Shhh! It's a secret!

Where are they now?

The student can perform calculations on whole numbers and has an understanding of place value of whole numbers.

Where to next?

The student demonstrates an understanding of positional value of decimals.

TP Tell the students that they can tell how close they are to the secret number by how close the decimal is to "one".

Syllabus outcomes

NS2.4: Models, compares and represents commonly used fractions and decimals, adds and subtracts decimals to two decimal places, and interprets everyday percentages

WMS2.4: Checks the accuracy of a statement and explains the reasoning used

WMS2.5: Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content

CMIT reference

Building place value through grouping: level 4

How?

Organise the students into pairs and provide each pair with a basic calculator. The first student enters a number onto the calculator without his or her partner seeing the number. It may be advisable to begin with a two-digit number. After entering the number the student then needs to press the following keys:

Press [÷]

Press [÷]

Press [=]

Keep pressing [=] until a "**0**" is displayed.

The first student then hands the calculator to his or her partner who tries to guess the original number and enters it into the calculator. He or she then presses [=] and a decimal notation will be displayed. If this decimal notation is greater than "1', then the guessed number was greater than the secret number. If the decimal is less than "1", then the guessed number was less than the secret number. When the secret number is guessed correctly and entered, then a "1" will be displayed.

Why?

Students need to develop an understanding of the positional value of decimals. For example, 0.8 is taken to be of greater magnitude than 0.75 because of the positional value of the digits.

Large and small

Where are they now?

Students know how measurement units are repeated and structured and are able to use one unit to work out how many will be needed altogether when making indirect comparisons of area.

Where to next?

Students are able to explain the relationship between unit size and the number of units used to measure area.

Syllabus outcomes

MS1.2: Estimates, measures, compares and records areas using informal units

SGS2.2: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

WMS2.3: Uses appropriate terminology to describe, and symbols to represent, mathematical ideas

CMIT reference

Count Me Into Measurement: level 3.2

How?

Show students a tessellating pattern made from hexagons or parallelograms. Give the student a suitable triangular tile and ask the students to determine how many triangular tiles would be needed to cover the pattern. Have the students share their method for solving the problem.

Variation

Provide the students with a large rectangle, covered with large squares. Provide the students with a suitable small square and ask them to work out how many small squares would be needed to cover the area of the rectangle.

Why?

Students should be able to see and explain the relationship between unit size and number of units needed to cover an area.

WR

Students could draw the triangular pattern needed to cover the shapes.

Chessboard

Where are they now?

Students know how measurement units are repeated and structured and are able to use one unit to work out how many will be needed altogether when making indirect comparisons of area.

Where to next?

Students are able to explain the relationship between unit size and the number of units used to measure area.

TP

This activity could be integrated into a visual arts lesson.

Syllabus outcomes

MS1.2: Estimates, measures, compares and records areas using informal units

SGS2.2a: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

WMS2.3: Uses appropriate terminology to describe, and symbols to represent, mathematical ideas

CMIT reference

Count Me Into Measurement: level 3.2

How?

Provide the students with a chessboard or a similar grid. Ask the students to make a "tile" so that they would only need one quarter of the number of tiles to cover the board. The students could then create the board from coloured paper tiles. Have the students share their models and methods for solving the problem.

Why?

Students should be able to see and explain the relationship between unit size and number of units needed to cover an area.

Hidden squares

Where are they now?

Students know how measurement units are repeated and structured and are able to use one unit to work out how many will be needed altogether when making indirect comparisons of area.

Where to next?

Students are able to:

- explain the relationship between unit size and the number of units used to measure area
- measure the area of a surface using square centimetres.

Syllabus outcomes

MS2.2: Estimates, measures, compares and records the areas of surfaces in square centimetres and square metres

WMS2.2: Selects and uses appropriate mental or written strategies, or technology, to solve problems

CMIT reference

Count Me Into Measurement: level 3.2

How?

Provide the students with prepared rectangular shapes and 1 cm grid paper. The rectangles should be covered with squares or tiles that are an integral multiple of the centimetre units. For example, 2 x 2 cm squares. Have the students place each shape on the grid paper and determine the number of hidden squares and the area of each shape in square centimetres.

Why?

Students should be able to see and explain the relationship between unit size and number of units needed to cover an area.

WR

Students could record their mental strategies they used to determine the area of the shape. Use these as models for discussion.

Crazy skyscrapers

Where are they now?

Students know how measurement units are repeated and structured and are able to use one unit to work out how many will be needed altogether when making indirect comparisons of area.

Where to next?

Students are able to:

- explain the relationship between unit size and the number of units used to measure area
- measure the area of a surface using square centimetres.

Syllabus outcomes

MS2.2: Estimates, measures, compares and records the areas of surfaces in square centimetres and square metres

SGS2.1: Makes, compares, describes and names three-dimensional objects including pyramids, and represents them in drawings

WMS2.5: Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content

CMIT reference

Count Me Into Measurement: level 3.2

Count Me Into Space: efficient strategies

How?

Provide the students with 2 cm grid paper. Tell the students they are to design a floor for a new building and that each floor must cover the same area, say 64 square centimetres. Using the 2 cm grid paper, have the students draw a floor plan. Have several students then combine their floor plans to make a multi-story building. Have the students determine what the building constructions would look like to accommodate the various floor plans. Students could use building blocks to make the building.

Why?

Students should be able to see and explain the relationship between unit size and number of units needed to cover an area.

Digi squares

Where are they now?

Students know how measurement units are repeated and structured and are able to use one unit to work out how many will be needed altogether when making indirect comparisons of area.

Where to next?

Students are able to explain the relationship between unit size and the number of units used to measure area.

Syllabus outcomes

MS2.2: Estimates, measures, compares and records the areas of surfaces in square centimetres and square metres

NS2.4: Models, compares and represents commonly used fractions and decimals, adds and subtracts decimals to two decimal places, and interprets everyday percentages

NS2.1: Counts, orders, reads and represents two- and three-digit numbers

WMS2.2: Selects and uses appropriate mental or written strategies, or technology, to solve problems

CMIT reference

Count Me Into Measurement: level 3.2

BLM

Digi squares, page 335

How?

Provide the students with 1 cm grid paper and pencils. Instruct the students that they are to create a graphic design or representation of a two-digit number. Each numeral is to cover the same number of 1 cm grid squares that it represents. For example, in the number 24, 20 grid squares must be used to make the number 2 and 4 grid squares must be used to make the number four. Discuss with the students how they may need to colour in half or quarter of squares. An example is provided in the BLM section.

Why?

Students should be able to see and explain the relationship between unit size and number of units needed to cover an area.

Measuring area with one tile

Where are they now?

The student uses an array structure to compare different areas.

Where to next?

The student moves and aligns a single unit in a systematic way.

The student explains the relationship between unit size and the number of units.

Syllabus outcomes

MS2.2: Estimates, measures, compares and records the areas of surfaces in square centimetres and square metres

WMS2.4: Checks the accuracy of a statement and explains the reasoning used

CMIT reference

Count Me Into Measurement: level 3.1, 3.2

BLM

Measuring area with one tile, page 336

How?

Present the students with a copy of the shapes on the worksheet. Have the students firstly predict which shape has the largest area and explain their reasoning. Ask the students to then use a unit square to determine which shape has the largest area. Discuss how the students determined their answer and how they could check for accuracy? Provide other shapes for students to explore and compare areas.

Why?

Students should be able to use one unit to work out how many will be needed altogether when making indirect comparisons.

Geoboard triangles 2

Where are they now?

The student is able to predict changes to shapes by mentally visualising and modifying the image of the shape.

Where to next?

The student selects effective strategies to make changes needed to achieve a planned product.

Syllabus outcomes

SGS2.2a: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

WMS2.1: Asks questions that could be explored using mathematics in relation to Stage 2 content

WMS2.2: Selects and uses appropriate mental or written strategies, or technology, to solve problems

CMIT reference

Count Me Into Space: Orientation and motion: coordinating images and actions

Bank of instructions

- Rotate 45º, 90º, 180º
- Flip the triangle over its base, apex
- Flip the triangle to the right or left
- Stretch one of the points of the triangle
- If the triangle has a right angle: Change the right angle into a smaller angle
- If the triangle doesn't have a right angle: Turn one of the angles into a right angle.

How?

Provide each pair of students with a geoboard, rubber bands and paper. Have the first student make a triangle on the geoboard with a rubber band. The student then gives his or her partner two or three instructions regarding the orientation or shape of the triangle. For example, *Make each side half as big*.

The second student then draws the triangle in the new orientation after the sequence of instructions has been given. The first student can complete the same instructions using the geoboard to verify the answer.

Why?

Students need to explore shapes to help them develop strong concept images that focus on the properties that make up the shape, such as angles and sides.

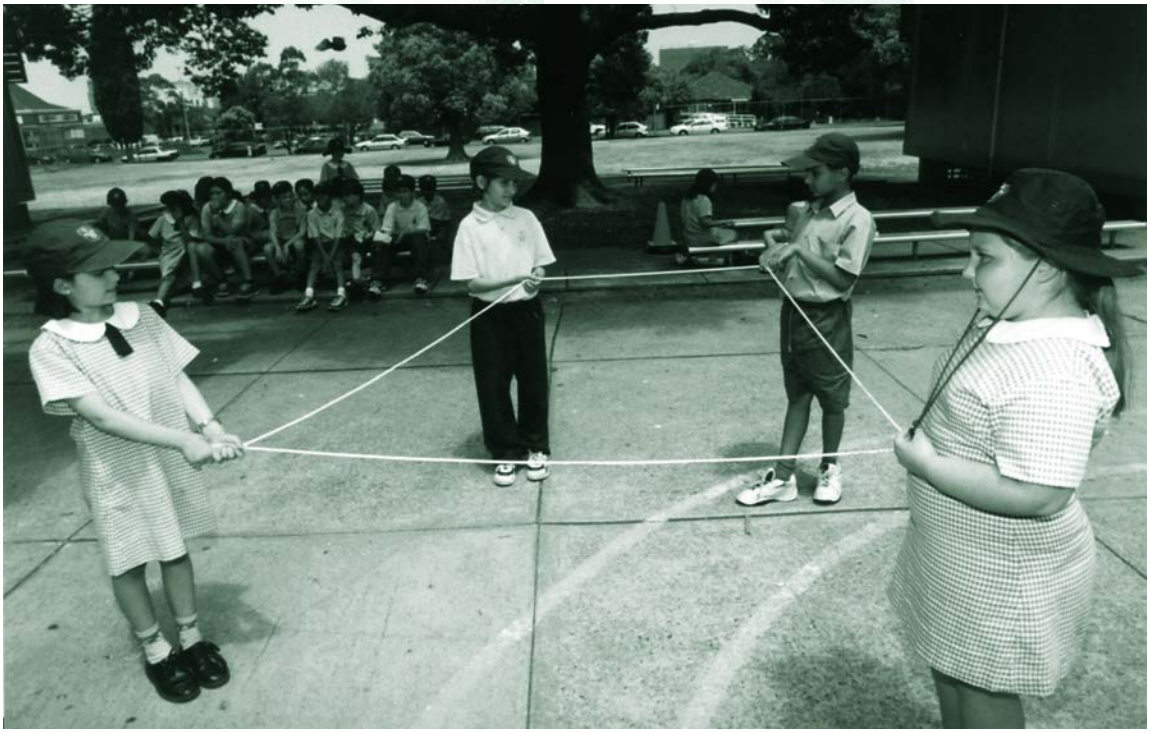
Silent string shapes

Where are they now?

The student is able to predict changes to shapes by mentally visualising and modifying the shape.

Where to next?

The student selects effective strategies to make changes needed to achieve a planned product.



Syllabus outcomes

SGS2.2a: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

WMS2.5: Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content

CMIT reference

Count Me Into Space: Orientation and motion: coordinating images and actions

How?

This activity may need to be completed outside the classroom. Organise the students into small groups and provide them with a length of string (long enough for the groups to hold, say 5 metres) tied to form a loop. Tell the students that when they are holding the string they are not allowed to speak to each other. Call out a nominated shape that the students are to make by holding the string and moving such as an isosceles triangle, rhombus or trapezium. Allow them to discuss how they will move the string prior to picking up the string. After they have made the shape with the string, the students place the string on the ground and walk around the shape. Call another shape. Again the students can discuss the changes that will need to be made to the existing shape. However, once they pick up the string they must be silent. The students change the shape they are holding to form the new shape, then place it on the ground and trace. Have the students share with other groups how they modified each shape to form the new shape.

Why?

Students need to explore shapes to help them develop strong concept images that focus on properties that make up the shape such as angles and sides.

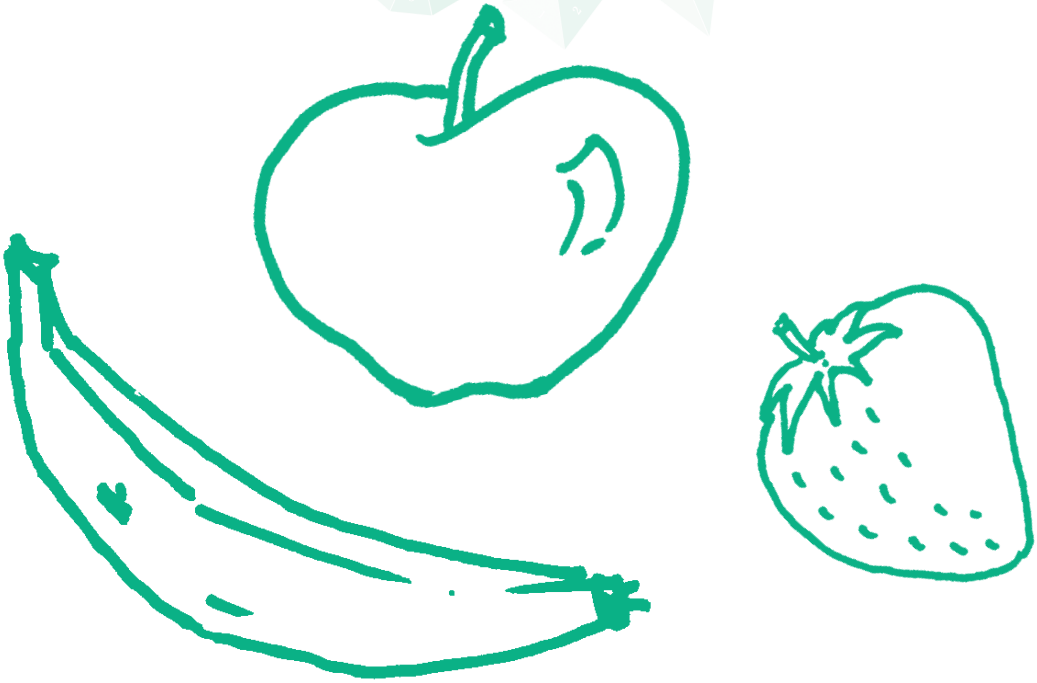
Food rainbow

Where are they now?

The student is able to predict changes to shapes by mentally visualising and modifying the shape.

Where to next?

The student selects effective strategies to make changes needed to achieve a planned product.



Syllabus outcomes

SGS2.1: Makes, compares, describes and names three-dimensional objects including pyramids, and represents them in drawing

WMS2.3: Uses appropriate terminology to describe, and symbols to represent, mathematical ideas

CMIT reference

Count Me Into Space: Part-whole relationships: coordinating images and actions

BLM

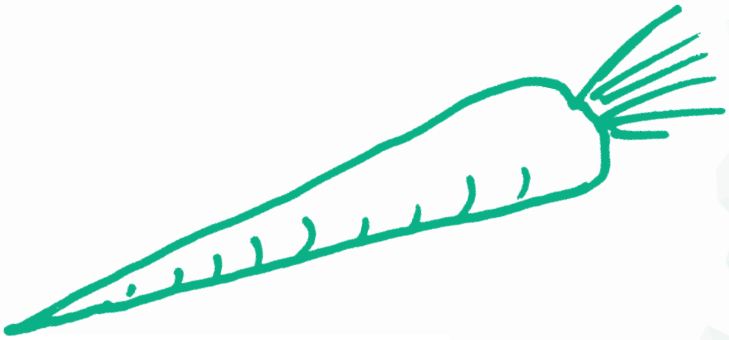
Food rainbow, page 337

How?

Organise the students into groups and provide each group with a type of food that will be used to cut cross-sections. For example, celery, potato, carrot, apple, banana and strawberry could be used. Each group will become "experts" in discovering the cross-section of one of the solids and then share their discoveries with the other groups. In each group have the students firstly predict and draw the cross-section of the selected food items when cut in the following ways:

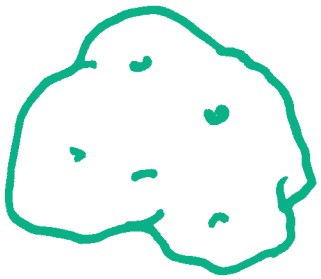
- from top to bottom
- from left to right
- from left to right on an angle.

With supervision, have the students cut and draw the three cross-sections onto the worksheet. Discuss the students' drawings. Rearrange the groups so that one person from each "expert" group forms a new "rainbow" group. Have each person in the "rainbow" group present the diagrams of the cross-sections from his or her "expert group".



Why?

Students need to explore shapes and objects to help them visualise properties of three-dimensional objects.



Symmetry building

Where are they now?

The student is able to generate static visual images of shapes and objects in a variety of orientations.

Where to next?

The student is able to mentally modify images of shapes and objects.

Syllabus outcomes

SGS2.1: Makes, compares, describes and names three-dimensional objects including pyramids, and represents them in drawing

WMS2.5: Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content

CMIT reference

Count Me Into Space: Part-whole relationships: coordinating images and actions

How?

Provide the students with a supply of building material and ask them to construct an interesting model. However, the model must be symmetrical in shape. When the model is finished, have each student draw one half of the symmetrical model. Give the drawing to a friend (not the original partner) to complete the drawing without seeing the model. When finished, compare the drawing to the model.

Variation

Display a collection of building blocks and other suitable equipment. Have the students draw a symmetrical model based on the collection of material. Have the students choose a friend to make the model from the drawing.

Why?

Students need to investigate the properties of shapes and objects. They need to develop concepts to effectively plan and generate models and new shapes.

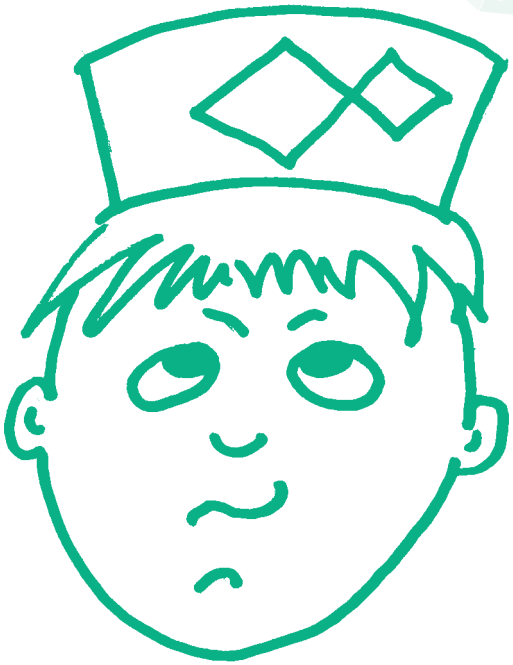
What's my shape?

Where are they now?

The student is able to predict changes to shapes by mentally visualising and modifying the image of the shape.

Where to next?

The student selects effective strategies to make changes needed to achieve a planned product.



Prior to commencing the activity, practise describing different shapes. Discuss properties such as number of sides, types of angles, types of lines as well as the orientation of the shape.

Syllabus outcomes

SGS2.2a: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

WMS2.5: Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content

CMIT reference

Count Me Into Space: Part-whole relationships: efficient strategies

BLM

What's my shape?, pages 338 and 339

How?

Have one student wear a headband to which a selected shape card can be attached. Sample shape cards are provided in the BLM section. Do not let the student see the shape card. The student then asks the class questions about the shape or shapes on the card to try and name each shape and its orientation or position in relation to another shape. The class may only answer yes or no. Once the student thinks he or she knows one of the shapes, he or she draws it on the board. A signal can be given, such as a shake of a tambourine, to let the student know that the drawn shape is the correct shape but in the incorrect orientation. A different signal could indicate correct shape and correct orientation. The teacher, or a nominated student, may describe the shape, or its orientation, rather than give a "yes" or "no" response.

Variations

When students are guessing the number of sides of the shape, the class could give hints such as "hotter" or "colder".

Let the student choose someone from the class for the clue. The teacher could also expand on the clue.

Why?

Students need to investigate the properties of shapes and objects. They need to develop concepts to effectively plan and generate models and new shapes.

Guess and draw

Where are they now?

The student is able to predict changes to shapes by mentally visualising and modifying the image of the shape.

Where to next?

The student selects effective strategies to make changes needed to achieve a planned product.

Syllabus outcomes

SGS2.2a: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

WMS2.1: Asks questions that could be explored using mathematics in relation to Stage 2 content

WMS2.5: Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content

CMIT reference

Count Me Into Space: Part-whole relationships: efficient strategies

How?

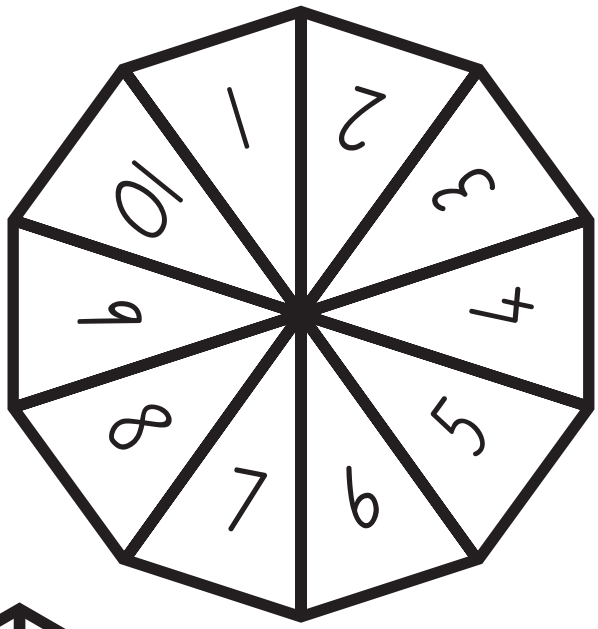
Organise the students into pairs. Each student will need two pieces of paper and a pencil. Place a barrier between pairs of students. Have the students sit opposite each other so that they can talk to each other but not see each other's drawings. On one piece of paper each student makes a drawing from simple lines and shapes. On the other piece of paper, each student tries to draw exactly the same drawing as his or her partner. To do this the student must ask questions about the drawing that can only be answered with a "yes" or "no" response. Remind the students to ask questions about straight, curved and parallel lines; whether a drawing or a shape is symmetrical; the number of sides a shape has and its position in relation to another shape. When the student thinks the drawing is complete, he or she shows it to his or her partner for comparison with the original drawing.

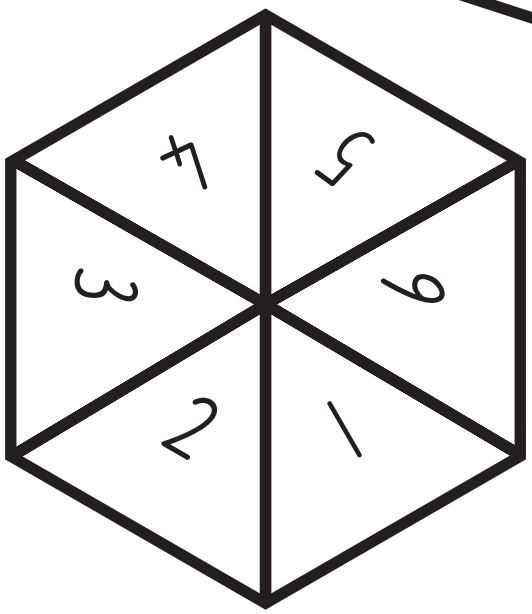
Why?

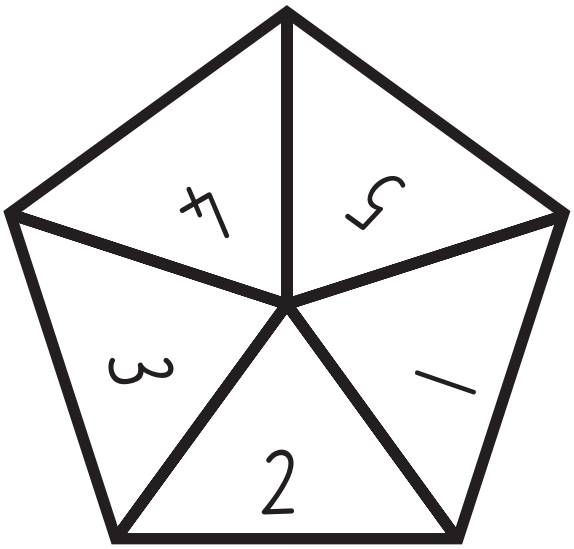
Students need to investigate the properties of shapes and objects. They need to develop concepts to effectively plan and generate models and new shapes.

Coordinating groups blackline masters

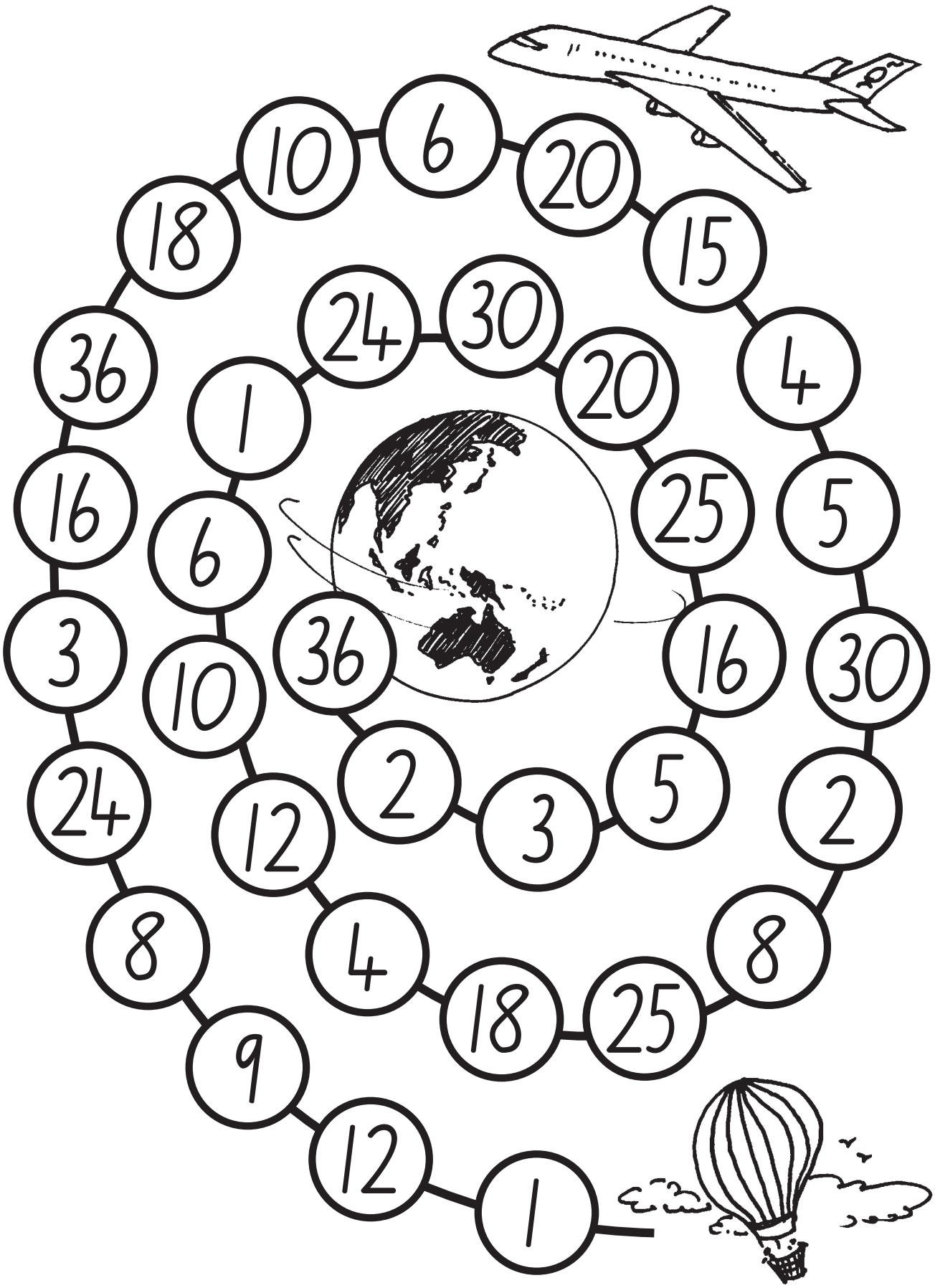
Spin and multiply



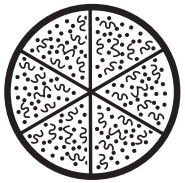
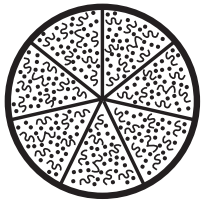




Race around the world



Una pizza per favore!

	Bambino 3 Pieces 	Piccolino 4 Pieces 	Mama 5 Pieces 	Papa 6 Pieces 	Famiglia 7 Pieces 
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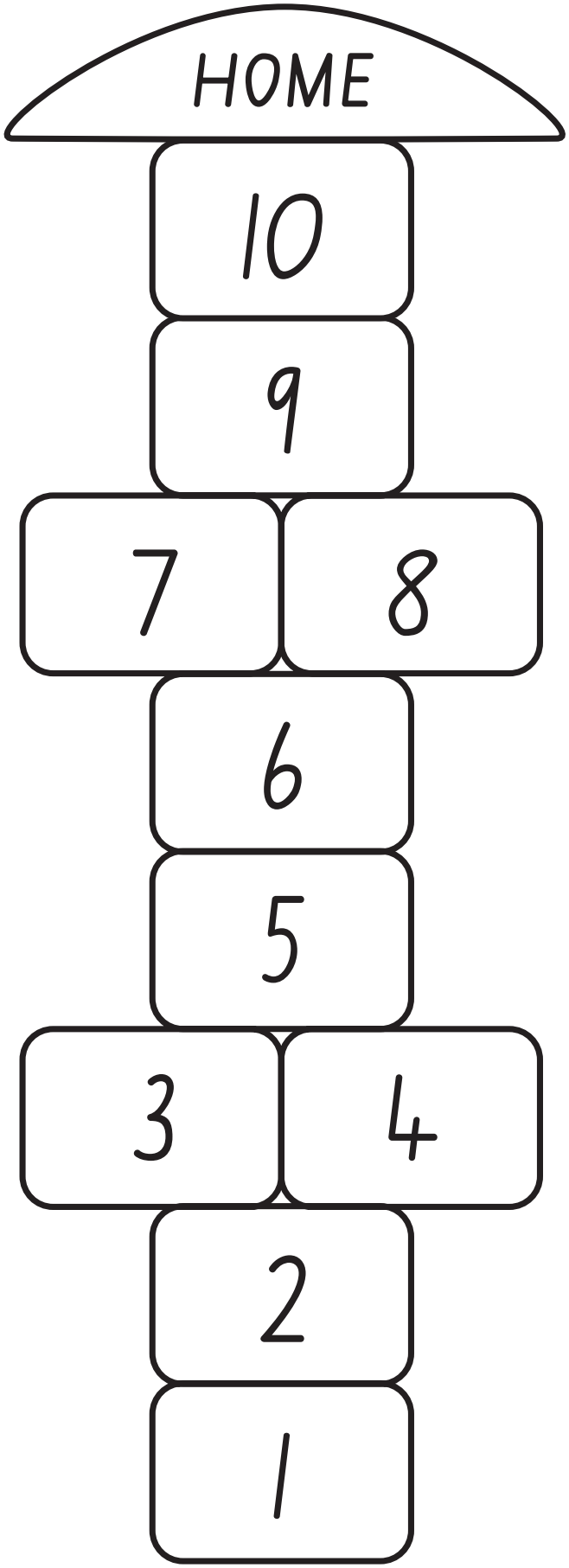
Hopscotch



Multiplication game boards

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
50	54	56	60	63	64
70	72	80	81	90	100

Cut out rectangle and discard

Cut out rectangle and discard

fold

fold

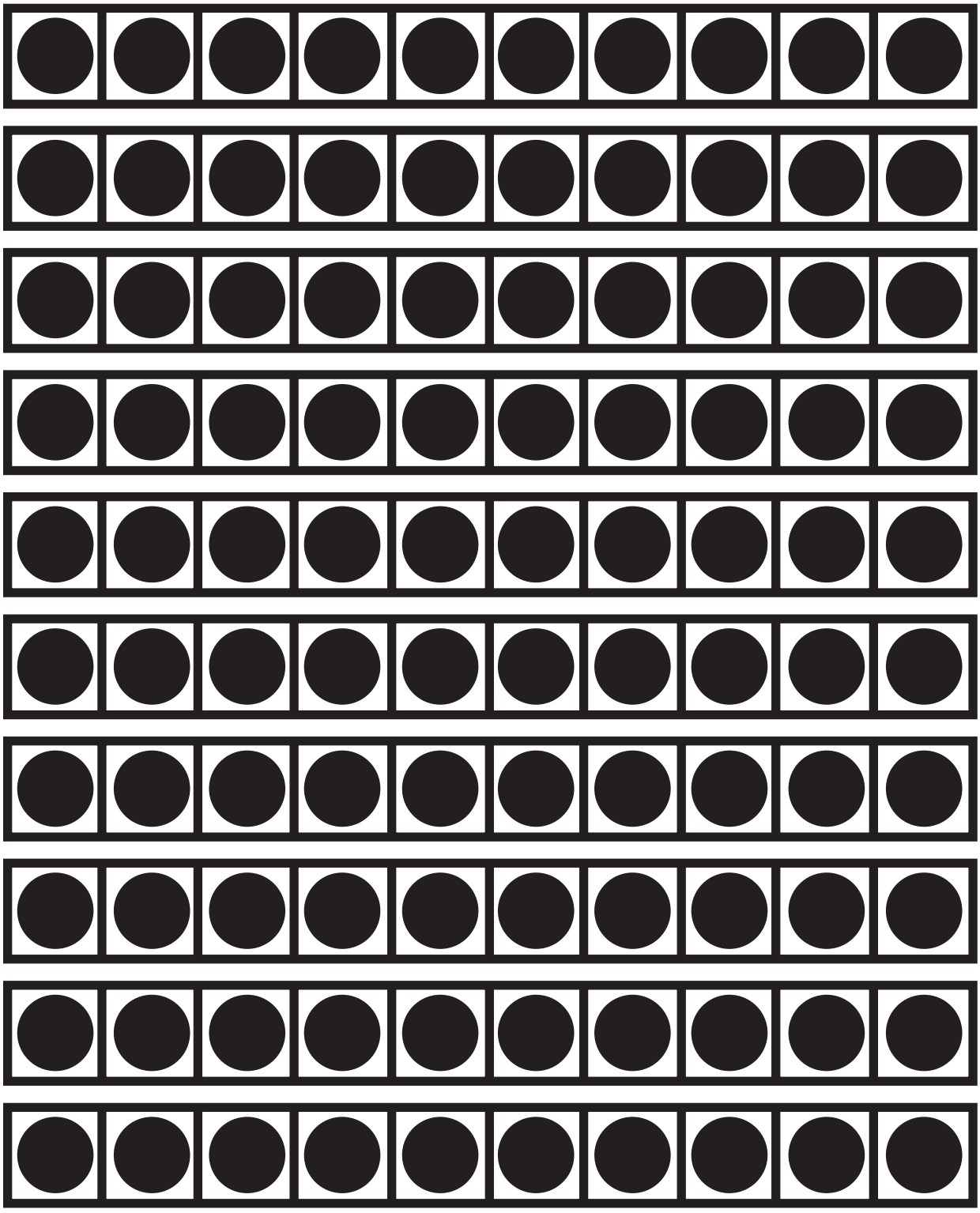
fold

Self-correcting facts

7 x 8 = 56	48 ÷ 8 = 6
4 x 8 = 32	72 ÷ 8 = 9
9 x 8 = 72	32 ÷ 8 = 4
6 x 8 = 48	64 ÷ 8 = 8
8 x 8 = 64	56 ÷ 8 = 7
6 x 9 = 54	81 ÷ 9 = 9
4 x 9 = 36	63 ÷ 9 = 7
9 x 9 = 81	36 ÷ 9 = 4
7 x 9 = 63	72 ÷ 9 = 8
8 x 9 = 72	54 ÷ 9 = 6

fold

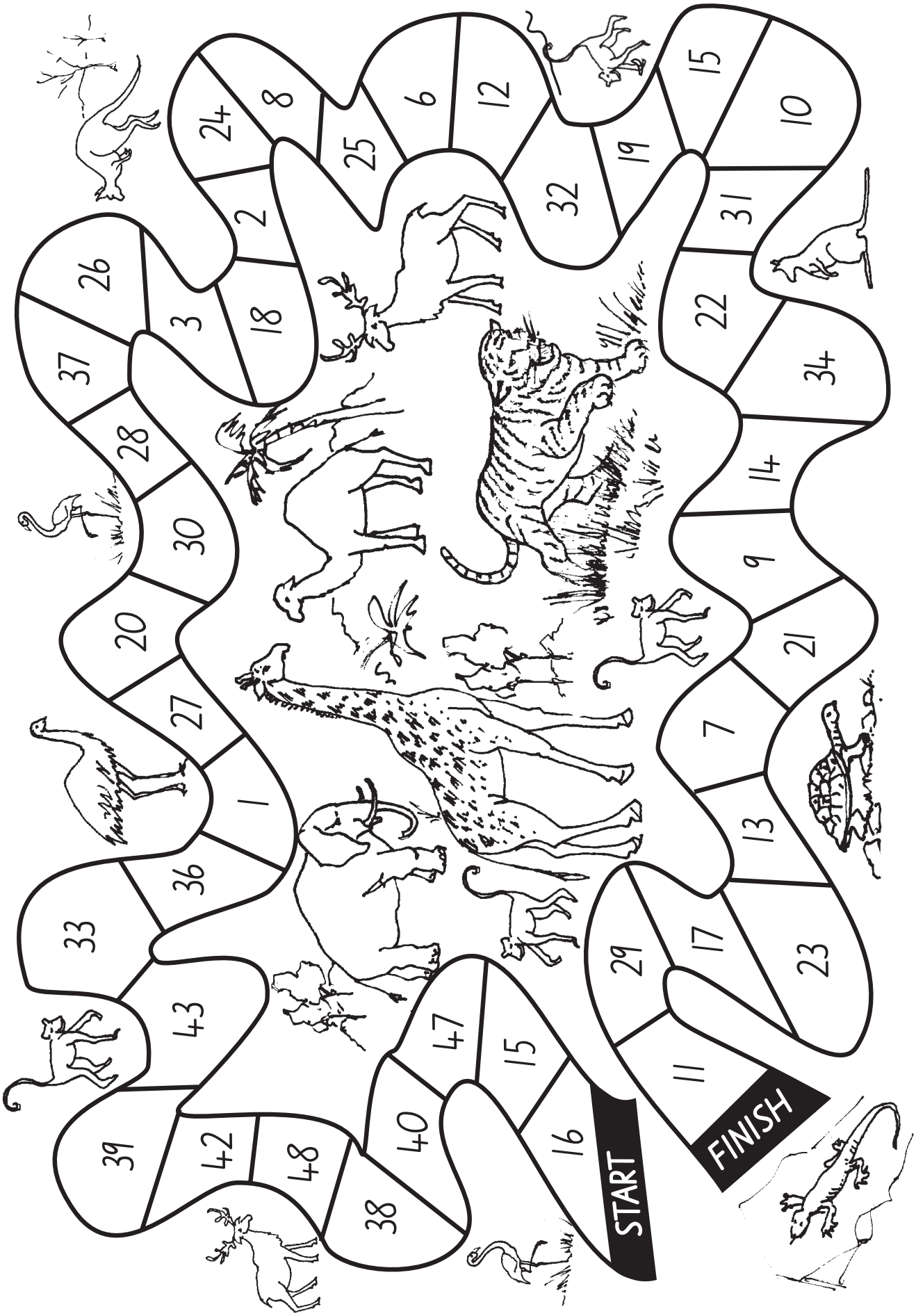
Ten-strip division challenge



Saucy sixes

17	26	8
7	9	14
19	23	25
11	16	27
35	20	10
22	15	21

Safari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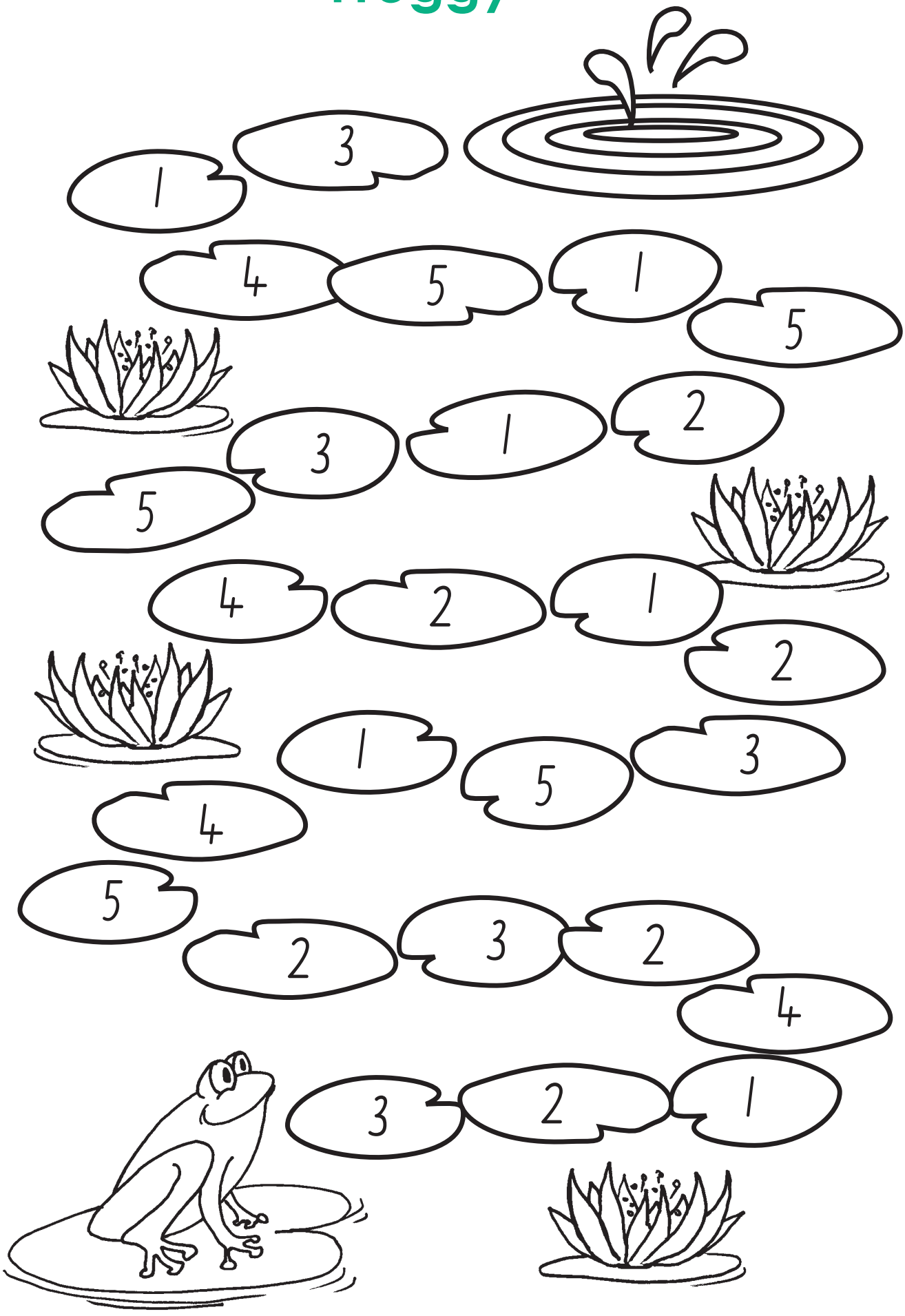
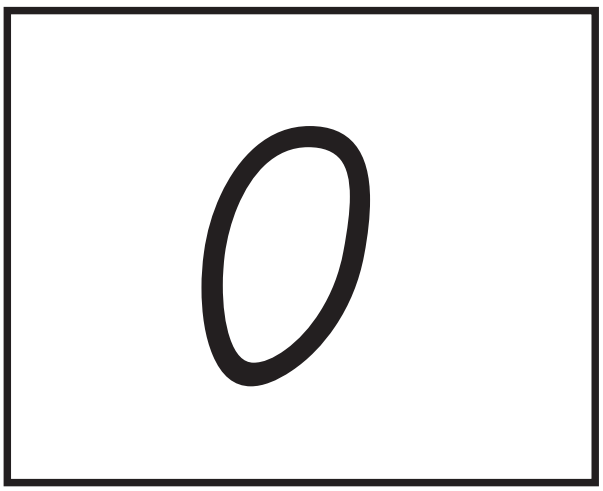
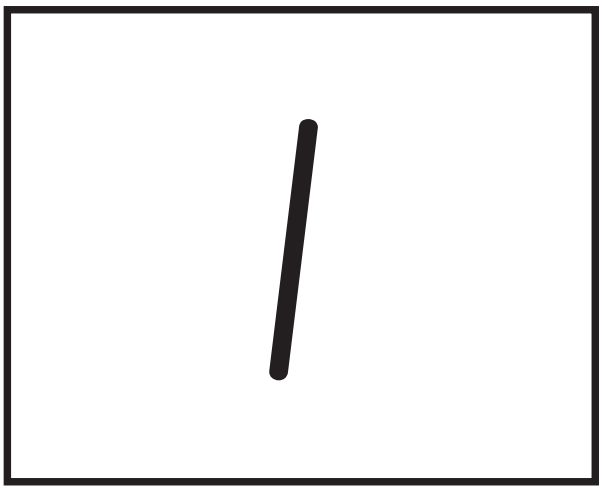
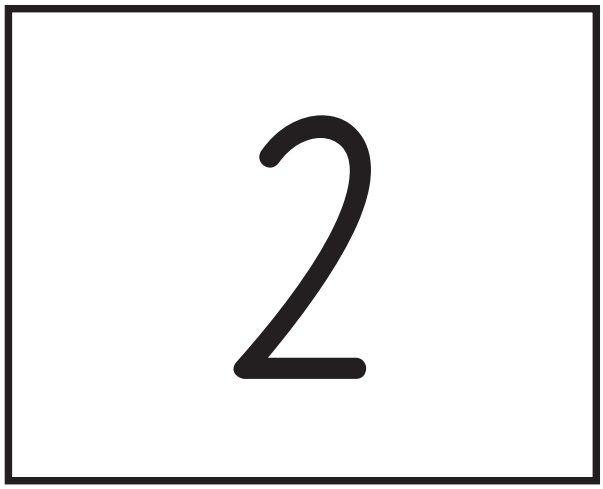
Froggy

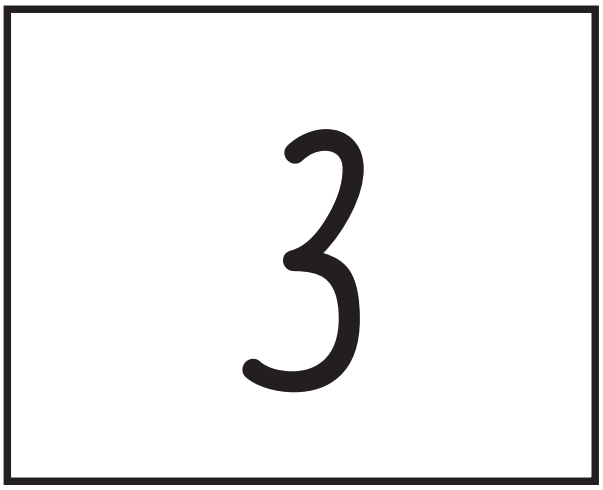


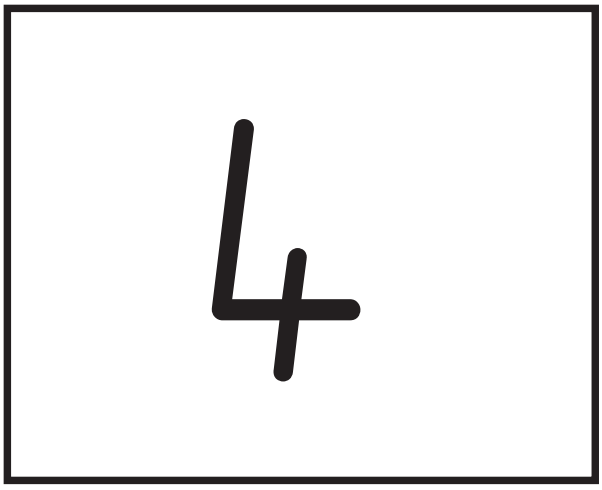
Race to 1000



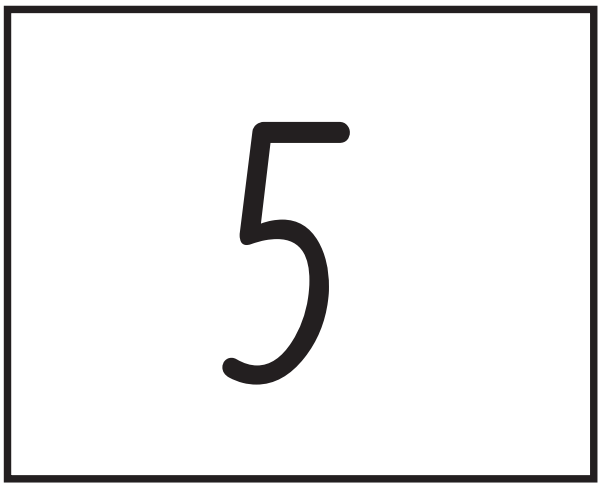


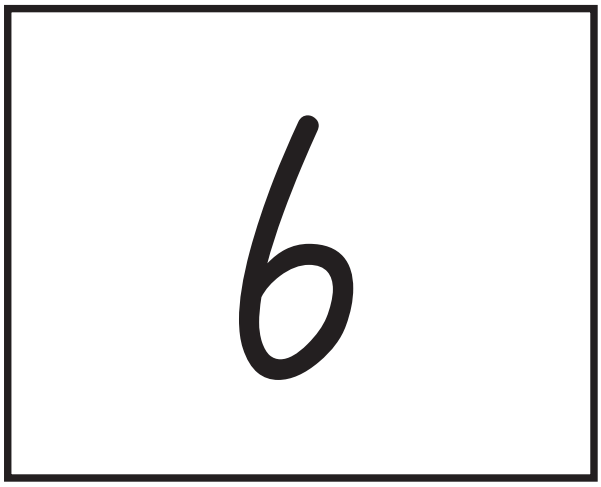


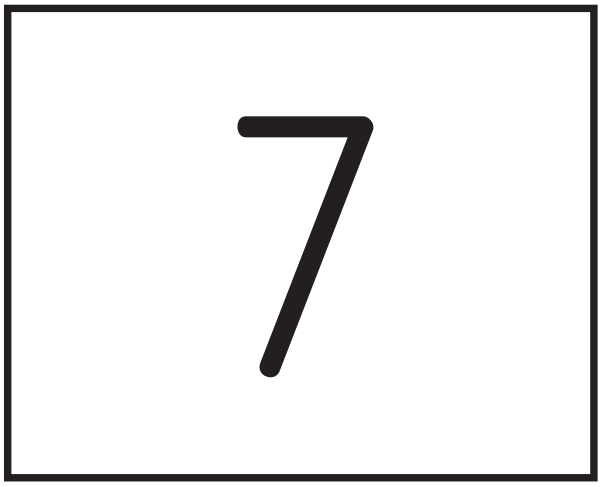


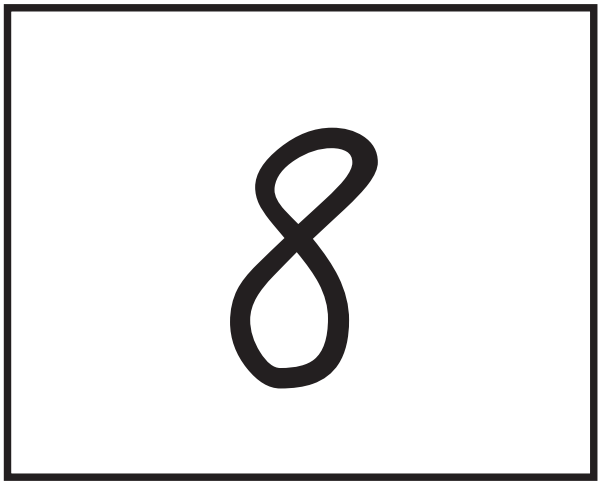


Race to 1000





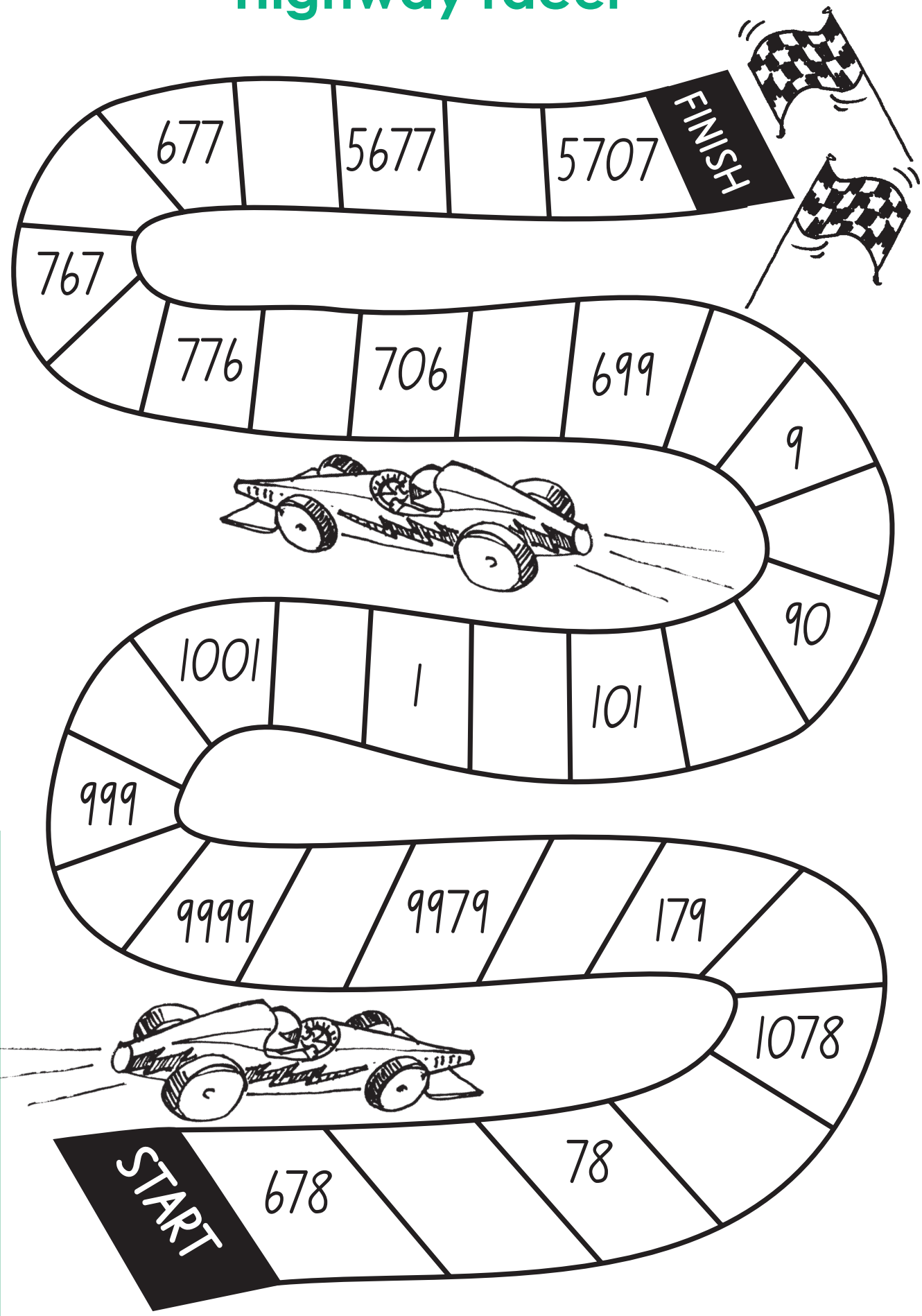




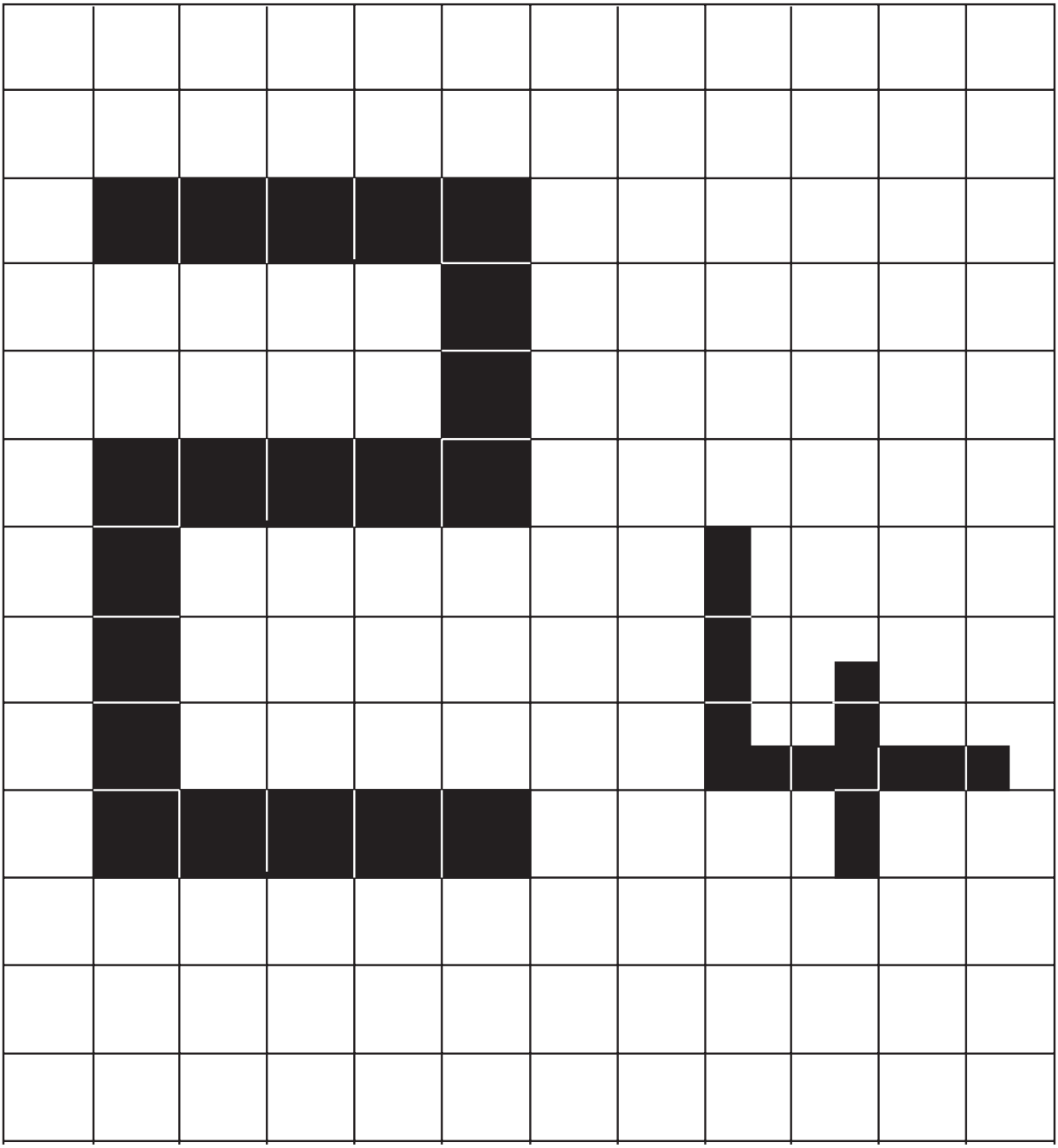
How many more?

First number	Second number	Tens	Ones
First number	Second number	Tens	Ones
First number	Second number	Tens	Ones
First number	Second number	Tens	Ones
First number	Second number	Tens	Ones
First number	Second number	Tens	Ones
First number	Second number	Tens	Ones
First number	Second number	Tens	Ones

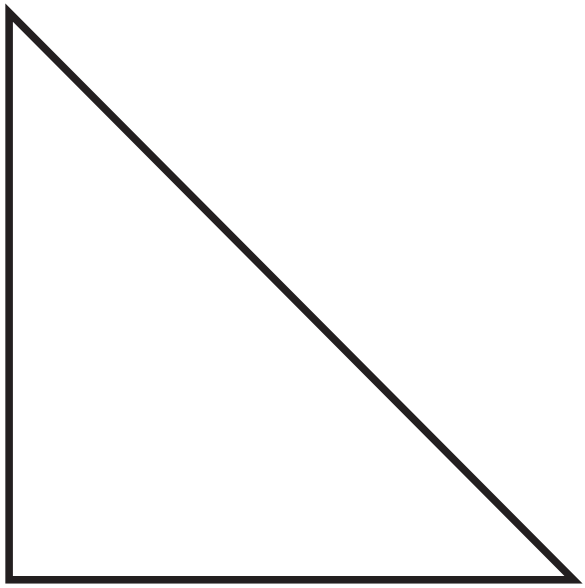
Highway racer

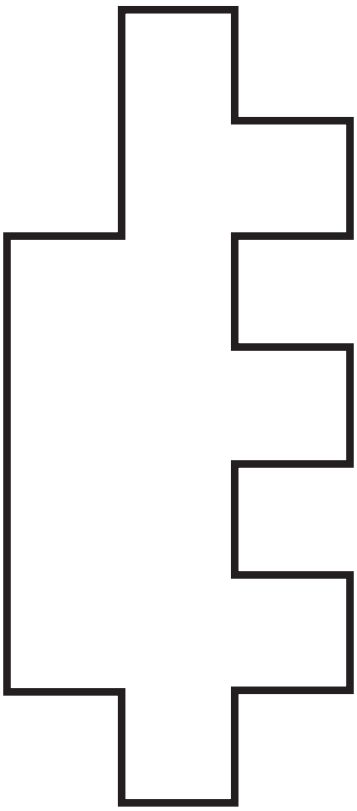


Digi squares

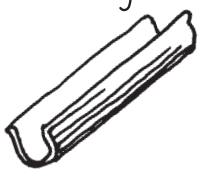


Measuring area with one tile

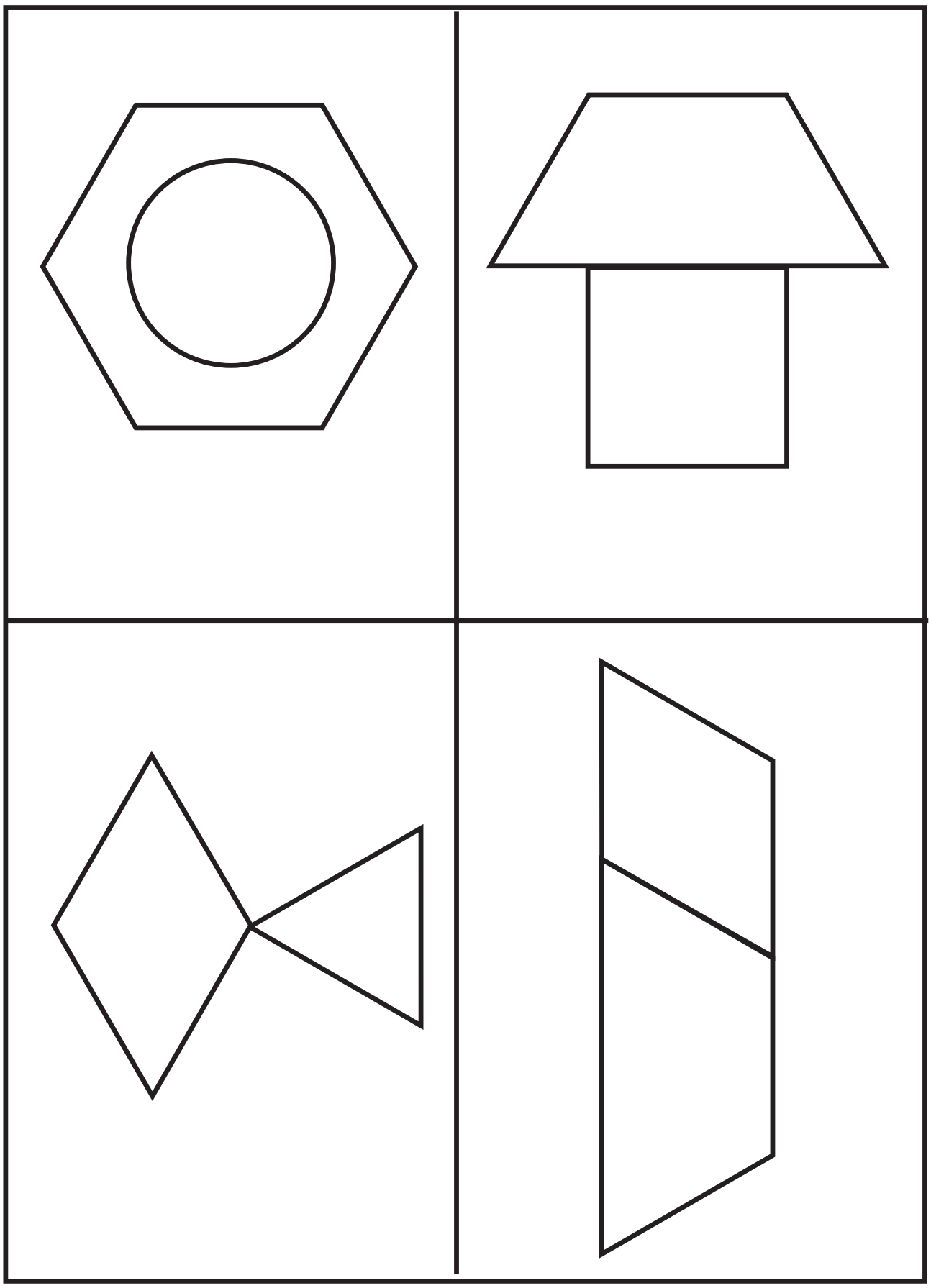




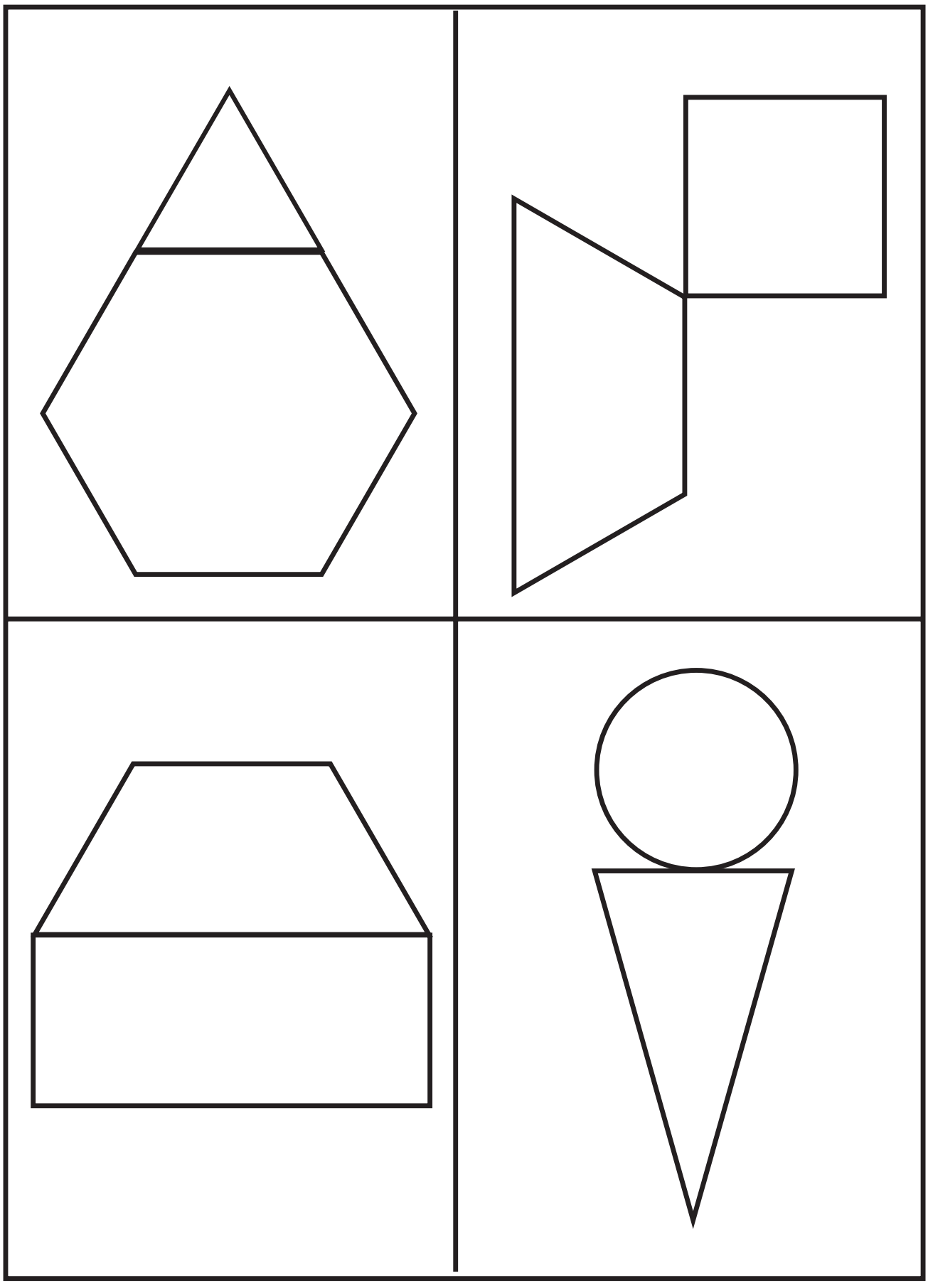
Food rainbow

SHAPE	CROSS-SECTION (top to bottom)		CROSS-SECTION (left to right)		CROSS-SECTION (diagonal)	
Potato 	prediction	actual	prediction	actual	prediction	actual
Apple 						
Banana 						
Strawberry 						
Celery 						
Carrot 						

What's my shape?



What's my shape?



Assessment tasks

Task	Student response	Assessment
T: *Start counting from 367 and count on by 10s.*	Counts from 367 to 417	Did the student successfully count on by tens over the hundred?
T: *What is the answer to this?* **8 x 4** T: *If you know the answer to that is 32, what would 32 divided by 8 equal?* **32 ÷ 8** T: *How did you know?*	Correctly solves the multiplication and division tasks without the use of equipment.	Did the student automatically recall the facts? Did the student refer to the inverse operation?
T: *I've got 27 cakes. Six cakes fit into a box. How many boxes do I need? Why?*	Automatically calculates the division question and states the remainder.	Did the student explain why there is a remainder?
T: *How many tens are in 302?*	Correctly states the number of tens.	Did the student state the number of units? Is the student able to treat 100 as ten groups of 10?

Task	Student response	Assessment
Give the student a sheet of 2 cm grid paper. T: *Draw a large rectangle on this paper and tell me how many squares are needed to cover it. If each side of the square was twice as long, how many would you need to cover the rectangle? How did you know?*	Draws a rectangle and calculates the number of squares needed to cover the area. Sees the relationship between the unit size and the number of squares needed.	How did the student determine the number of squares needed? Did the student refer to unit size and quantity?
Place a square pyramid on its base in front of the student. T: *If I stand this pyramid on its point what shape will the top face be? Draw how the triangle facing you will look if, after I stand it on its point, I rotate it 90° to the right.*	States that the top face will be a square. Draws a triangle in correct orientation.	Was the student able to draw the shape without manipulating the object? Did the student draw the correct type of triangle?

Maths bites

Using a hundred chart

- Provide each student with one or two different numeral cards in the range 1–100. Ask the class to construct a hundred chart on the floor made from the individual numeral cards. Discuss where to place each card when some of the numerals are missing. Determine the missing numbers.

- On a large hundred chart, shade in the multiples for a given number. Discuss the patterns created.

- Use the hundred chart to discuss the relationship between multiplication and division.

- Look at the "squares" or outlines around the numerals on the hundred chart. Use this concept to reinforce the structure of arrays.

- Use the hundred chart to show that the digits of multiples of "nine" add to "nine" e.g. 3 x 9 = 27; 2 + 7 = 9

- Shade patterns on the hundred chart for a multiple, say "two" and then discuss doubling to show the multiples for "four".

- Trace around a 3 x 3 square on a hundred chart. (Any nine numbers.) Look for a relationship between the four corner numbers and the centre number. Try other 3 x 3 squares and see if a similar relationship exists.

- Prepare a large blank hundred chart. Write some numbers in the chart as clues. Write other numbers in the range 0–100 on sticky notes. Ask individual students to post the notes onto the correct square in the hundred chart. Discuss quick ways of determining where the number belongs.

- Modify two egg cartons so that they have ten compartments each. Write a numeral inside each compartment in the range 0–9. Place a counter inside each egg carton. Label one carton “tens” and the other carton “ones”. Shake each carton and open to discover which number the counter has landed in. Ask the students to determine the total of both cartons, by stating how many tens, how many ones and how many altogether. Find or mark the number on the hundred chart.

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