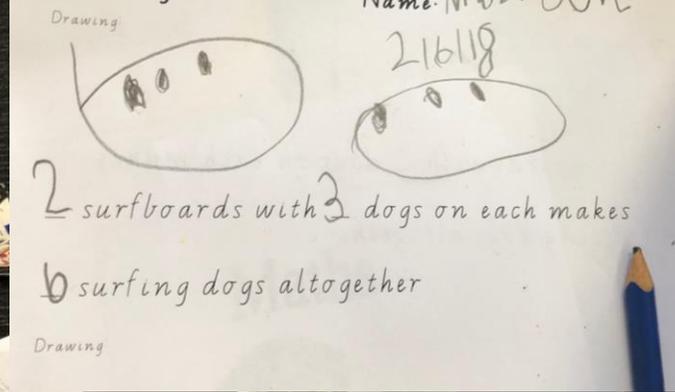
If your class is particularly high-energy, implement set spots in the fishbowl. Always allocate support students the sitting spots, so they don't get blocked and can have a front row seat of the fishbowl. Emphasise that students need to move so they can see. You don't just stay in your seat if you're at the movies and a really tall person sits in front of you – you move to where you can see!

Set spots if needed, but always for support students





For a partner game, always fishbowl it with a student partner so students can see it how actually looks in action. In the process, model fair play, partner manners and also get a sense of how the modelling is going with one of your students. Always record, in the same way you expect students to record their work, as part of the fishbowl, and ask your partner to record too.



For the first two years of school, another common set up is a whole-class circle, with students recording within this as a highly-guided introduction to concepts (for example, equal groups with animals on skateboards shown above). Extension students sit on one side together and can be extended within the whole-class circle, or shifted to a nearby desk when ready for independent practice. Support students sit close to the teacher and all students receive lots of teacher feedback as they work. The materials from the whole-class circle then closely match the student materials at their desks (for example, as shown above, giant skateboards to mini skateboards).

- Always say 'please' and 'thank you.'
- When using a deck of cards for games (like one more snap), keep the deck in the middle and no hovering hands (hands in your lap).
- For a competitive game, use the dice to determine who goes first (odds v. evens). If there are no dice, use scissors-paper-rock to decide who gets to go first, but only one game till there's a winner – not best of 5!
- **Help your partner, but do not tell them the answer. Teach them by giving them clues or showing them how to use the materials to figure it out.**
- Be kind and play fair.

# Partner etiquette

Mostly, students will be working with partners and sometimes independently too. The recommended set-up for each session is under the materials list for that lesson. Independent work is important to ensure students can learn particular concepts at their own pace, without being rushed by a partner who is getting it quicker. However, partner dialogue and peer-practice is also an integral part of building understanding and reasoning. When groups increase in size (to 3 or 4 students), some students do more of the work and some do less, just like in group work for adults! We want every student to do as much thinking as possible, so a mix of partner-based and independent work is ideal.

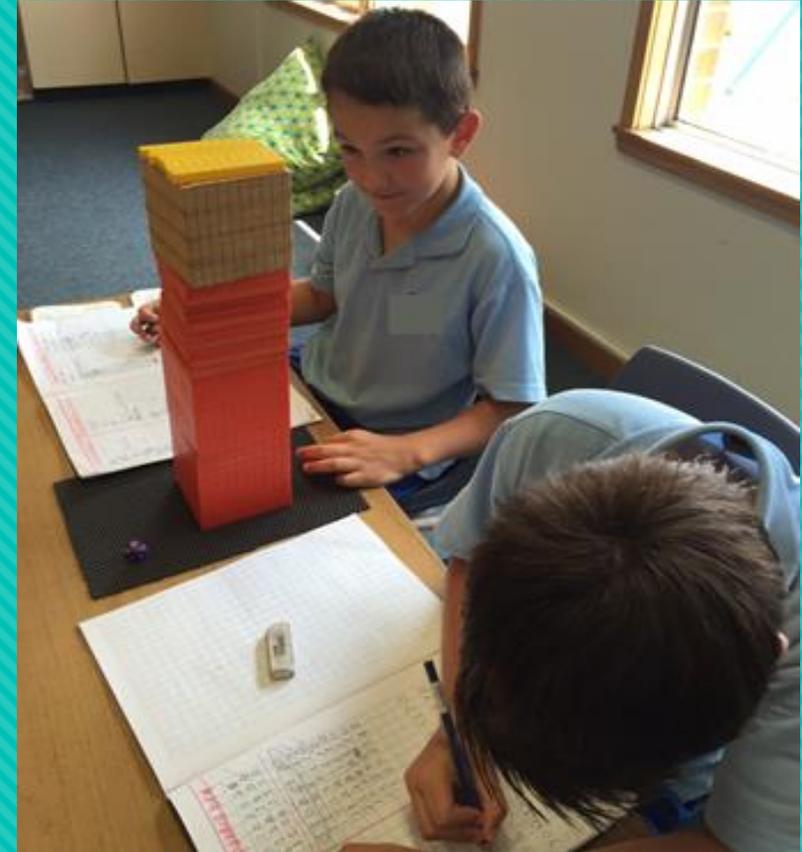


# Maths buddies

- We recommend like-ability partners for most sessions. This does not mean separate tables for support, mid and extension students, because that creates behaviour management issues. It instead involves a mixture of abilities on the one group table, but where each pair is like-ability. This way, mids can see what extension students are doing and work hard to be able to earn this upgraded challenge too.
- This also ensures that students can be extended and supported as pairs, without an extension student becoming frustrated by the content not being challenging enough when they work with a support partner, and without a support student drowning or learning to just copy their extension partner without thinking.

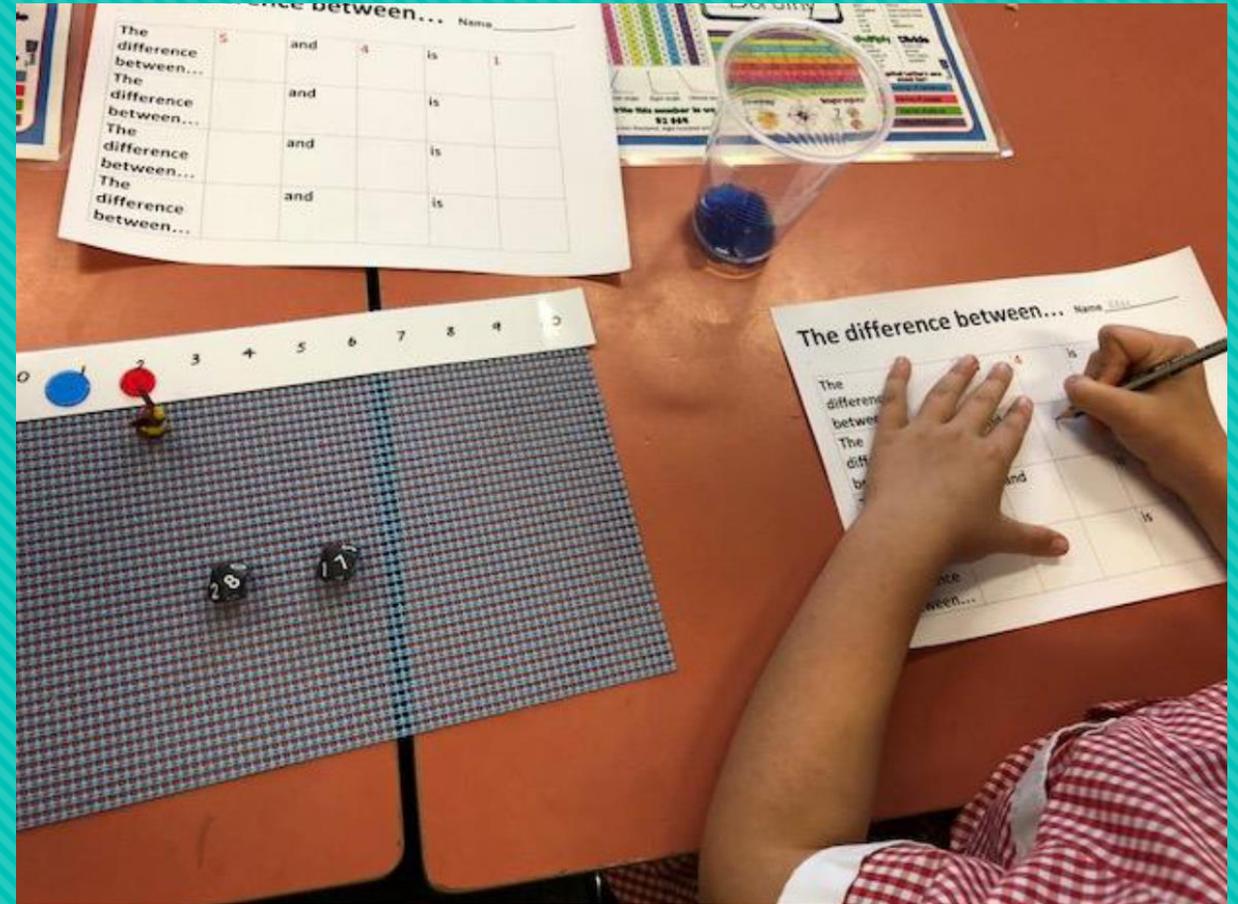
# Maths buddies

- For this reason, it is often easiest to set up regular maths buddies. These should be students who are similar in ability and work well together (not besties who distract each other, not sworn enemies). This reduces the time-wasting of allocating partners at the start of every session – if we have set reading groups, why don't we have set maths buddies too? We would never waste time making new reading groups at the start of every literacy session.
- Aim to make combinations that are like-ability, but that also complement each other. For instance, one is good with oral reasoning and showing working, the other is good with using materials to solve problems.



# Maths buddies

# Tip Four: Student recording

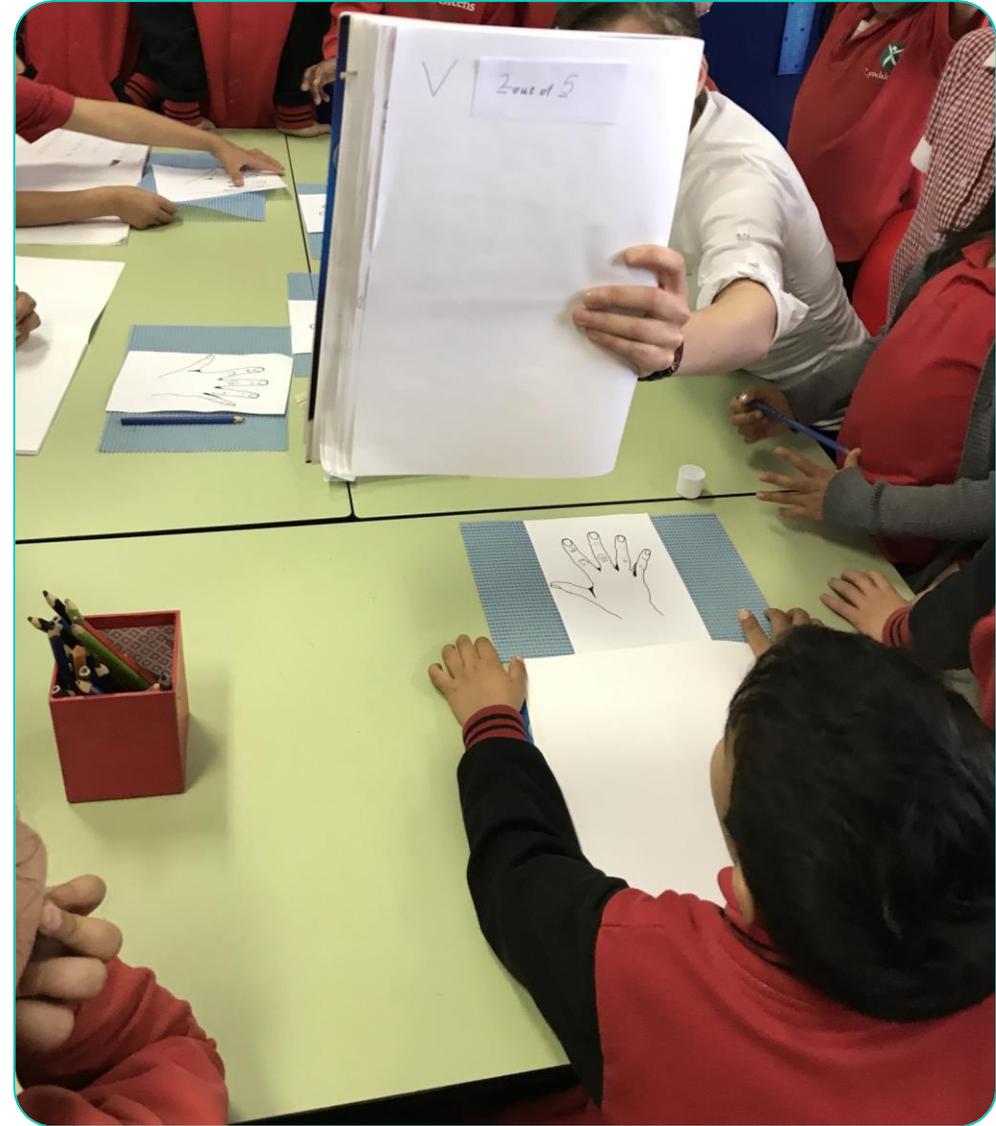


Even though primary school maths is a material-based beast, there should still be student recording involved in almost every session. The templates in each folder match the lesson's materials and make it easy for students to record by removing literacy barriers.



**In the fishbowl, use a mini whiteboard to show students how the recording that matches their work with the materials should look on paper, but also show students how it should look in an actual book. This reduces the transfer difficulty – students don't have to guess how it should look in their books – they can see it.**

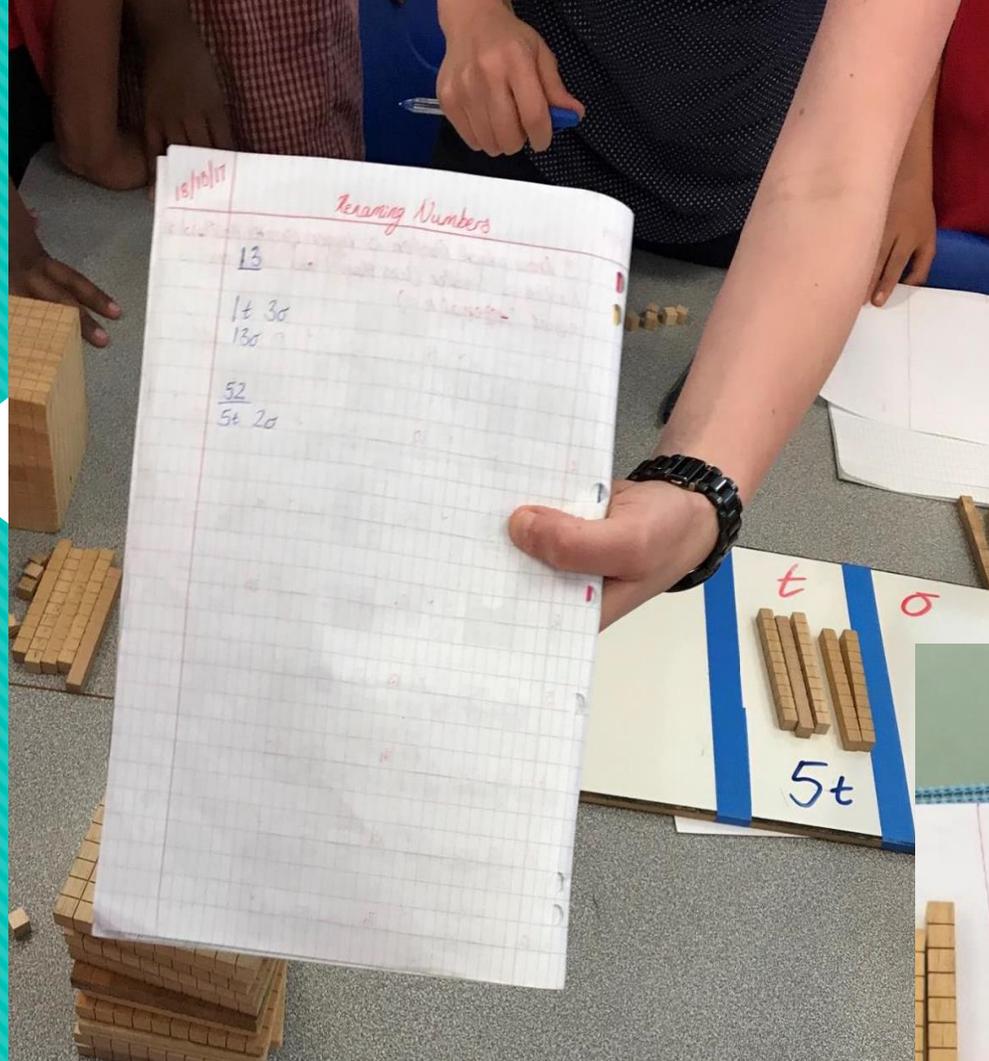
Show the  
recording in  
a student  
workbook



# Show them your grid book with worked examples

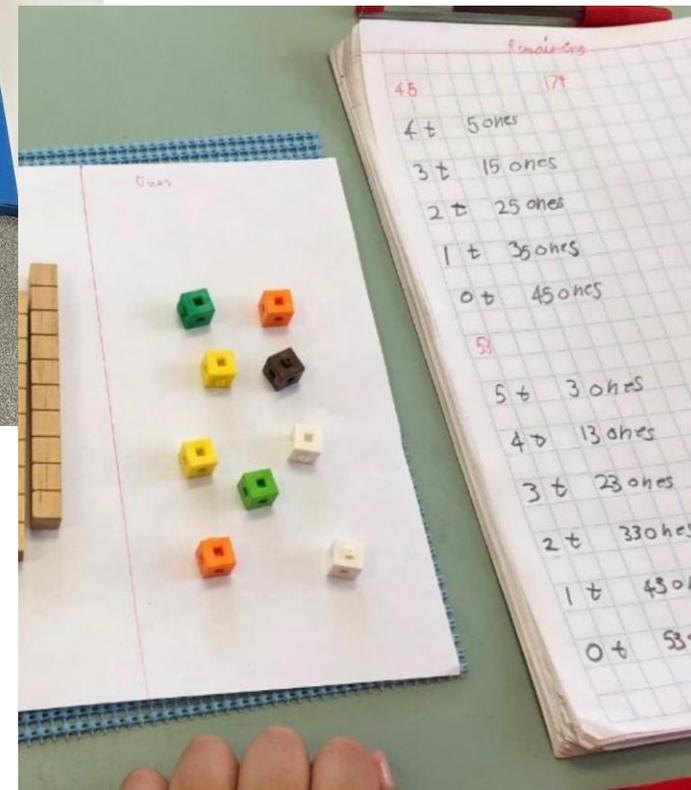
This is the one habit that will have the most significant impact on the standard of students' recording and workbooks.

By showing students in your own example maths book, you set a high standard for recording, neatness and show them exactly how it should look in their books or on the recording template (without them having to mentally transfer your modelling from a whiteboard to their own books).

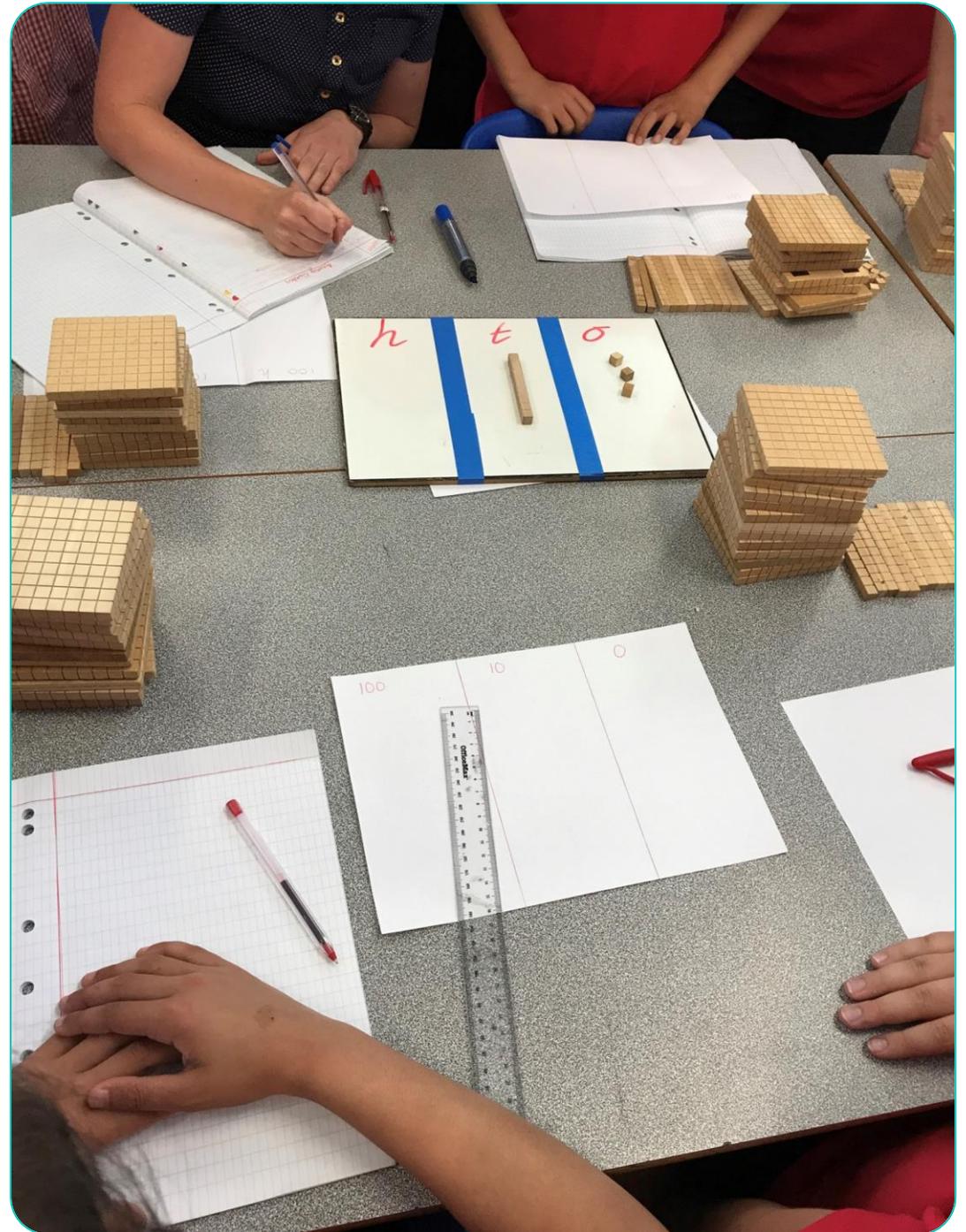


Shown during fishbowl

Support student work during that same session



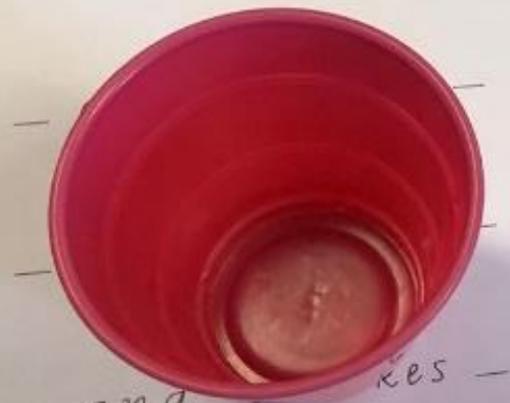
Work like a student –  
model using  
the materials  
and the  
recording



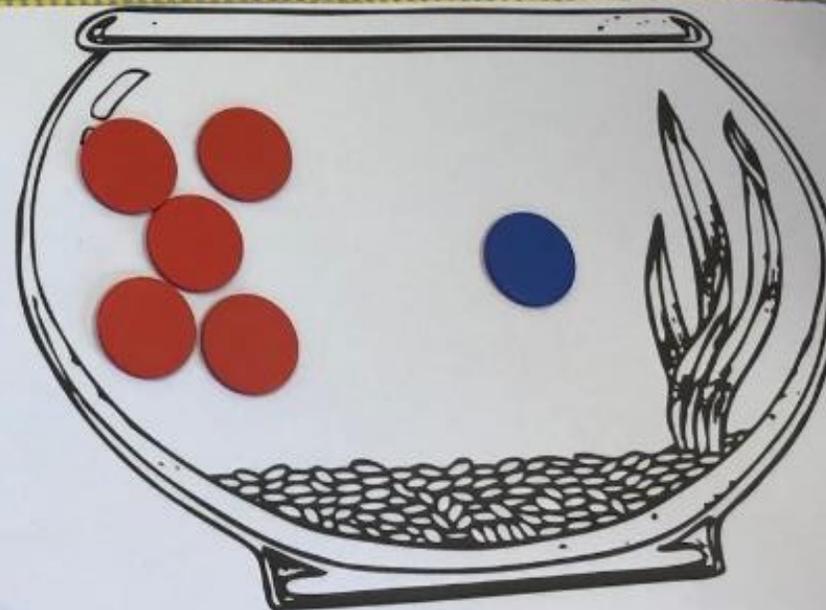


— and — makes —

— and — makes —



— and — makes —



Sample of a desk set up in the first year of school – the lesson was about all the ways to make 6 (partitioning) so the counters were pre-counted with 6 in each cup. The teacher asked the extension students to collect two cups, partitioning 12.

## Matching recording for that lesson:

Even for the first year of maths, students record their work alongside the materials, mostly in the supportive templates from the unit folders. For the early years, many templates are kept consistent throughout units to reduce recording difficulties, with just the materials and the context for the lesson changing.

Name Ethan Date \_\_\_\_\_  
We are learning to add things together.

3 and 9 makes 12 ✓

7 and 5 makes 12 ✓

4 and 8 makes 12 ✓

6 and 6 makes 12 ✓

Name \_\_\_\_\_ Date \_\_\_\_\_

We are learning to add things together.

4 and 2 makes 6 ✓

5 and 1 makes 6 ✓

4 and 2 makes 6 ✓

3 and 3 makes 6 ✓

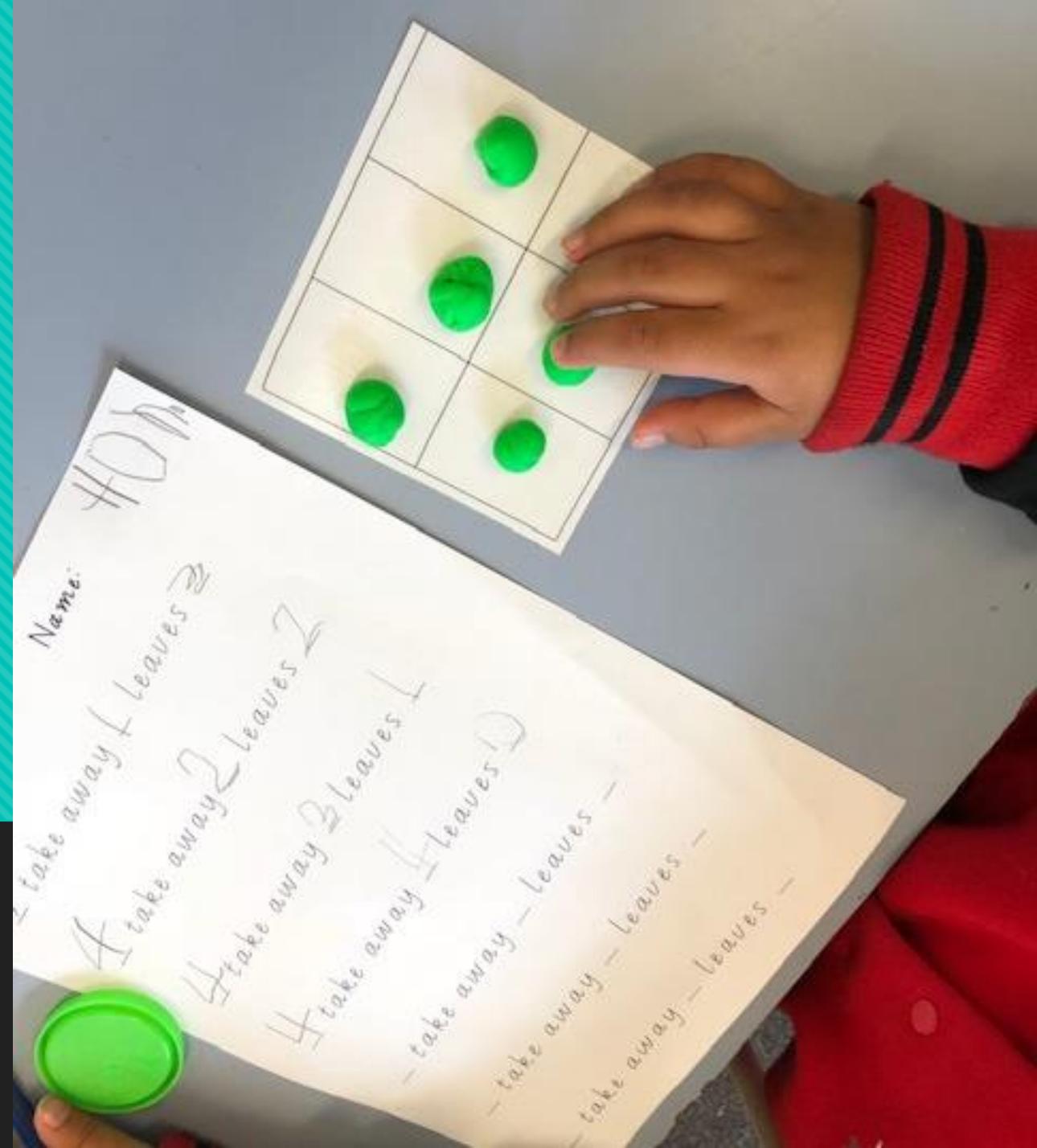
4 and 2 makes 6 ✓

2 and 4 makes 6 ✓

# Another example of recording while using the materials

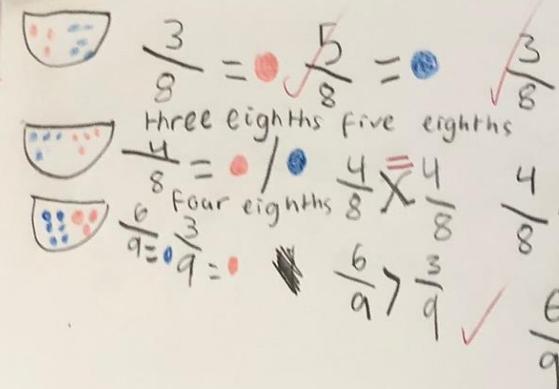
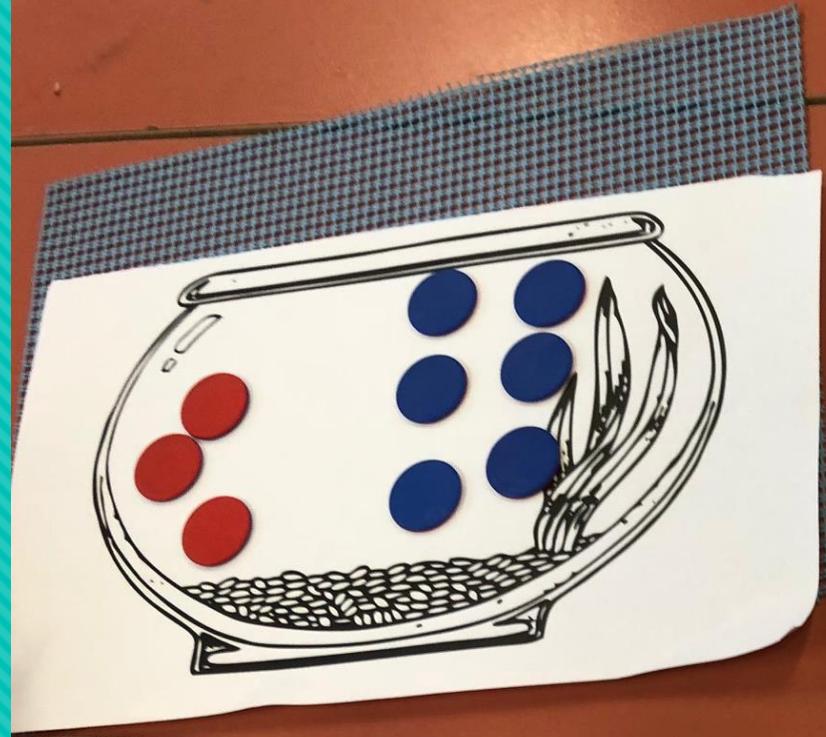
Since students are always recording (apart from during some warm-ups), at a glance, you can see whether the student is getting it or needs help. This student was doing an awesome job during their first lesson on subtraction, so was upgraded from a 4-frame to a 6-frame.

## Subtraction squish



By Year 2, where the same example lesson from the previous slides can be used for fishbowl fractions, students start mostly recording in their workbooks, without templates. Like the use of the materials, the recording is carefully and deliberately modelled as part of the whole-class fishbowl.

# Maths book recording



# Year 2 recording

## Air hockey partitioning



All the ways to make 12  
29/8/18

~~4 + 4 + 4 = 12~~  
 $6 + 6 = 12$   
 $5 + 7 = 12$   
 $5 + 5 + 2 = 12$   
 $6 + 6 = 12$



All the ways to make 12

$6 + 6 = 12$   
 $6 + 4 + 2 = 12$   
 $7 + 5 = 12$   
 $8 + 4 = 12$   
 $10 + 2 = 12$   
 $11 + 1 = 12$   
 $5 + 7 = 12$   
 $4 + 8 = 12$   
 $2 + 10 = 12$   
 $1 + 11 = 12$   
 $12 + 0 = 12$   
 $0 + 12 = 12$

By year 3/4, there are virtually no templates as students record in their grid books. Books are ruled up with headings at the same time as the desk set-up (often girls set up desks, boys set up books, then switch to further reduce traffic jams). Both desks and books are set up before the whole-class fishbowl.

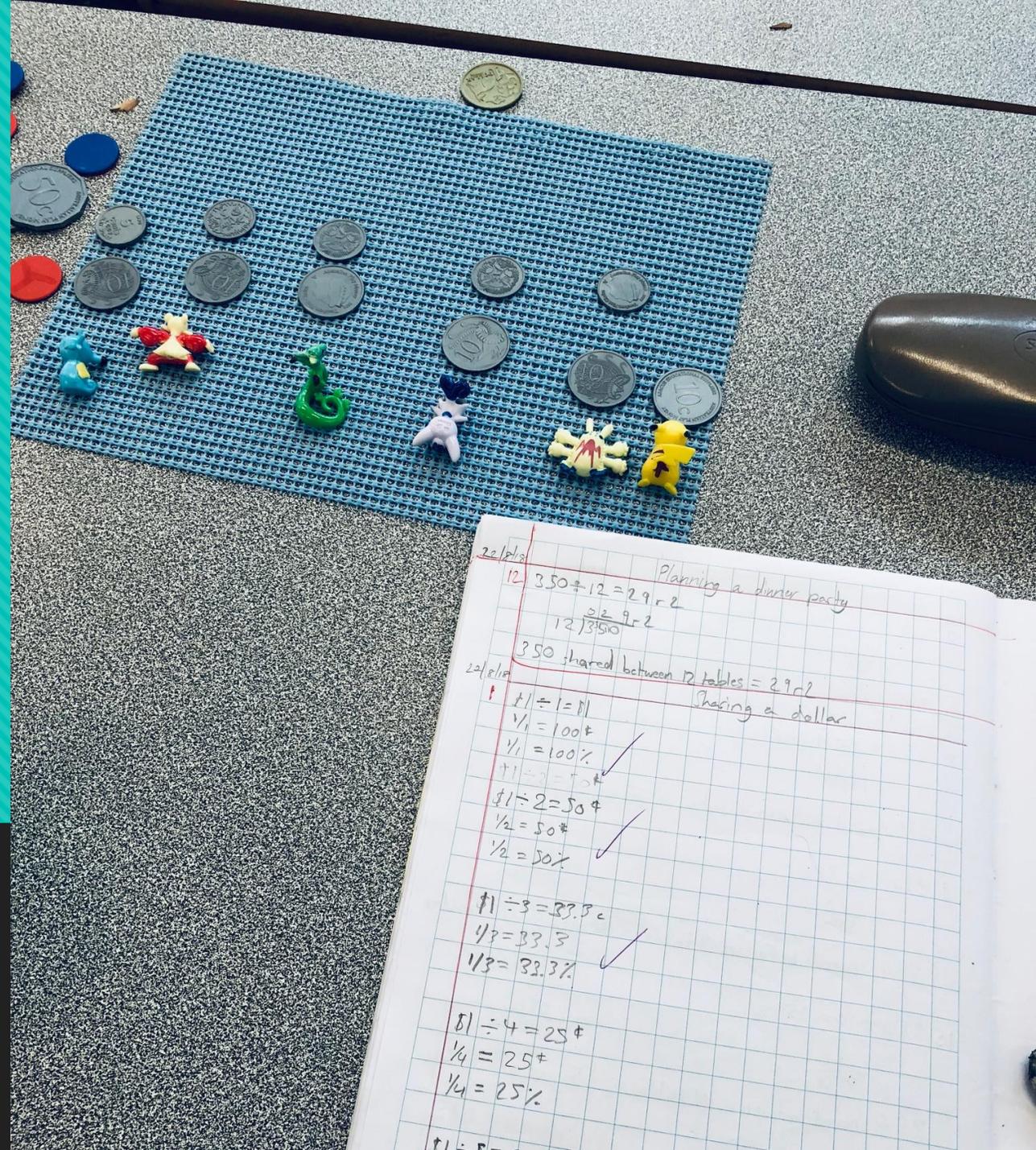
# Maths book recording

ages 118

Equivalent Fractions			
Sky divers	Equivalent all (Whole)	Equivalent to $\frac{1}{2}$	Battle
6	$\frac{6}{6} = \frac{3}{3} = \frac{3}{6}$	$\frac{3}{6}$	$\frac{3}{6} = \frac{3}{6}$
7	<del>cant make half</del> $\frac{4}{7} + \frac{3}{7} = \frac{7}{7}$	cant make half.	$\frac{3}{7} > \frac{3}{7}$
8	$\frac{3}{8} + \frac{5}{8} = \frac{8}{8}$	$\frac{4}{8}$	$\frac{3}{8} < \frac{5}{8}$
9	$\frac{5}{9} + \frac{4}{9} = \frac{9}{9}$	cant make half.	$\frac{5}{9} > \frac{4}{9}$
10	$\frac{6}{10} + \frac{4}{10} = \frac{10}{10}$	$\frac{5}{10}$	$\frac{4}{10} < \frac{6}{10}$
11	$\frac{7}{11} + \frac{4}{11} = \frac{11}{11}$	cant make half.	$\frac{7}{11} > \frac{4}{11}$
12	$\frac{6}{12} + \frac{6}{12} = \frac{12}{12}$	$\frac{6}{12}$	$\frac{6}{12} = \frac{6}{12}$
13	$\frac{7}{13} + \frac{6}{13} = \frac{13}{13}$	cant make half.	$\frac{7}{13} > \frac{6}{13}$

We recommend starting grid books in grade 2 and only using the 1cm<sup>2</sup> variety from years 2-6. Year 2 can use a mix of the plain and grid books, but all 3-6 classes should be using 1cm<sup>2</sup> grids for maths.

# Maths book recording



20/12/18  
12  $3.50 \div 12 = 29 \text{ r } 2$   
 $\begin{array}{r} 29 \\ 12 \overline{) 350} \\ \underline{22} \phantom{0} \\ 130 \\ \underline{120} \\ 10 \end{array}$   
3.50 shared between 12 tables = 29r2

22/12/18  
!  $\$1 \div 1 = 100\%$   
 $\$1 = 100\%$   
 $\$1 = 100\%$  ✓  
 $\$1 = 100\%$  ✓  
 $\$1 \div 2 = 50\%$   
 $\$1 = 50\%$  ✓  
 $\$1 = 50\%$  ✓

$\$1 \div 3 = 33.3\%$   
 $\$1 = 33.3\%$   
 $\$1 = 33.3\%$  ✓

$\$1 \div 4 = 25\%$   
 $\$1 = 25\%$   
 $\$1 = 25\%$

$\$1 \div 5 = 20\%$   
 $\$1 = 20\%$   
 $\$1 = 20\%$

In 5/6, the recording is still straightforward in that, as far as possible, it matches the materials for that session:

*(Units of time)*  
 Converting minutes into hours and minutes

118 mins → 60 mins ✓  
 58 mins ✓ = 1hr - 58minutes

movie - Antman and the Wasp

movie -

L1: We are learning to use number bonds to work out hours and minutes from a given time.

Success Criteria -  
 I can convert between minutes and hours.  
 I understand that there are 60 minutes in 1 hour.

1 75 mins → 60 mins ✓  
 15 mins ✓ = 1 hour and 15 minutes

2 95 mins → 60 mins ✓  
 35 mins ✓ = 1 hour and 35 minutes

FIFA Australia vs Peru 210 mins

3 210 mins → 180 mins ✓  
 30 mins ✓ = 3 hours and 30 minutes

Jurassic World: Fallen Kingdom 2D 128 mins

4 128 mins → 120 mins ✓  
 8 mins ✓ = 2 hours and 8 minutes

5 Tag 100 mins → 60 mins ✓  
 40 mins ✓ = 1 hour and 40 minutes

Incredibles 2 3D 125 mins

6 125 mins → 120 mins ✓  
 5 mins ✓ = 2 hours and 5 minutes

Kaala 162 mins

7 162 mins → 120 mins ✓  
 42 mins ✓ = 2 hours and 42 minutes

*Fantastic Baer!*

The assessments are paper-based (not online) because we need students to be able to show their strategies and working out – ensuring we as teachers, and our students, place value on strategies (not just answers). We know this takes longer to mark, but the spreadsheets have formulas to try to make it more efficient. The way in which the linked spreadsheet highlights your class' points-of-need, developmental gaps and extension/support needs makes the data immediately useable – also by linking directly back to the units that can be used to fill those gaps.

The fact that the assessments are linked back to the hands-on units (within the second row of boxes below the data spreadsheets), we hope, takes away some of the huge preparation involved in running an excellent hands-on maths curriculum in your classroom.

# Assessments

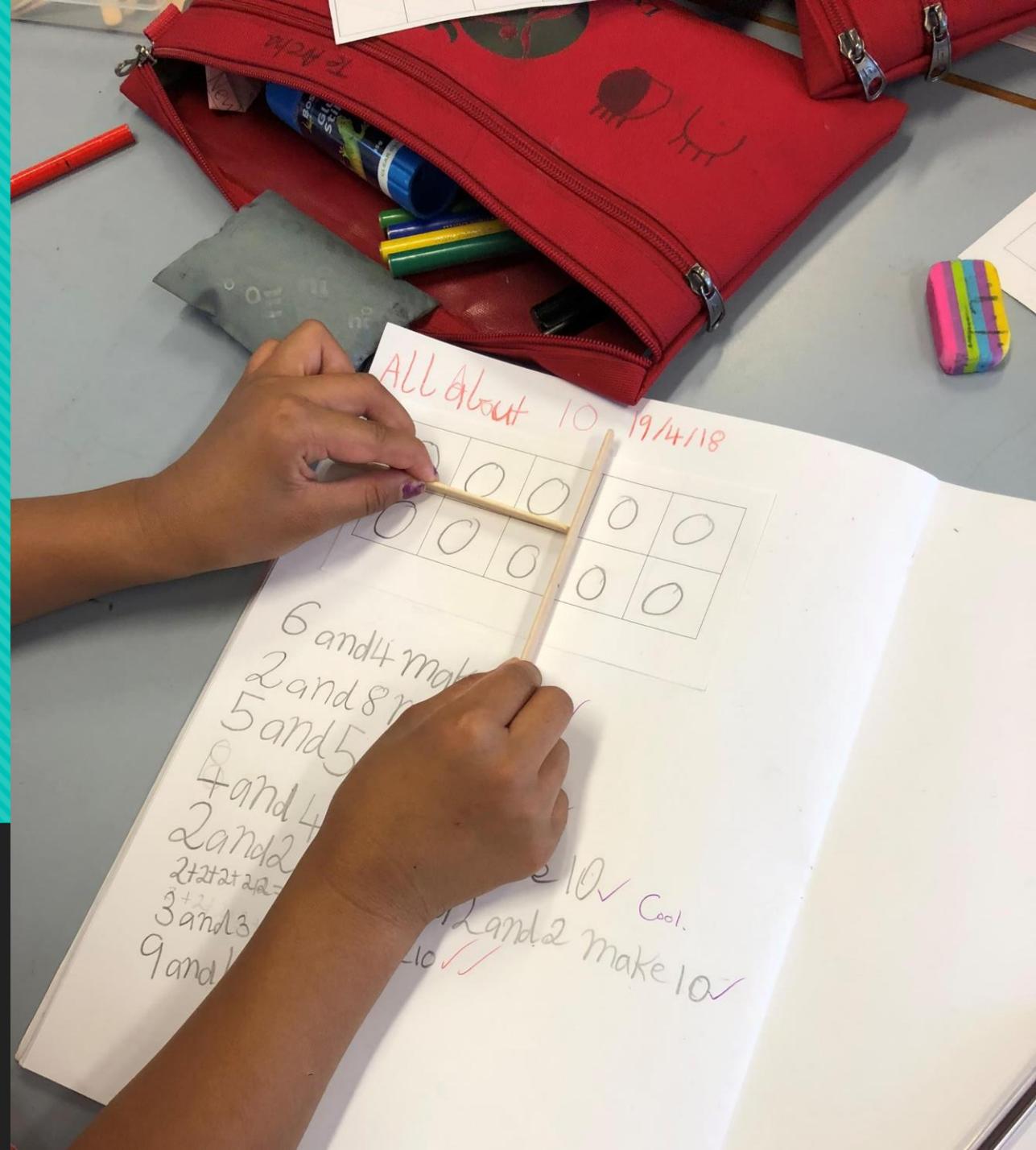
# Tip Five: Warm-ups and engaging hooks



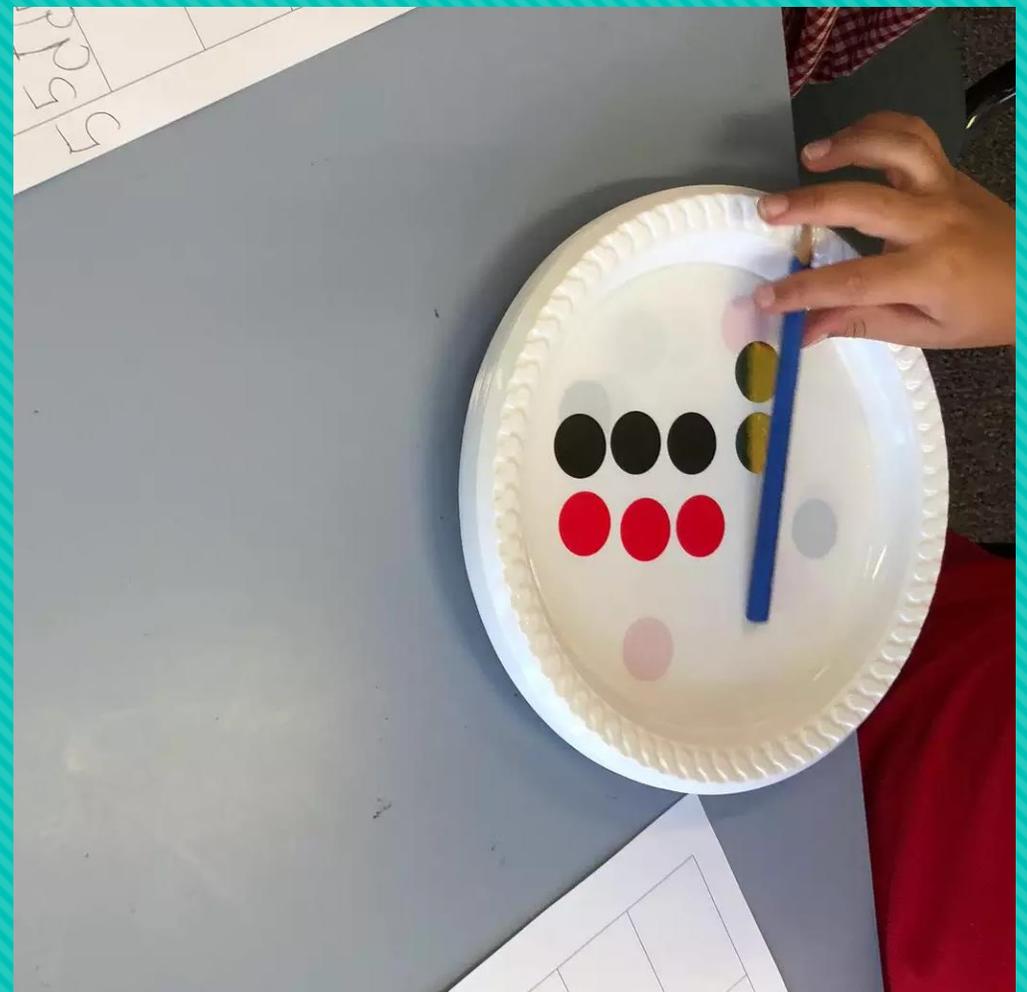
**My brain isn't interested, until my heart is.**

Warm-ups, including number talks and fluency games, are part of the lesson structure and occur before the main part of the session. Warm-ups should generally be kept consistent all week, starting on a Monday and continuing until Friday, or for two weeks if needed. This means students can get straight to work for maths as soon as they enter the room, providing you with time to deliver an extension prompt or target specific students from the previous lesson.

Often, warm-ups can be used to consolidate and spiral-revise previous units, or to front-load challenging concepts. This sequence is included in each unit and in the recommended year level timing overviews.



Prioritise skills that take longer to build for your warm-up games. For example, subitising (seeing number instantly), digit formation (using digit roads every day throughout the first two terms of school), partitioning the numbers 5-9 (all the ways to make 5 to 9), skip-counting and, for 3-6, the times tables and division fact families. These skills will almost never be achieved in a few weeks, so need to form part of warm-ups throughout the following term or even throughout the year, until these skills are mastered.

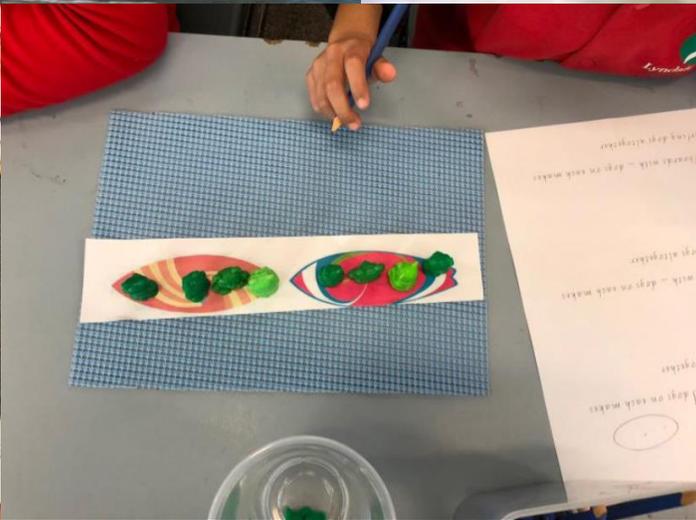


**Use warm-ups for long-term skills**

Hooks are different to warm-ups. They are a tune-in, which only need to span for about 2 minutes. Hooks excite students and create a meaningful real-life or amusing context for the session ahead. For example, for a lesson on sharing buttons between gingerbread men (creating equal shares and recording division number sentences), we show this clip of the King interrogating Gingy and him begging to keep his prized gum-drop buttons!



## Engaging Hooks



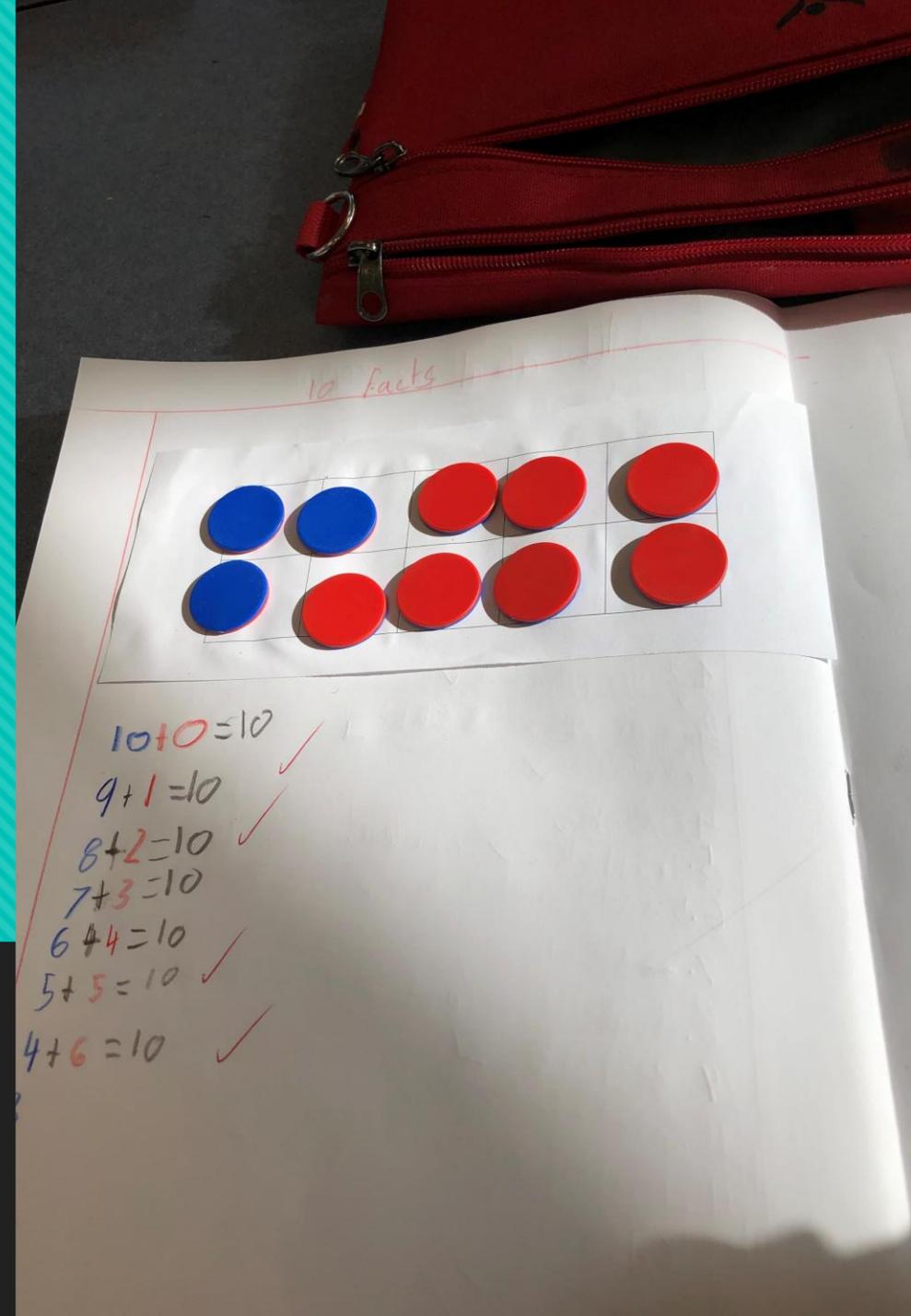
Here's the link: <https://www.youtube.com/watch?v=tDOM-U7uStM&t=1s>

**The hook for a lesson on multiplication  
(creating equal groups on your surfboards) –  
a real-life surf dogs contest!**

**Extension and Support  
within the same context**

The hook for this lesson was a superhero party – students brainstormed blue and red superheroes that they could invite to their birthday if they were allowed 10 guests

**10 facts**  
**Mid-range year 1 student**



Extending prompts (extension) are included throughout all lessons. Often, extension is more manageable by keeping the materials and lesson context the same or similar. For example, while other students were developing their 10 facts, the students who already knew these off-by-heart were applying them to create 20, 30 and 40 facts. Extension students started to notice patterns and, at this point, were then asked to break the number into 3 parts using the colours, for example, with 30 as  $8 + 12 + 10$ . A further extension was ready, relating to partitioning 100. In this way, the teacher has a few levelled extensions pre-planned and ready-to-go. Extension students usually start with an extension, without having to 'complete' the mid-level part of the session if it does not value-add to them.

## Superhero party 20, 30 and 40 facts – extension grade 1 students

The image shows a student's math notebook with several pages of work. At the top right, a 100 chart is visible with red and blue dots placed on various numbers. The notebook pages contain ten-frame activities and handwritten addition facts.

**Page 1 (Top):** A ten-frame with 10 blue dots. Below it, a ten-frame with 8 blue dots and 2 red dots. To the right, a list of addition facts for 10:  $2+8=10$ ,  $4+6=10$ ,  $6+4=10$ ,  $10+0=10$ ,  $10+0=10$ ,  $8+2=10$ ,  $9+1=10$ .

**Page 2 (Middle):** A ten-frame with 10 red dots. To the right, a list of addition facts for 20:  $10+10=20$ ,  $9+11=20$ ,  $12+8+10=30$ ,  $8+12+10=30$ ,  $490=11$ ,  $490=11$ .

**Page 3 (Bottom):** A ten-frame with 10 blue dots. To the right, a list of addition facts for 30:  $20+10=30$ ,  $21+9=30$ ,  $22+8=30$ ,  $23+7=30$ ,  $24+6=30$ ,  $25+5=30$ ,  $26+4=30$ ,  $27+3=30$ ,  $28+2=30$ ,  $29+1=30$ ,  $30+0=30$ .

The notebook also features a ruler and a pencil. The text "Top Ten Numeracy" and "www.top10resources.com" is visible at the bottom of the pages.

## ENABLING PROMPT (SUPPORT)

Make the numbers smaller, for example, if the class is partitioning 6, they may still need to learn to partition 4. Repeat the same lesson focus (partitioning 4) many times, just with different materials, while the class may be using these materials to partition higher numbers.

Use 3-dot dice to reduce the size of the numbers, for example, rolling two 3-dot dice to decide what to put into their addition machines.

For division, allocate them numbers like 12, 16 or 18 to mostly avoid remainders.

## EXTENDING PROMPT (EXTENSION)

Make the numbers bigger, or require them to break the number into 3 parts, or make the numbers decimals or fractions.

Upgrade the dice – use 10-sided, 20-sided or place value tens dice. For example, for fact families, apply their understandings to create 2- or 3-digit fact families by rolling these larger dice. During Fact Families Unit 7, extension students use coins to create decimal fact families and, while most of the class is using dominoes to create whole number fact families, they use the dominoes to create fraction fact families.

For division, use numbers that involve remainders and investigate divisibility.

**Examples of how to extend and support a lesson**

## ENABLING PROMPT (SUPPORT)

Model your fishbowl example in their workbook so a worked example is at the top of their page (support students rarely have the strategy of referencing the whiteboard).

Record it using the supporting template, which removes literacy barriers and closely matches the materials for that session. For example, for fractions, just start by recording 'out of' sentences using pre-sliced 'out of' strips from the unit's folder.

## EXTENDING PROMPT (EXTENSION)

Record it multiple ways, for example, a multiplication as:

$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

4 carriages with 5 animals in each, makes 20 altogether

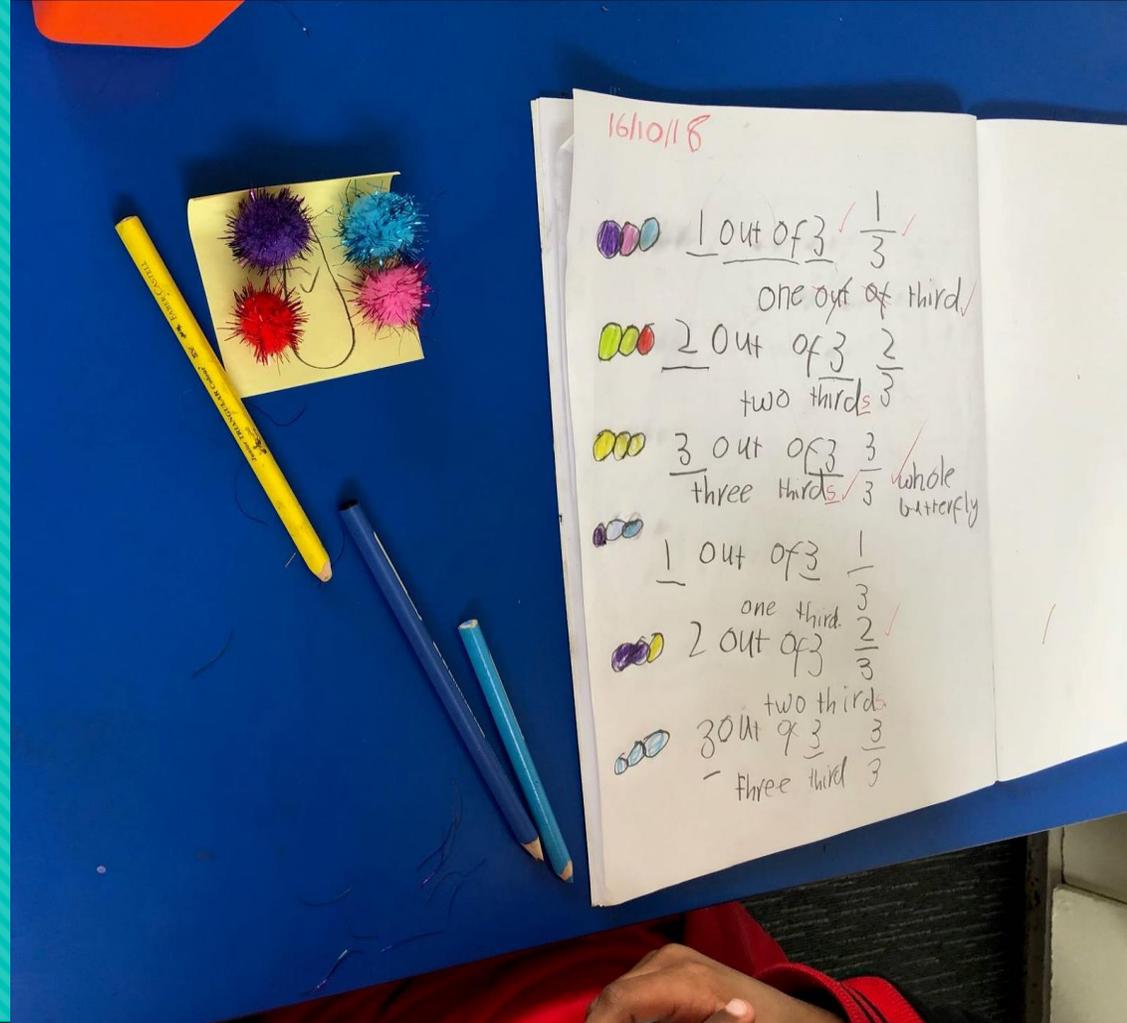
Record the matching division,  $20 \div 4 = 5$  in each

Show these extensions in the fishbowl, so that some mid-range students can attempt it too, when ready.

For fractions, as well as recording as numbers and in worded form, compare their size using a greater/less than sign and decide whether each fraction is more or less than half.

**Examples of how to extend and support a lesson**

# Tip Six: Build mathematical vocabulary every day



The mathematical vocabulary relevant to each session is highlighted in the second line (below the learning intention). Often, this will include cross-content vocabulary. For example, during this fraction creatures lesson in year 1, the pom-poms were not referred to as balls, they were called spheres and it was pointed out to students that most balls (soccer balls, basketballs) are spheres. Shape and angles vocabulary can often be incorporated during many number-focused lessons. Ask students to repeat/chorus these words as a class to practise saying them, then encourage students to use them to their partner and to you throughout the lesson.

five six seven eight nine ten  
 4 5 6 7 8 9 10

200			
7	8	9	10
7	18	19	20
7	28	29	30
7	38	39	40
7	48	49	50
7	58	59	60
7	68	69	70
7	78	79	80
88	89	90	
98	99	100	
108	109	110	
118	119	120	
128	129	130	
138	139	140	
148	149	150	

**addition** +

*why?*  
 - to check  
 - to find the total

*when?*

*what?*  
 added balloons  
 scores  
 candles

*language*  
 - join together  
 - equals = same as  
 - altogether  
 - number sentence  
 $7+3=10$

*strategies*  
 - Partition  
 - Count On ✓  
 - Doubles  
 - Friends of 10

To combine two or more numbers to make one larger number  
 $7+2+1=10$

**Subtraction** -

*why*  
 helps you with change at the shops.  
 - helps us work out the difference

*language*  
 take away  
 minus  
 subtract  
 difference

*strategies*  
 - count back  
 - count down

\* Always start with the biggest number  
 $7-3=4$

**Friends of 10**

Partner numbers that make 10  
 $1+9=10$   
 $2+8=10$

**DOUBLES DOUBLES**

$0+0=0$	$8+8=16$
$1+1=2$	$9+9=18$
$2+2=4$	$10+10=20$
$3+3=6$	$11+11=22$
$4+4=8$	$12+12=24$
$5+5=10$	
$6+6=12$	
$7+7=14$	

Use different strategies to add

**Double Trouble**

$1+1=2$   
 $2+2=4$

**Jump off strategy**

Start from the bigger number, jump off and count on.

WALT- We are learning to... Share objects

*What?*  
 food  
 toys  
 money  
 people  
 ideas

*When?*  
 School  
 play  
 home  
 activities

*why?*  
 fair  
 equal amounts



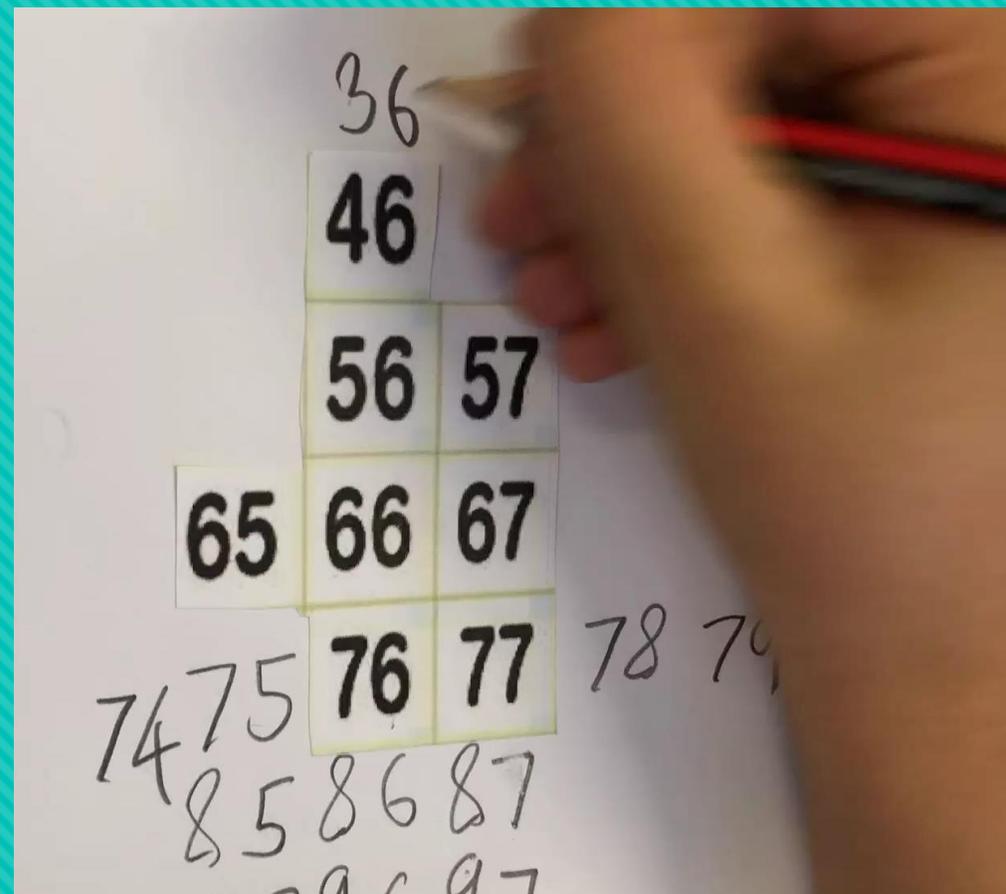
12 magic eggs shared between 3 ducklings.  
 How many do each get?


Our Numeracy Reflection

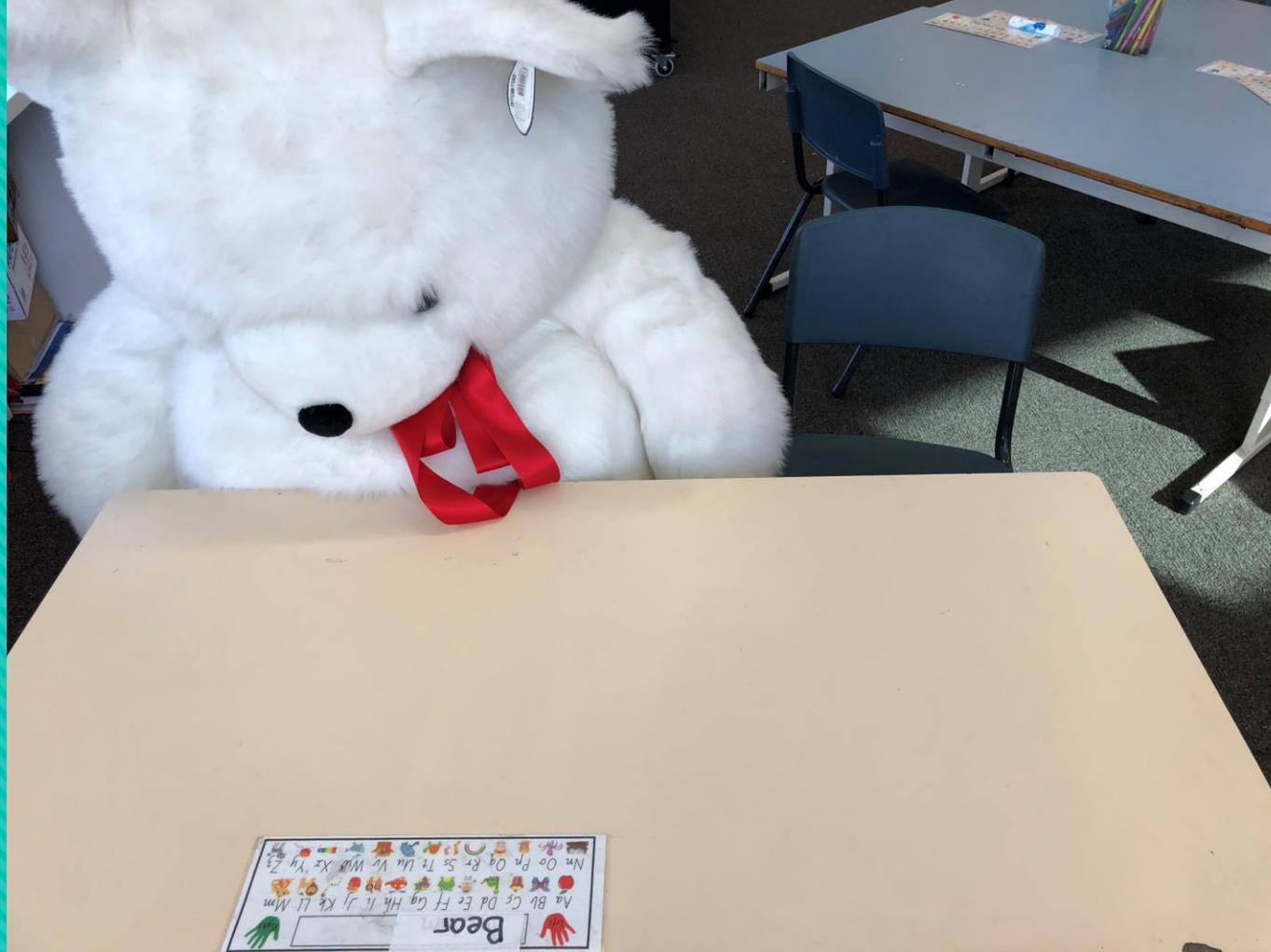
An anchor chart created with your students is not always as pretty, but is far more powerful than a printout.

Keep a class numeracy reflection book, which is also a great way to remember what worked well each year! If students don't need them, retain a few students' books each year as another easy way to recall sessions that worked well. Send the reflection book home for students to read with parents.

# Tip Seven: Immediate Feedback



The teaching does not just occur at the start of the lesson, it occurs the whole way through – questioning, assisting, providing positive feedback, roaming to identify extension and support needs (not just for extension and support students, but for all). The power of high-floor, low-ceiling lessons is that your middle cohort can now fluidly become extension students (attempting the extending prompt) **EVERY LESSON** if they show understanding and work hard – and they notice this quickly!

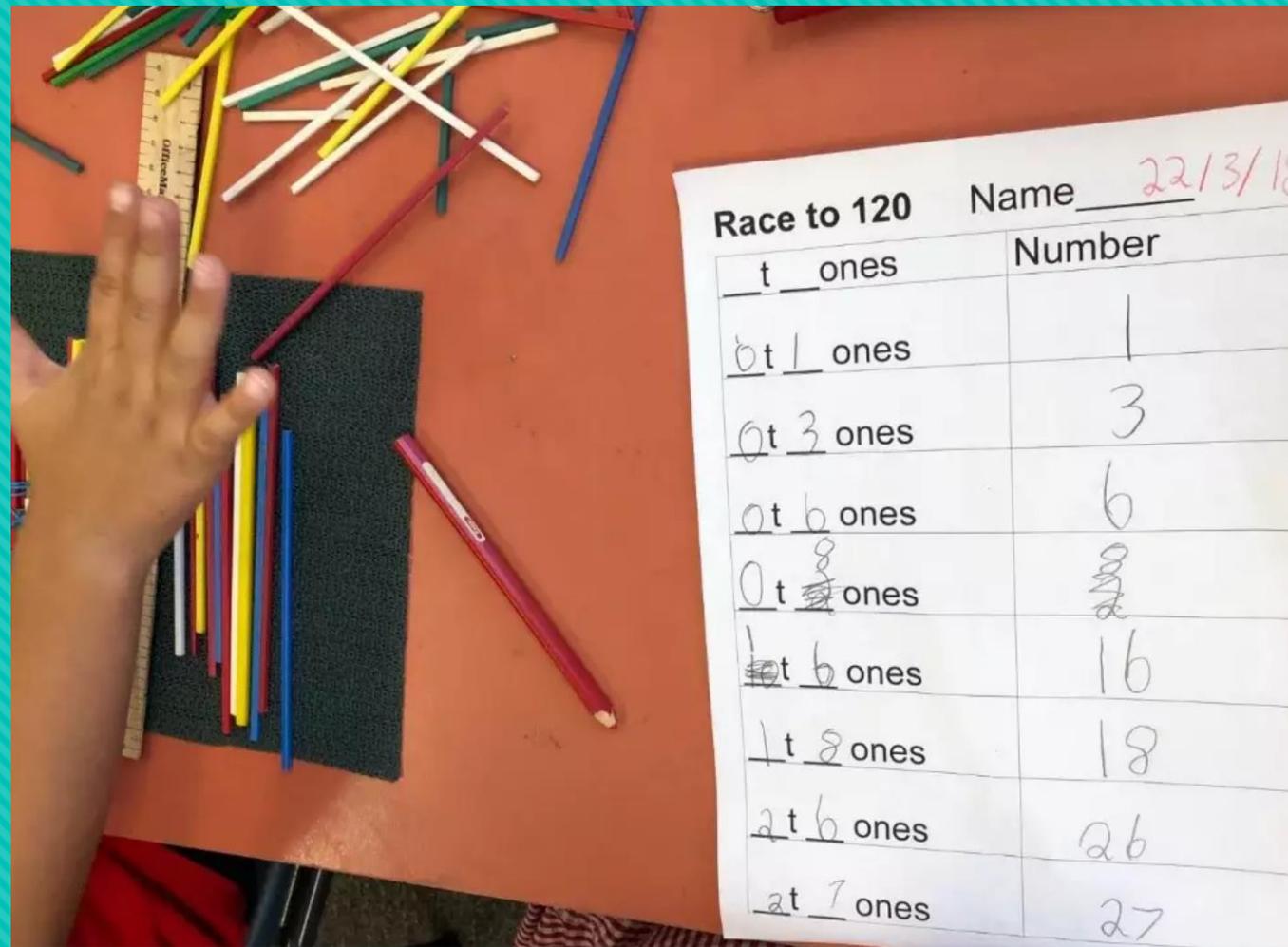


Accordingly, it is important that the teacher does not get 'stuck' with one particular student or group. If the teacher does not need to regularly check-in with and assist all students, it generally means the task is not set at their zone of proximal development – it is just a fluency/rotation task, rather than an understanding/reasoning/problem-solving session.



**So, if there are odd numbers, give one student a teddy bear to play with – you cannot get stuck because all students (including extension students) should need you at some point during the session. This is true formative assessment – it happens minute-by-minute.**

# Tip Eight: One rich lesson instead of three average rotation tasks



If a lesson is working, continue it for two or three sessions. If students are engaged and it is hitting an identified point-of-need on the pre-assessment, with levelled extensions for those who need these, why stop because of the bell? Depth is more important than speed-based surface-level topic coverage, which just creates gaps and no long-term retention. When students build mastery, they retain from year-to-year and they don't 'forget', because each strategy has been consolidated, not just covered.

# Give it the time it deserves

It's good for students to feel challenged and like they are struggling – that's what learning looks like. At first, some students may say they miss worksheets, because they have become accustomed to maths providing the instant satisfaction of a straightforward problem with a nearly instantly discernible answer. However, Australia's best mathematician recently struggled for 8 years to solve a problem, attempting it in different ways for days on end, then changing strategies, and attempting it again. Real maths isn't about quick gratification, it's about enjoying the challenge.

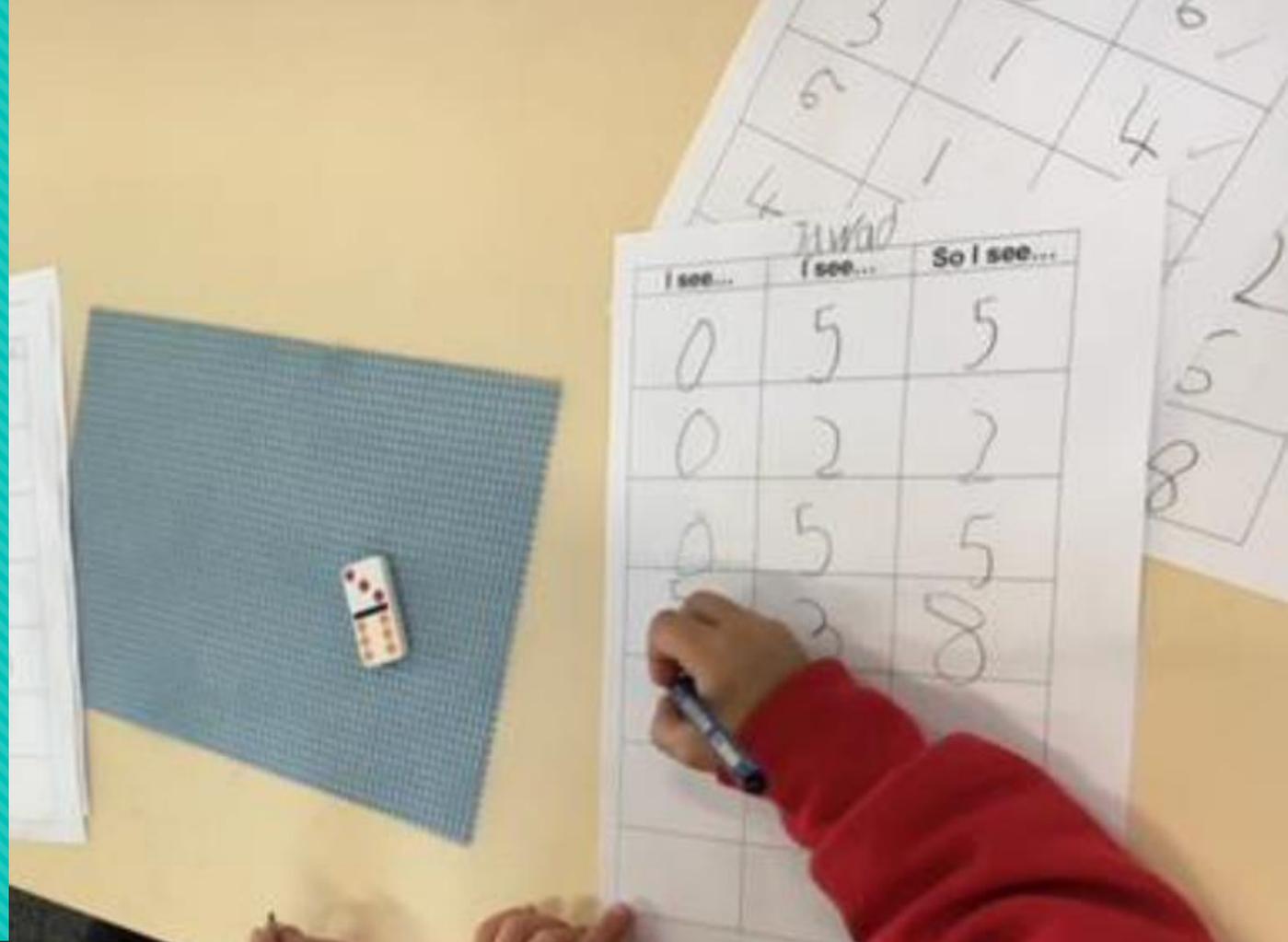
If you're not  
struggling,



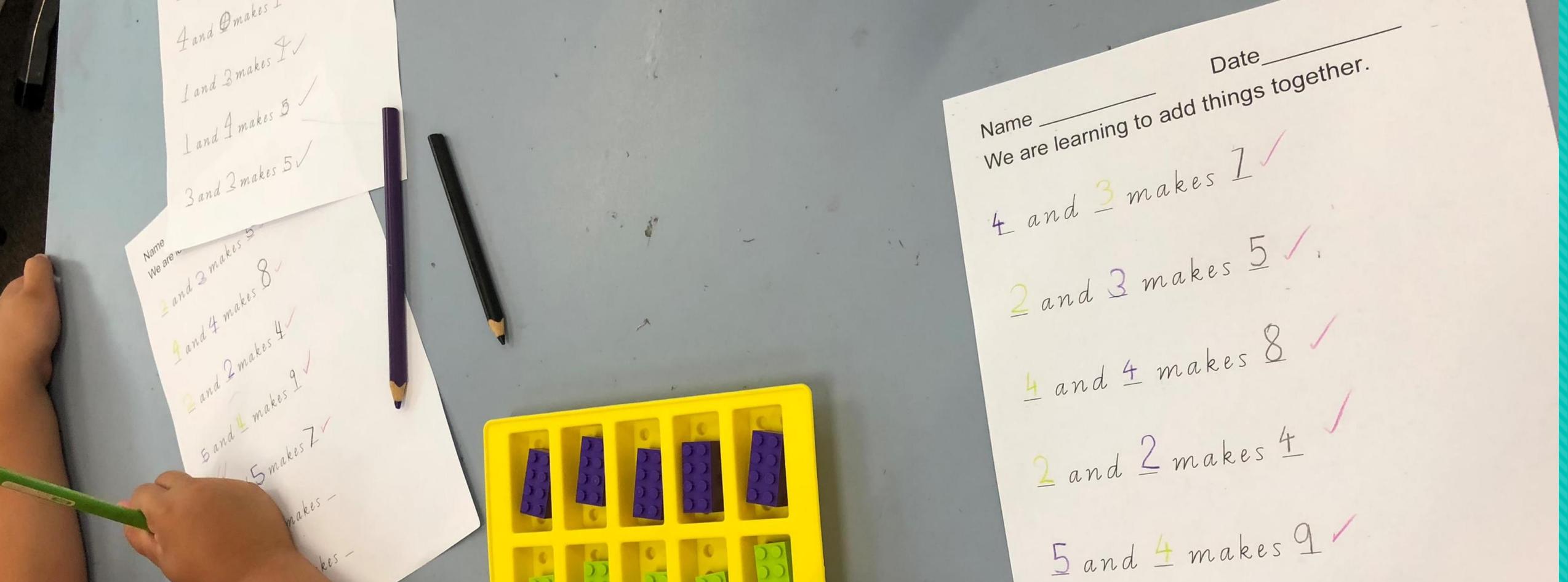
you're not  
learning.

When you are struggling, your brain is growing!

# Tip Nine: Work ethic and high expectations



First year of school (term 4) and this class finished about three double-sided pages each. It's more about quality than quantity, but time well-used and work ethic matters a lot too.



High expectations regarding both students' work ethic and the presentation of students' work are integral. Without solid student relationships, behaviour management and a classroom culture of hard work, very little can be achieved. These preps (and most of this entire class), by term 2, had exceptional digit formation, developed as part of consistent practice of digit roads throughout their first term and a half at school. Likewise, these preps completed two and a half pages of additions in the half-hour of partner practice time with these materials, and that was the average of the entire class that session. Avoid maths sessions becoming cut-and-paste times, by pre-slicing any materials that need to be cut, to maximise the skill-based practice time.

**Tip Ten:  
Have fun...  
really have  
fun!**

If you don't like teaching maths yet, fake it till you make it. Pretend it's your favourite subject. Sometimes, you may act so well, you might trick yourself for a moment, and momentum is a wonderful thing once you get rolling. A great maths teacher starts with one great maths lesson and goes from there. Often, all students need for a lesson to be exciting and fun is your enthusiasm.

**Thank you for using our work. We sincerely hope you find the units useful in your classrooms.**

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