Just-in-Time Maths

Vignette

3

A rich balance - resources

THE LEARNER FIRST™

A balance of experiences in our plan

Exercise

Routine procedural tasks.
Usually without words

Application

Routine, worded problems
1 or 2 steps involved
Usually transparent

Open ended

Non-routine, worded or visual
Multiple solution pathways
and/or solutions

Unfamiliar

Non-routine,
more than 2 steps

Research has documented that when students are primarily asked to solve tasks of low-cognitive demand, they have few opportunities to develop:

- an understanding of ***why*** particular procedures are appropriate;
- disciplinary practices like **flexible problem-solving**;
- the ability to explain/connect their mathematical thinking
- a conceptual understanding of mathematical ideas (connect)

Boaler & Staples

The role of mathematical tasks, activities and tools is central.
It is through tasks, more than in any other way, that opportunities to learn are made available to the students
Anthony and Walshaw, 2009

Assessment requires a balance of questions

KNOWLEDGE (35%)

Exercise

Recall basics, understand concepts, carry out straightforward procedures
Numbers, shapes or symbols only
e.g. 23 x 19 =

APPLICATION (40%)

Application

Solving familiar and routine tasks
Simple instructions (with just a few sentences)
e.g. There are 218 passengers and 191 crew members on a ship.
How many people are on the ship altogether?

REASONING (25%)
Unfamiliar Problems:

Unfamiliar

Solving unfamiliar, complex tasks with multiple steps
Complex instructions (with multiple sentences).

14 Henare makes figures 1 to 4 with matches.

Figures 1, 2, and 3 are shown below.

He needs four matches to make figure 1, seven matches to make figure 2, and ten matches to make figure 3.

He uses the same rule each time to make the next figure in the pattern.

How many matches will he need to make figure 4?

NZ Maths provides us with a rich repertoire

e-ako

PLD360
maths adventures

maths adventures

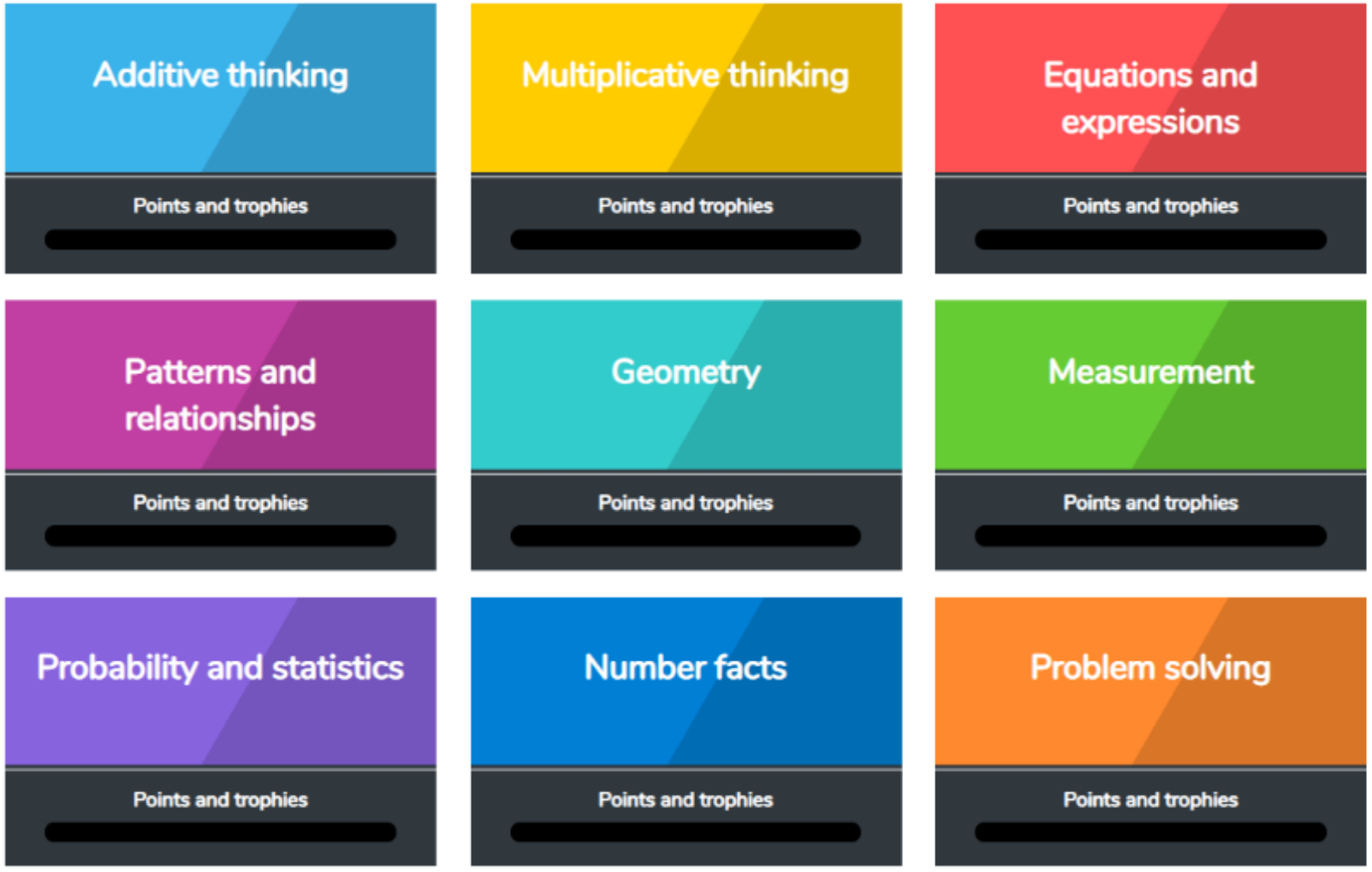
Student pathways

Check out student content, learn from the teacher tips

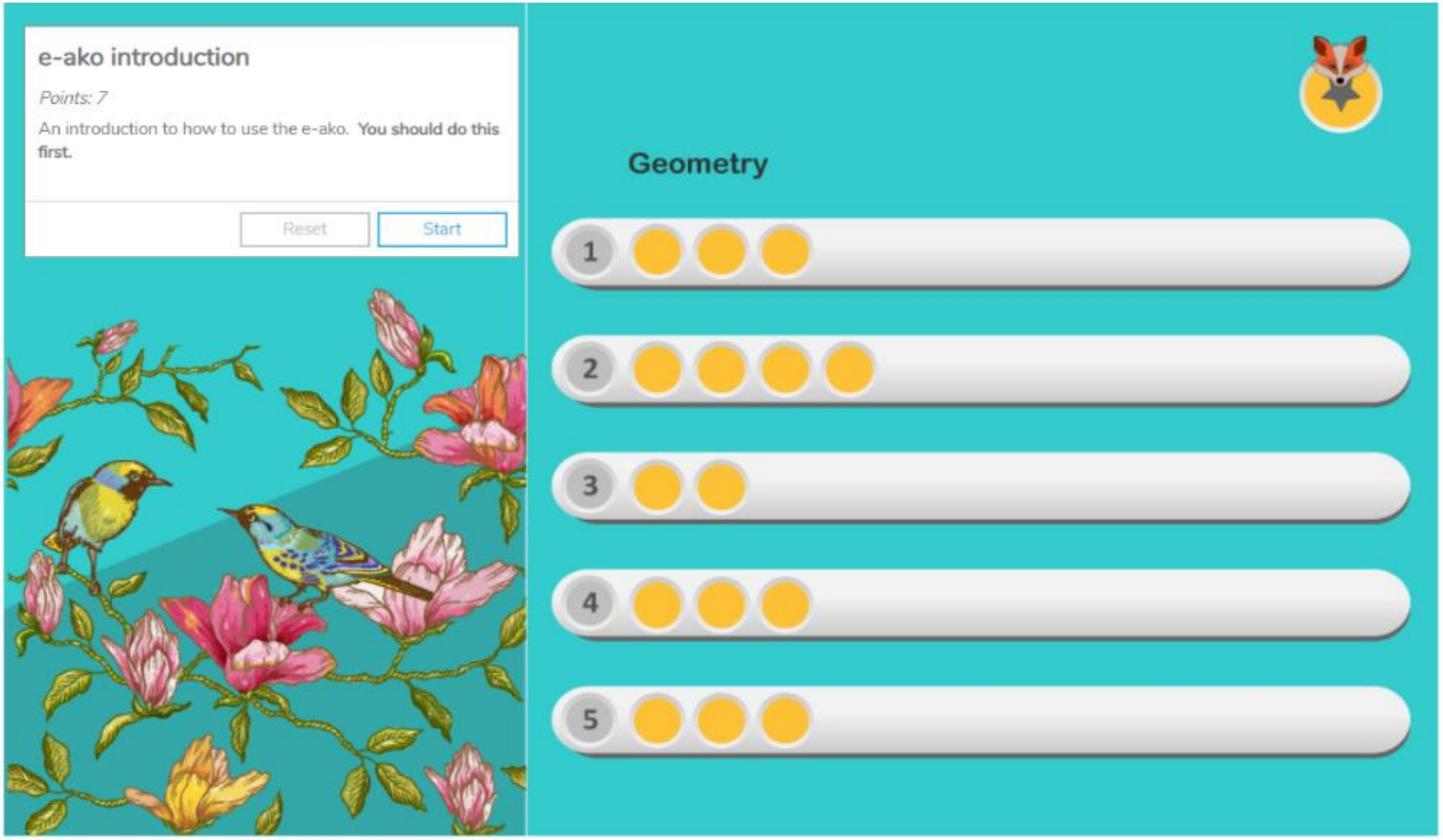
Create new class

Work with multiple classes

E-ako promote key exercises and application problems



Opportunities for independent and group consolidation



Procedures and concepts are communicated

G4.10: Recognising transformations in patterns

We make sense of the world around us in many different ways.

We are going to learn to:

- Recognise translation, reflection and rotation in designs
- Use a combinations of transformations to create a pattern
- Carry out enlargements.

Tama and Tara are finding out more about their local *marae*.

They provide a mix of exercises and application problems

Tara also knows some other things about the patterns.



Tick which are true.

- ☐ You see similar designs in traditional *moko*, which are permanent face or body tattoos.
- ☐ On *moko*, the designs are usually in black.
- ☐ In traditional *kōwhaiwhai*, the koru are usually white.
- ☐ Designs like this are in some Māori carvings.
- ☐ *Moko* (tattoos) and carvings are made by master artists.
- ☐ In *kōwhaiwhai*, there are also designs like this, which are called crescents, or *kape*.

- ☐ Transformations, including reflection, rotation and translation, are used in making *kōwhaiwhai* patterns.

Points: 5 / 130 Page: 4 / 28

Check Answers

Rich learning activities – unfamiliar problems

Rich learning activities

Differentiated activities at Levels 1 to 5 of the NZC.

Activities have been developed at Levels 1 to 5 of the NZC.

- **Level 1 rich learning activities**
- **Level 2 rich learning activities**
- **Level 3 rich learning activities**
- **Level 4 rich learning activities**
- **Level 5 rich learning activities**
- **Counting Collections** (number sense activities for levels 1 to 5)
- **Differentiated units** (level 4 and 5 units with cross-curricular links)

Geometry and Measurement

- How long is a piece of string? (GM3-1)
- Standing order (GM3-1, NA3-1)
- Sugar rush (GM3-1, NA3-1)
- Parking cars (GM3-1, GM3-4)
- Where is the epicentre? (GM3-1, GM3-5)
- Across Lake Taupo (GM3-1, NA3-1)
- Noah's mystery parcel (GM3-1, GM3-2)
- Folding Boxes (GM3-2)
- Platonic crackers (GM3-3)
- Polygon puzzle (GM3-3, GM3-4)
- Banana cake (GM3-5)
- A case for a new phone (GM3-6)

Statistics

- Big Feet (S3-1)
- Books vs Bean Bags? Part i (S3-1)
- Books vs Bean Bags? Part ii (S3-1)
- Books vs Bean Bags? Part iii (S3-1)
- Listening to music (S3-2)
- What are we eating? (S3-2)
- Penalty shoot-out (S3-3)

Number and Algebra

- Carbon offset (NA3-1, NA3-2)
- Standing order (NA3-1, GM3-1)
- Sugar rush (NA3-1, GM3-1)
- Bill's dollars (NA3-1, NA3-2, NA3-6)
- Cricket with no ticket (NA3-1, NA3-6)
- WiFi units (NA3-1, NA3-2, NA3-6)
- Loads of sugar (NA3-1, NA3-4, NA3-6, GM3-1)
- A share of the spoils (NA3-1, NA3-5)
- Fraction circles (NA3-1, NA3-5)
- Domino donuts (NA3-1, NA3-6)
- A close game (NA3-1, NA3-7)
- Across Lake Taupo (NA3-1, GM3-1)
- Camping groups (NA3-2, NA3-6)
- Vege rows (NA3-3, NA3-8)
- The seventh wave (NA3-3, NA3-8)
- Sports tops (NA3-3, NA3-7, NA3-8)
- Broken Sparkles (NA3-4)
- Lunchtime Activities (NA3-5)

A clear link to procedural and conceptual approaches

This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity

Sam the surfer knows that the seventh wave in each set is the biggest. It is also the middle wave in each set.

Sam is surfing with five other surfers. To be safe, they each take a wave in turn. Sam takes the very first wave of the first set.

They are in the water long enough to surf every wave of ten sets. How many 'seventh waves' does Sam get?

The procedural approach (show)

- The student is able to use appropriate strategies, including imaging and skip counting to solve a problem involving sequences.

The conceptual approach (show more)

- The student is able to use appropriate strategies to solve a problem involving sequences.

A clear link to procedural and conceptual approaches

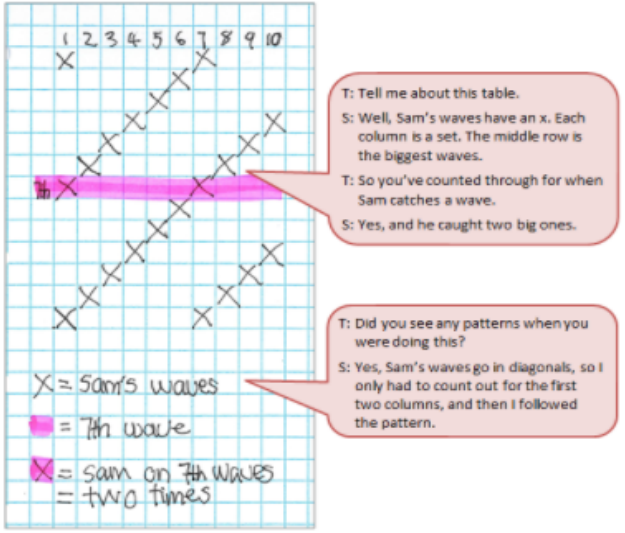
The procedural approach (hide)

- The student is able to use appropriate strategies, including imaging and skip counting to solve a problem involving sequences.

Prompts from the teacher could be:

1. How many waves are there in each set?
2. Could you make a table or a sequence of images to represent of each set of waves?
3. Use your table or images to mark out which of the waves will be Sam's.
4. Find how many of the waves that Sam rides, are the seventh (biggest) wave.

Click on the image to enlarge it. Click again to close.



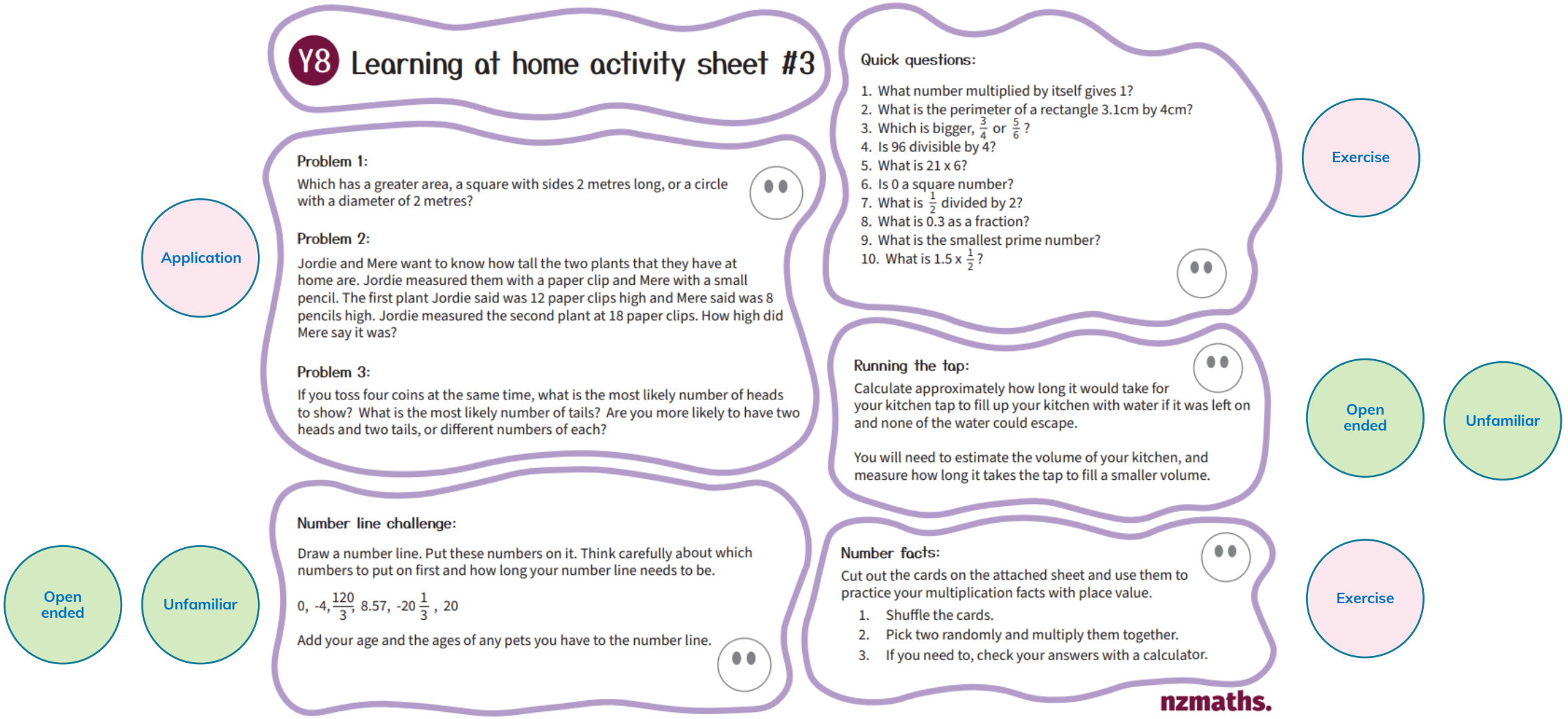
A new edition: Learning at home supports

Weekly plans: Using offline activities

Each of the buttons below links to a printable plan of maths work. All of the activities in these plans can be carried out without access to computers. The activities include mathematical problems to solve, projects to work on, and basic facts to practice. Notes for whānau are included.
Click on a button to download a plan for the school year level appropriate to your child.
If the plan is too easy or too hard, move up or down a year to find one that best suits.

Year 1 #1	Year 1 #2	Year 1 #3	Year 1 #4
Year 2 #1	Year 2 #2	Year 2 #3	Year 2 #4
Year 3 #1	Year 3 #2	Year 3 #3	Year 3 #4
Year 4 #1	Year 4 #2	Year 4 #3	Year 4 #4
Year 5 #1	Year 5 #2	Year 5 #3	Year 5 #4
Year 6 #1	Year 6 #2	Year 6 #3	Year 6 #4
Year 7 #1	Year 7 #2	Year 7 #3	Year 7 #4
Year 8 #1	Year 8 #2	Year 8 #3	Year 8 #4

The theme of ‘balance’ is continued



Guides to support our judgements

Number line challenge:

The first thing to do in creating this number line is to work out what numbers should go closest to each end. Here are the numbers to place on the line in order from lowest to highest.

$-20\frac{1}{3}, -4, 0, 8.57, 20, \frac{120}{3}$

The lowest number is -20 , and the largest number is (40), so put those in first.

Then work out about where each other number belongs. If you divide the space between the first two numbers into thirds, then you can place 0 and 20 on those marks.

The numbers do not need to be placed exactly, but make sure they are in the right order and the spacing is reasonable. Here is a possible answer:

Running the tap:

To complete this challenge you need to do three things:

1. Work out the approximate volume of your kitchen in litres.
   A litre is 1000cm3. There are 1000 litres in a cubic metre. If your kitchen is 4 metres by 4 metres and 3 metres high, then its volume is 4m x 4m x 3m = 48m3, or 48000 litres.
2. Work out how fast water comes out of your tap (also in litres).
   You can do this by timing how long it takes to fill a large container of known volume (for example a 2 litre milk bottle). Your tap is likely to flow at between 5 and 15 litres per minute.
3. Use those answers to work out how long the tap would take to fill the room.
   For the kitchen above and a 10 litre per minute tap, it would take 4800 minutes to fill the room. This is equivalent to 3 days and 8 hours.

Kaiako
Ākonga
Whānau
Family

NZ Maths – A balanced approach starts here

Procedural Fluency

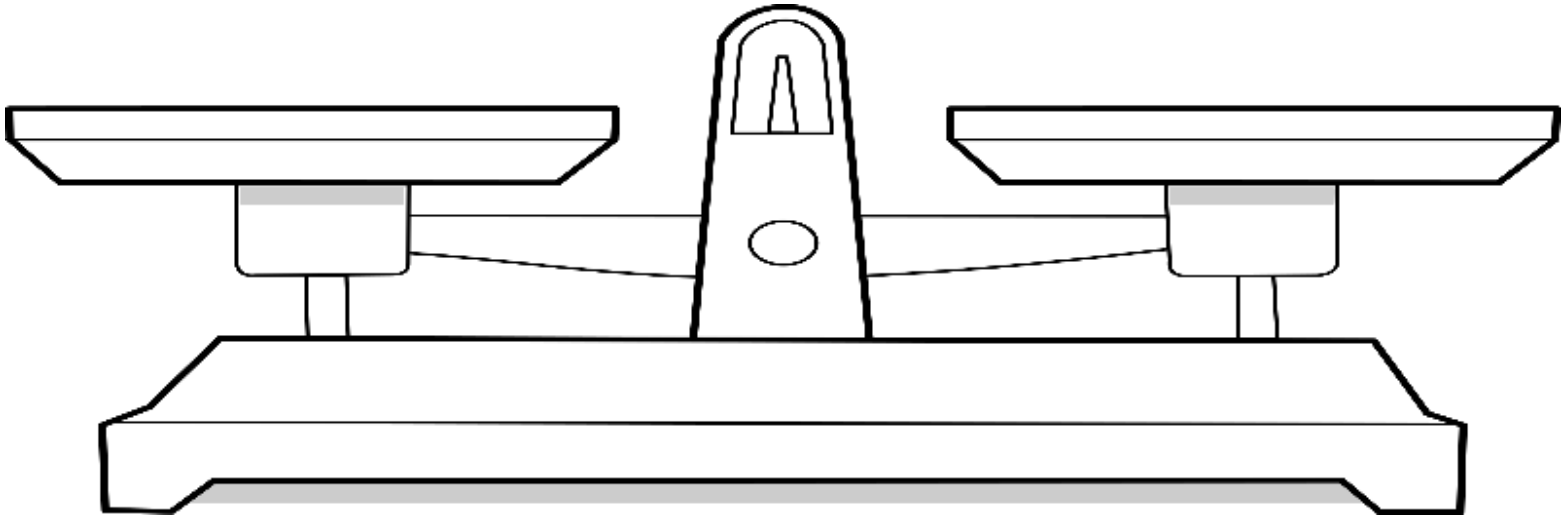
Conceptual Understanding

Practice and deepen
Describe and connect

Adaptive Reasoning

Problem Solving

Explore and evaluate
Explain and communicate



Application

Open ended

Exercise

Unfamiliar

Mātauranga
Tataiako

Productive Disposition

Effective Pedagogies
Key Competencies