

Implementing the Top Ten Hands-on Maths Packs

1. Copy the package to each teacher's laptop or computer, providing each team member with continual access at school and home.

Many teachers prefer to print each unit as they use it. This is definitely recommended for the first year of use in particular, as the pack is quite large, so it helps to use post-it notes to mark and work through each unit. Alternatively, some teachers prefer to use the pack electronically with page references or screenshots for their weekly planning. **The second page of each unit plan includes a hyperlinked table of contents.** Templates are saved in the *Templates* subfolder for each unit, and are linked to each lesson using hyperlinks in the Early Years Package.

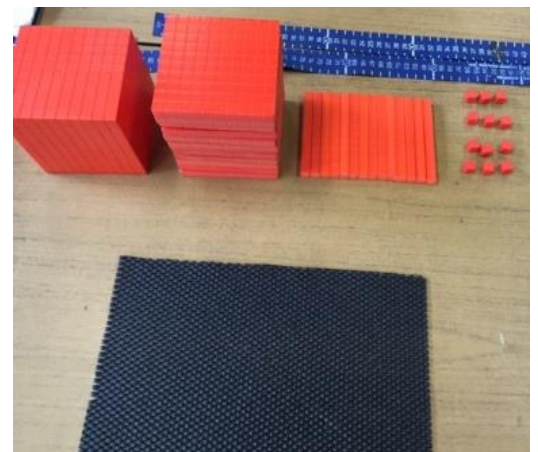
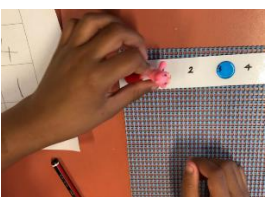
2. Set aside an afternoon staff meeting or curriculum day to allow time for teams to peruse the full contents of the electronic package, particularly the implementation support folder, units and assessments.
3. Explore the *Implementation Support PowerPoint* in the implementation folder, which outlines the history, purpose and strategies behind the packs.

4. The Top Ten principles that guide our approach and that we believe underpin excellent mathematics teaching:

- 1) **Always start with materials** (dice, cards, counters – all the classics) for students to genuinely understand and enjoy learning mathematical concepts, as opposed to memorising rote-based rules.

Incorporate efficient routines into maths lessons to make materials-based sessions more manageable. This includes '**clearing the desks**' (removing absolutely everything from desks, including pencil cases and water bottles). Another routine is '**using an example desk**' – students collect and set up materials from a modelled example of what they should look like (shown right), prior to content instruction commencing. Some teachers do this using an interactive whiteboard, however, we find it works more effectively in real-life by setting up the actual materials on a support student's desk in front of the class.

First, show students how to set up the materials. **Then** model the actual task, always around an example desk with materials (rather than on the class whiteboard). This ensures that students only need to remember one set of instructions at a time. Aim for whole-class modelling to be 15 minutes at most (always with materials at a desk), **maximising student practice time.**



Students working for 75% of the maths lesson, whole-class instruction is 25% at a maximum.



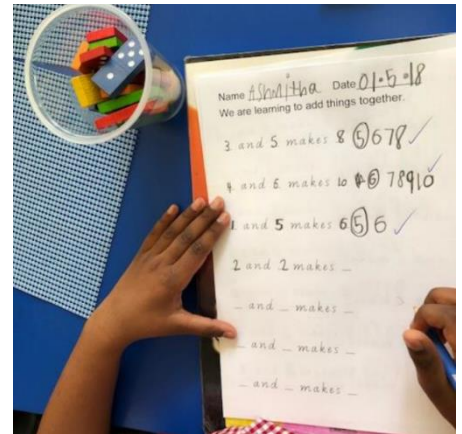
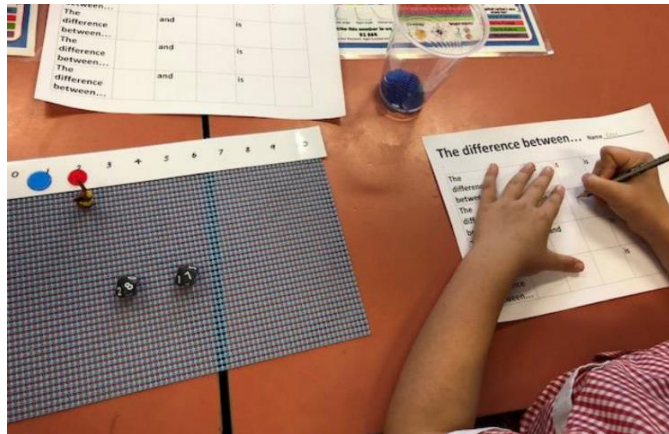
Subitising as maths superhero eyes: "I see 2, I see 1, I see 3!"

- 2) Run double sessions of maths (1.5 hours) to increase the amount of student work time (reducing transition times) and **almost always deliver each task twice (for two consecutive days)**. Most of the growth happens on the second day of the same task.
- 3) **Emphasise the mathematical language** of each session by chorusing it as a class three times, and building it into students' interchanges with their partner and recording. In the early years pack, lesson-specific maths vocabulary is highlighted at top of each session in bold.

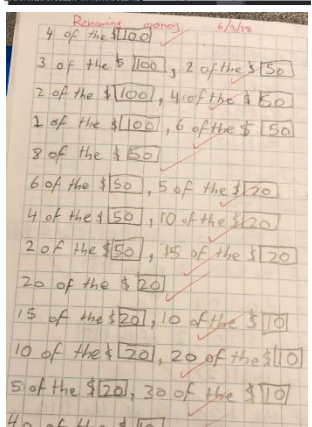
Start with the language, not the symbols
 add: and
 subtract: take away, difference
 multiply: equal groups
 divide: sharing, equal shares
 fractions: out of

We are learning to add things
 1 and 1 makes 2
 2 and 1 makes 3
 1 and 2 makes 3
 2 and 2 makes 4
 1 and 3 makes 4
 2 and 2 makes 4

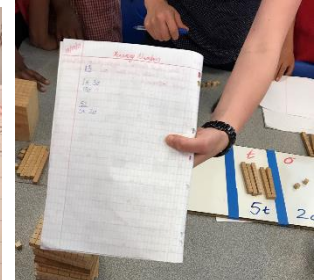
- 4) **Mathematical recording during every session and most warm-ups:** Even though sessions are materials-based, students consistently record while using the materials. For the early years, the recording templates aim to remove literacy barriers and make it so the recording matches, as seamlessly as possible, the materials used beside it.



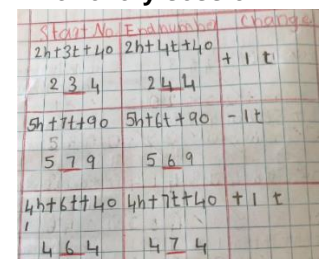
For years 3-6, most recording occurs in students' 1cmx1cm grid books. Student work samples often show the set-up of the books, with suggested columns and headings. It is critical to show students what the recording should look like **using your own example maths grid book**, rather than showing them on the class whiteboard. You may also use a mini whiteboard during the desk demonstration for better visibility.



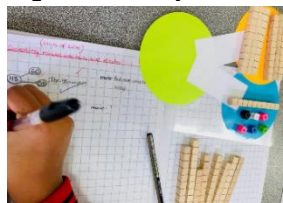
Tens	Ones	Tens	Ones	Sum
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3	9	+	2	ones = 3 9 2
8	6	+	9	ones = 8 6 9
6	2	+	7	ones = 6 2 7
4	5	+	8	ones = 4 5 8
9	3	+	7	ones = 9 3 7
5	6	+	1	ones = 5 6 1
1	3	+	2	ones = 1 3 2
3	6	+	4	ones = 3 6 4
4	9	+	3	ones = 4 9 3
6	3	+	9	ones = 6 3 9
7	5	+	9	ones = 7 5 9



Use your own maths grid book to model recording expectations and set a high standard for what excellent work looks like for every session.



Recording during a 15-minute warm-up before the main part of the session. When students enjoy it – they work hard! Also set expectations, for example, "We want to get *this* many done!"



Some teachers worry that a hands-on approach will mean no evidence at the end of the session. However, our students' workbooks are consistently full, using about 4 grid books a year and one to three pages of working out for each session, all while students are also using materials. It is the best of both worlds.

5) Implement diagnostic assessments to pinpoint strengths, developmental gaps and zones of proximal development. Pre-tests and post-tests are located in the *Assessments* folder. These cover all number and algebra content descriptors and enable teachers to identify gaps from earlier content, and where both support and extension students need to start their work for each unit. Teachers start the unit from where most of their cohort is showing gaps, but also identify support students (who can receive the more scaffolded variations of sessions in the lesson plans) and extension students (who can focus on extending prompts that reach into upper year levels' content areas).

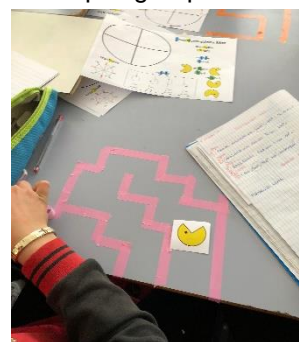
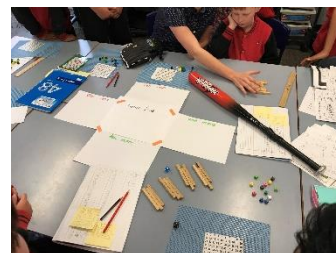
Our pre- and post-tests focus on strategies (not just answers).

6) Hook students into the session using something exciting and relevant to their lives:

- Link lessons to real-life – show students the amazing maths in the world (images of vineyards and rollercoasters when introducing arrays), go outside for maths (nature counts, shape walks) and relate it to their interests (Pokémon division; sneaker design symmetry; Super Mario for difference between; and so on). Softball maths for 10 more/less.
- Stories (classics, numeracy picture books, or made up by you) are captivating and create pathways to students' hearts and long-term memories. Base maths around a story.
- Set up the lesson as a competitive game, with like-ability partners versing one another. Mixed-ability pairings are rarely recommended to prevent coasting and to enable extension for each pair as needed.
- Sport, e.g. fractions basketball, obstacle course positional language.



Surfboarding for equal groups!

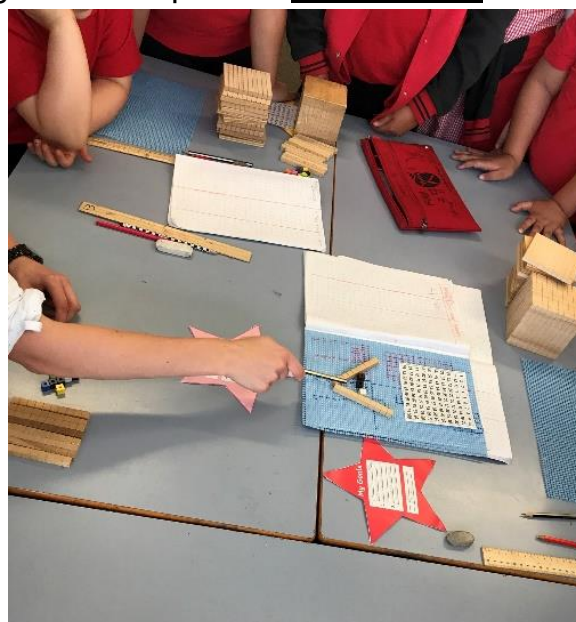


Pac-Man mazes for angles and transformations!

7) Model steps to the investigations using a student partner in the exact same situation in which students will be working. Use a fishbowl (shown to the right) around a desk using the same materials as students, including working in one of their maths books.

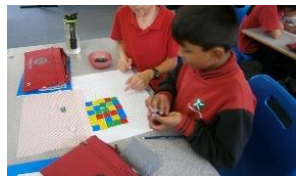


Model at the desk, not at the whiteboard, with a mini whiteboard and maths book to demonstrate recording as you use materials. This avoids the need for students to transfer your modelling from the board to the desk.

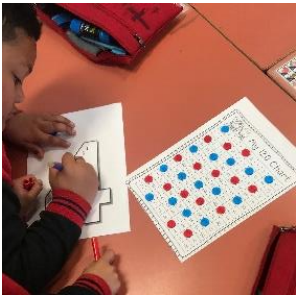


8) Differentiation within the one session: Instead of rotation tasks, run one open-ended session where the challenge level can be flexibly increased or more scaffolded for different students. For example, deliver an extension twist at the end of your modelling that all students hear, but only extension students attempt at first. When mid-level students show confidence, they can also attempt the extending prompt. Alternatively, sit extension students in like-ability pairs and extend them as soon as they show they are ready (or at the start of the session, if the main session is not challenging enough for them). You could also deliver the extending prompt during the warm-up game, while other students are independently engaged in the week-long warm-up. Warm-ups usually stay the same all week – modelled on Monday, continued Tues-Friday.





9) Ask higher order questions that require students to discuss strategies and risk-take to invent (rather than remember) mathematical conceptions. Regularly ‘**cold call**’ (ask a student who does not have their hand up) and provide lots of **think time**. As you roam the classroom while students work, harness the power of **immediate feedback** throughout the session to empower students to construct concepts and learn from mistakes.



10) Teach units in solid blocks to allow teachers to work through multiple developmental steps, and to allow students to retain skills through exposures to different materials and repeated practice of each skill and strategy until it is mastered. Give students sufficient time to enjoy working through challenges, sometimes in pairs, at other times individually, i.e. willingly jump into the learning pit and victoriously emerge out the other side after a decent intellectual struggle. **Students need to know they will have time to conquer the challenges you set**, engage in considered thinking and confidently master skills. Then students can celebrate the growth you achieved together by comparing their pre-test score to their post-test growth (*Assessments* folder spreadsheets). Many developmental steps within units require a week of lessons, or more, to master – not a single session! Developing mastery-level, deep understanding beats speedy topic coverage every day of the week!



11) Have fun during maths – your attitude to the subject has a HUGE impact on students, so aim to use the sessions that make you excited about maths! **It is important for teachers to know that this pack is intended as a significant support for planning, not as a strict or prescriptive approach.** For example, we want teachers to continue to use other high-impact lessons that have worked well for them in the past, and other great resources, not just our units. We have tried to create the best collection of lessons for each concept, but we want teachers to **choose the point-of-need sessions for their class that most powerfully speak to their passion as a teacher and motivate more use of hands-on maths.**

OVERVIEW OF THE PACKAGE

ASSESSMENTS FOLDER

Pre/post-tests are MS Word documents. Students complete these on paper to show working out and strategies. Spreadsheets enable tests to be efficiently marked electronically (not on paper first) by simply entering ‘2’ for a correct answer, ‘1’ for a partially correct answer. Keep the square blank (do not enter anything) for incorrect responses.

CURRICULUM AND IMPLEMENTATION FOLDER

Curriculum links: Organised content descriptors by topic.
Unit timing recommendations: Recommended time allocations for each year level align to the number and complexity of content descriptors for each concept.

ALL OTHER FOLDERS

Units linked to Sport (Years 3-6 Pack) – AFL Maths and Cricket Maths for use at ideal times throughout the year.
Projects – additional mini projects for years 3-6 including road trip maths, billy cart maths and decimal growth booklets.

UNIT FOLDERS

YEARS 3-6 UNITS AND EARLY YEARS UNITS

Units start with curriculum links (Early Years Pack), teaching tips and warm-up games relevant to each skill. There is a hyperlinked table of contents on page 2 of each unit. Units then flow into sequential learning intentions, with a series of lessons that each include:

- hooks (left-hand column)
- lesson summaries (bold at the start of the table)
- questioning and modelling tips in the main body of the lesson plan
- photographs of lessons in action and student work samples
- support/extension options (final section of each lesson plan)
- variations (more ways to master the same skill with slightly different materials or another hook).