Tracks

Where are they now?

The student counts on by ones when solving two-digit addition questions. The student does not treat ten as a composite unit for counting but rather as ten single units.

Where to next?

The student treats ten as a composite unit and can solve two-digit addition and subtraction questions by counting by tens and ones.

TP

Model how to count backwards and forwards by tens and ones on a hundred chart prior to the students completing this activity in pairs.

Syllabus outcomes

NS2.2: Uses mental and written strategies for addition and subtraction involving two-, three- and four-digit numbers

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

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

CMIT reference

Building place value through grouping: level 1

BLM

Tracks, page 154

How?

Organise the students into pairs and provide them with a copy of *Tracks* BLM, a set of numeral cards 0–9 and a hundred chart. Have the students take turns to draw two cards from the deck to make a two-digit number. The student who has drawn the cards records this number on the "Tracks" sheet as their starting number. The partner then fills in the boxes on the sheet with three directional arrows. These arrows indicate if the student is to:

⇧ count back by ten from the number

⇩ count on by ten

⇨ add on one

⇦ take away one.

The first student locates the starting number on the hundred chart and follows the directional arrows to determine the number they would finish on.

For example, if the starting number is 24 and the directional arrows were, ⇩, ⇩ , ⇨ , then the finishing number would be 45.

Variations

Have the students complete the activity on a blank hundred chart.

Use a numbered 1–100 chart and a blank die marked with directional arrows. Both students place a counter on number 45 and take turns to roll the die and move their counter accordingly. The winner is the first to reach 1 or 100.

Use ⇖ and ⇘ to represent –11 and +11.

Why?

In solving addition and subtraction problems, students need access to a range of strategies other than counting by ones including counting by tens from the middle of the decade.

Hundred chart jigsaw

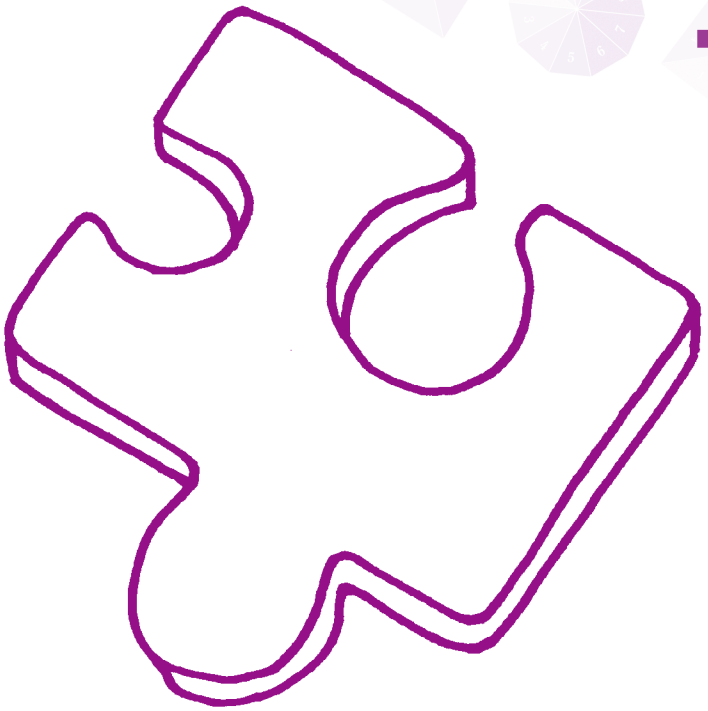
Where are they now?

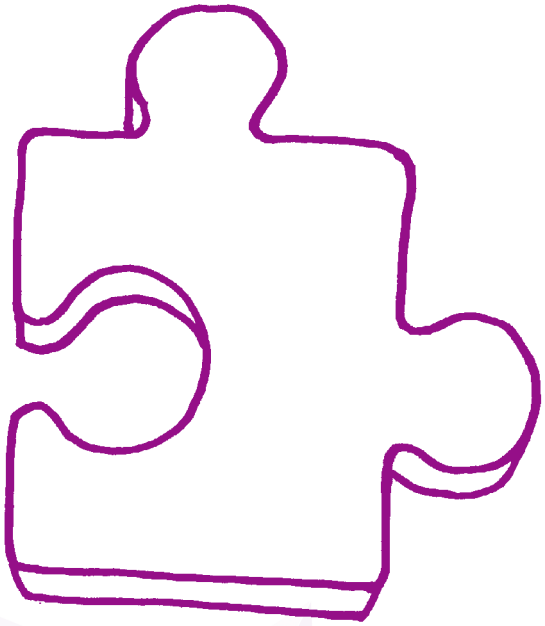
The student counts on by ones when solving two-digit addition questions. The student does not treat ten as a composite unit for counting but rather as ten single units.

Where to next?

The student treats ten as a composite unit and can solve two-digit addition and subtraction questions by counting by tens and ones.

TP Copy the master sheet onto cardboard for easier handling.





Syllabus outcomes

NS2.1: Counts, orders, reads and records numbers up to four digits

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

CMIT reference

Building place value through grouping: level 1

Numeral identification: level 3

BLM

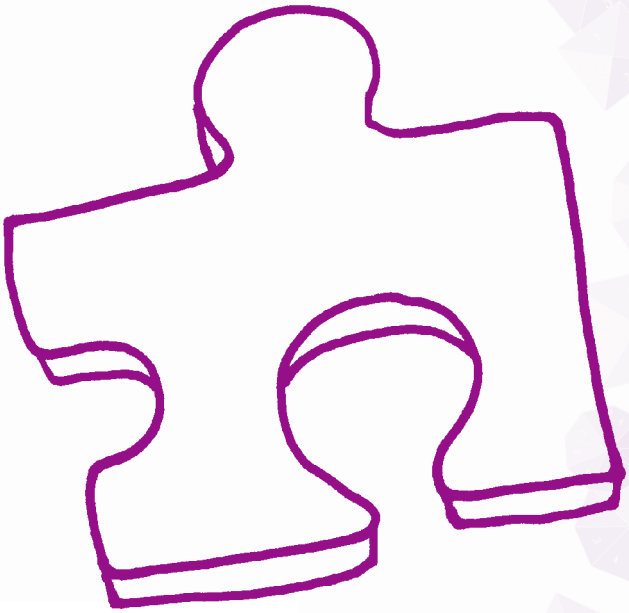
Hundred chart jigsaw, page 155

How?

Organise the students into pairs and provide them with a copy of the *Hundred chart jigsaw* BLM. Have the students fill in the missing numbers on the chart by either subtracting or adding by tens and ones. The students then cut out the jigsaw pieces and fit them together to form a hundred chart.

Variation

Have the students reconstruct the hundred chart without filling in the missing numbers.



Why?

In solving addition and subtraction problems, students need access to a range of strategies other than counting by ones including counting by tens from the middle of the decade.

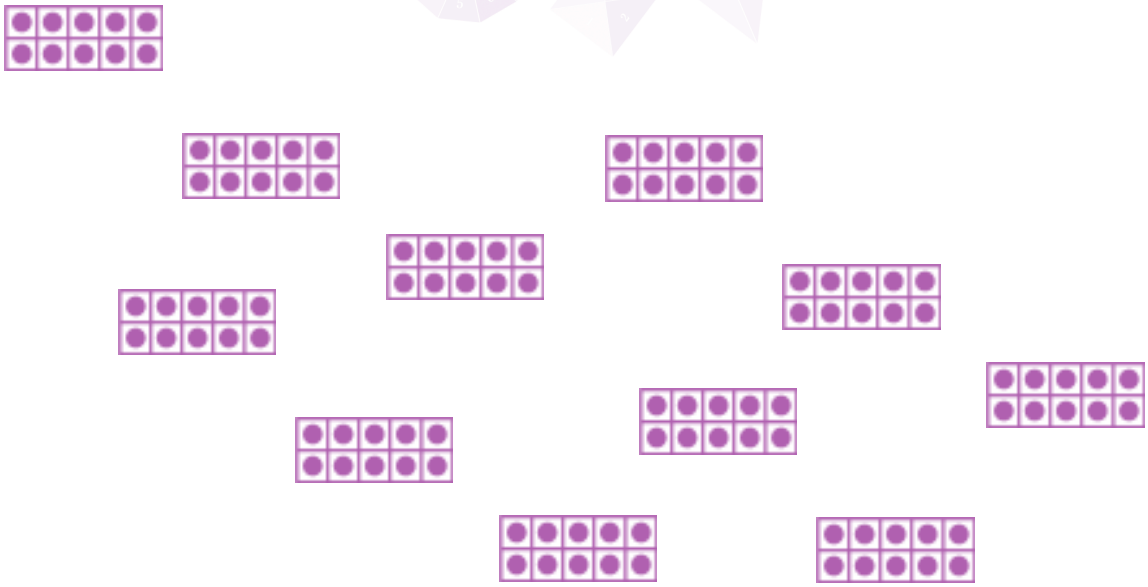
Teeny tiny ten-frames

Where are they now?

The student counts on by ones when solving two-digit addition questions. The student does not treat ten as a composite unit for counting but rather as ten single units.

Where to next?

The student treats ten as a composite unit and can solve two-digit addition and subtraction questions by counting by tens and ones.



Syllabus outcomes

NS2.1: Counts, orders, reads and records numbers up to four digits

NS2.2: Uses mental and written strategies for addition and subtraction involving two-, three- and four-digit numbers

WM2.3: Uses appropriate terminology to describe, and symbols to represent, mathematical ideas

CMIT reference

Building place value through grouping: level 1

Numeral identification: level 3

BLM

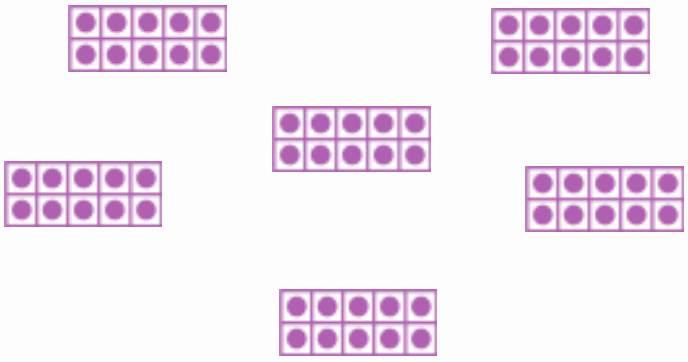
Teeny tiny ten-frames, page 156

How?

Provide the students with a set of *Teeny tiny ten-frames*. Nominate a two-digit number and ask the students to represent the number using the ten-frames. Have the students share how they made the number. Ask the students to make a second two-digit number. Repeat the questioning. Have the students find the total of the two numbers using the ten-frames. Discuss how they solved the addition.

Variation

Make the first number and then cover it up. Make the second number and use the material to determine the total of both numbers.



Why?

Place value concepts need to be developed through its use in mental addition and subtraction.

WR

Record students' thinking as they discuss the strategies used to solve the additions.

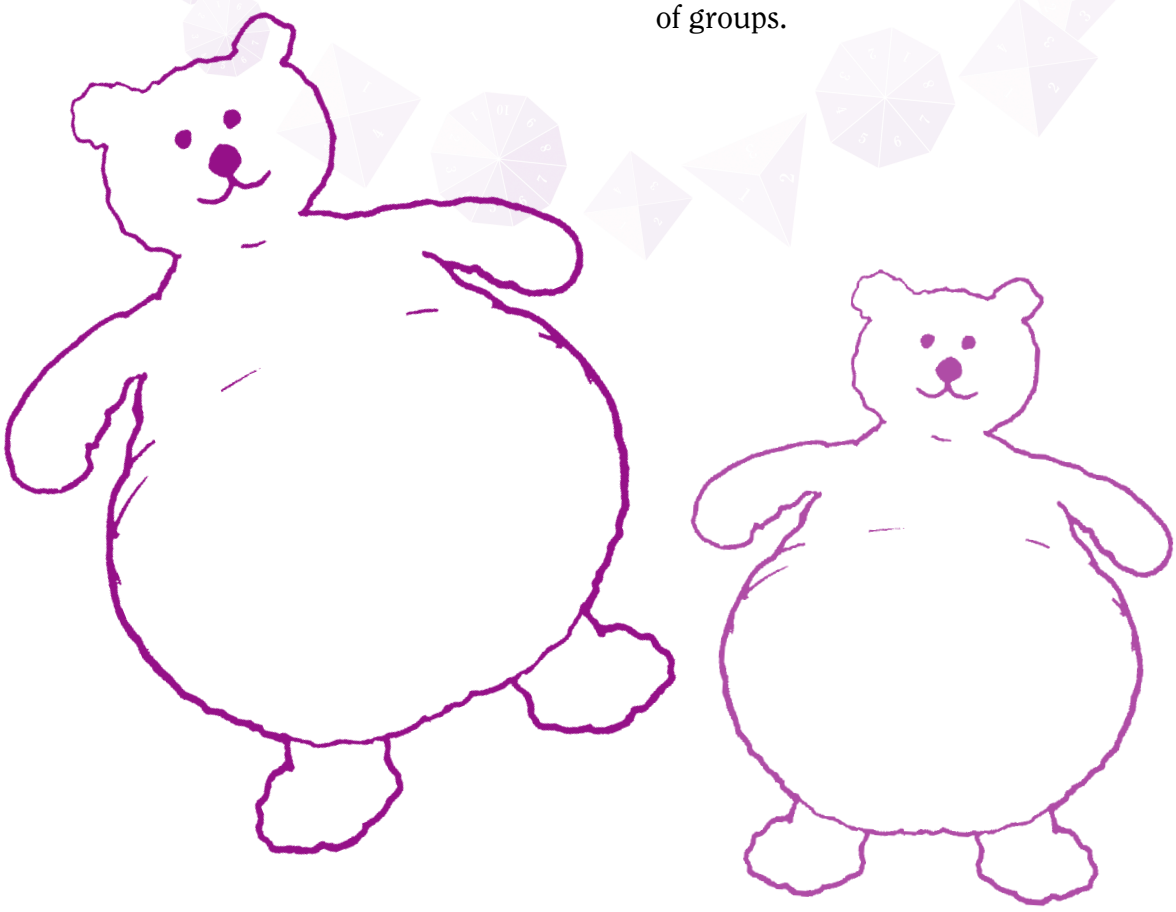
Teddy tummies: multiplication

Where are they now?

Students can form groups by one-to-one dealing.

Where to next?

Students use equal grouping and perceptual skip counting to find the total of groups.



Syllabus reference

NS1.3: Uses a range of mental strategies and concrete materials for multiplication and division

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Building multiplication and division through equal grouping and counting: level 1, 2

BLMs

Teddy tummies, page 157

Hundred chart, page 152

How?

Provide pairs of students with a *Teddy tummies* baseboard, 30 transparent coloured counters and a worksheet displaying numerals 1–30. Ask the students to share the counters among the teddies and mark each numeral on the worksheet with a cross as the counters are distributed. When the students are able to form equal groups on each of the teddies, (i.e. each time all teddies contain the same number of counters), have them circle the number on the worksheet instead of marking it with a cross.

Have the students count the numbers from 1–30, first with a rhythmic count (saying all numbers and stressing the circled numbers) and then using a skip count (saying only the multiples 3, 6, 9 …).

Provide the students with a hundred chart. Ask the students to place the counters on the hundred chart that correspond to the numerals they have circled on the worksheet. Have the students identify and discuss the number pattern for multiples of three and then continue the pattern on the hundred chart.

Variations

Change the number of teddies on the worksheet to work with multiples other than three.

After the students have completed the pattern on the hundred chart, pose questions such as: *Which number have you covered with your fourth counter?* (12) *What does this mean?* Discuss the fact that this means 4 x 3 = 12. Close your eyes. *What number do you think will be covered by the tenth counter? Why?* (Note that the expression "covered by" is less likely to cause confusion than "under". Some students may think that 22 is "under" the fourth counter, because 22 is "under" (below) 12 on the hundred chart.

Why?

A student may be able to form equal groups yet not be able to calculate the total of the groups in an organised way. Using a skip count will assist students in finding the total and in visualising composite units.

People markers

Where are they now?

Students are able to use material to form equal groups and find the total by counting by ones.

Where to next?

Students find the total of groups by using a rhythmic or skip count.

Syllabus reference

NS1.3: Uses a range of mental strategies and concrete materials for multiplication and division

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Building multiplication and division through equal grouping and counting: level 1 and 2

Recording symbols

BLM

Ten-frame, page 148

How?

Prepare ten, ten-frame cards, each displaying the number of dots for the multiple to be practised. For example, each ten-frame has three dots. Distribute the ten-frame cards to the students. Ask a student to call out a number in the range 1–10. Select a corresponding number of students to bring their ten-frame cards to the front of the class. Have the class find the total number of dots by firstly using rhythmic counting and then repeat using skip counting. Record the number pattern on the board when all ten, ten-frames are used.

Why?

To develop students' concepts of multiplication and division, we need to provide strategies that focus on groups of items rather than individual items. Rhythmic and skip counting help students to focus on groups within the whole.

WR

A flip strip could be used to record the number pattern.

Counter grab: multiplication

Where are they now?

Students are able to model equal-sized groups and find the total by counting by ones.

Where to next?

Students use skip counting to determine the total of groups and any remainders.

Syllabus reference

NS2.3: Uses mental and informal written strategies for multiplication and division

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Building multiplication and division through equal grouping and counting: level 1 and 2

BLM

Counter grab, page 158

How?

Provide students with a small container of counters and a copy of *Counter grab* BLM. Instruct the students to take turns to grab a handful of counters, or other suitable material, and place them on the floor or table. Have the students firstly estimate how many counters there are and then organise the counters into groups of a nominated number, for example, groups of three. Encourage the students to determine the total by using rhythmic or skip counting, Discuss what happens when there are counters left over. On the worksheet, students record their estimate, the number of groups, the number of counters in each group, any remainders and the total. Model stress and skip counting to find the total.

Variation

Have the students make different equal groups from the one handful of counters and record the combinations.

Why?

Using a skip count will assist students in finding the total and in visualising composite units. Students should also be given opportunities to work on problems that involve remainders.

Create an array

Where are they now?

Students are able to form equal groups and find the total by counting by ones.

Where to next?

Students use skip counting to determine the total of the groups.

TP

Discuss the arrays in terms of both multiplication and division.

Syllabus outcomes

NS2.3: Uses mental and informal written strategies for multiplication and division

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Building multiplication and division through equal grouping: level 2 and 3

BLM

Dizzy dots, page 147

How?

Explain the term "array" to the students and provide them with a 10 x 10 array and two sheets of paper. Use an overhead projector or large chart to demonstrate how the 10 x 10 array can be covered with two pieces of paper to form other arrays. For example, cover the top three rows with paper and the first five columns with another piece of paper to form a 7 x 5 array (7 rows with 5 in each row).

Ask the students to use their arrays sheets and paper to make nominated arrays. Have the students use skip counting of the rows to determine the answer.

Variations

Ask the students to form arrays that have a nominated number of dots, say 24. Record the arrays the students have constructed. 6 x 4, 4 x 6, 3 x 8, 8 x 3.

Have the students form arrays of their own choice and describe it to other class members.

Ask the students to create word problems to match the array they have constructed. For example, 4 bears live in each cave and there are 6 caves. How many bears altogether? Other students may then use their array paper to solve the problem.

After the student has formed an array, ask him or her to turn the array through ninety degrees and re-name the array.

Why?

Using arrays assist students to view rows of items as countable things, i.e. composite units. This strong visual representation of equal groupings will also help students to move beyond rhythmic counting and skip counting.

WR

Have the students record their solutions to the word problems using an empty number line for the skip counts. These could be used later to determine inverse operations.

Colour an array

Where are they now?

Students are able to form equal groups and find the total by counting by ones.

Where to next?

Students use skip counting to determine the total of the groups.

TP

5 mm grid paper would be a suitable size for this activity.

Syllabus outcomes

NS2.3: Uses mental and informal written strategies for multiplication and division

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Building multiplication and division through equal grouping: level 2

How?

Provide the students with grid paper and two dice. Tell the students that one die will represent the number of rows and the other die will represent the number of columns. Have each student roll the two dice and then colour in the corresponding number of squares on the grid paper to form an array. The student then cuts and pastes the arrays onto paper and records the number of columns, the number of rows and the total number of squares. Discuss strategies for determining the total. Students may record the information as a number sentence. Allow the students to share and compare their finished work.

Why?

Using arrays assist students to view rows of items as countable things, i.e. composite units. This strong visual representation of equal groupings will also help students to move beyond rhythmic counting and skip counting.

Self-correcting arrays

Where are they now?

Students are able to form equal groups and find the total by counting by ones.

Where to next?

Students use skip counting to determine the total of the groups.

Syllabus outcomes

NS2.3: Uses mental and informal written strategies for multiplication and division

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Building multiplication and division through equal grouping: level 2

BLM

Self-correcting array, page 159

10 x 4 array, page 160

How?

Prepare an array and numeral sheet for the multiple to be practised and a cover board. A sheet for a 10 x 4 array is included in the BLM section. Display the covered array to the class. Reveal the top row of the array, ensuring the "tab" covers the end number. Ask questions such as: *How many dots in this row? How many rows can you see? How many dots altogether?* Progressively reveal the next row of dots and repeat questions. Encourage students to discuss how they are determining the total. If the students are counting by ones, encourage them to use skip counting. Allow the students to work in pairs and repeat the activity. The folded tab may be lifted after the students have answered, in order to check if they are correct.

Variation

Demonstrate how to determine division facts using the array structure.

Why?

Using arrays assist students to view rows of items as countable things, i.e. composite units. This strong visual representation of equal groupings will also help students to move beyond rhythmic counting and skip counting.

WR

Have the students use the multiplication questions to determine and record division facts.

Traffic tally

Where are they now?

Students find the total sum of groups by counting by ones.

Where to next?

Students find the total sum of groups by counting in multiples.

TP

The common method of tallying involves making four vertical strokes and bundling these with a cross stroke for the fifth. 

Syllabus outcomes

DS2.1: Gathers and organises data, displays data using tables and graphs, and interprets the results

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

CMIT reference

Building addition and subtraction though grouping: quinary-based strategies

Multiplication and division: level 3

How?

The students will need to be provided with a clipboard, paper and pen and will need to be in a location whereby they are able to observe passing traffic. Prior to the activity, ensure students understand the common method of tallying. In groups, students use tally marks to record the number of cars that pass by before a nominated vehicle passes. Each group could monitor the traffic for a different vehicle, for example, bus, motor bike, truck, petrol tanker or bicycle.

Variations

The nominated vehicle could be a particular coloured car or make of car.

Add "P" plate drivers, "L" plate drivers and pedestrians to the list.

Tally all vehicles that pass within a given time, for example 15 minutes and create a simple table to organise the data.

Transfer the information to a column graph or use *Compute-a-graph*.

Why?

This activity encourages students to use five as a sub-base by counting in fives. This has the potential to reduce the reliance on counting by ones.

High rollers 1

Where are they now?

Students find the total sum of groups by counting by ones.

Where to next?

Students find the total sum of groups by counting in multiples.

Syllabus outcomes

DS2.1: Gathers and organises data, displays data using tables and graphs, and interprets the results

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

CMIT reference

Building addition and subtraction though grouping: quinary-based strategies

Multiplication and division: level 3

How?

Organise the students into groups and provide each group with a die. Each student in the group takes a turn to roll the die. The group records the number of times each number is rolled using tally marks. Continue until the die has been rolled a nominated number of times. Encourage the students to count by fives and then count on any additional single marks to determine the total. Have each group compare their results.

Variation

See High rollers 2 in the following section; *Forming groups*.

Why?

This activity encourages students to count by fives. This has the potential to reduce the reliance on counting by ones.

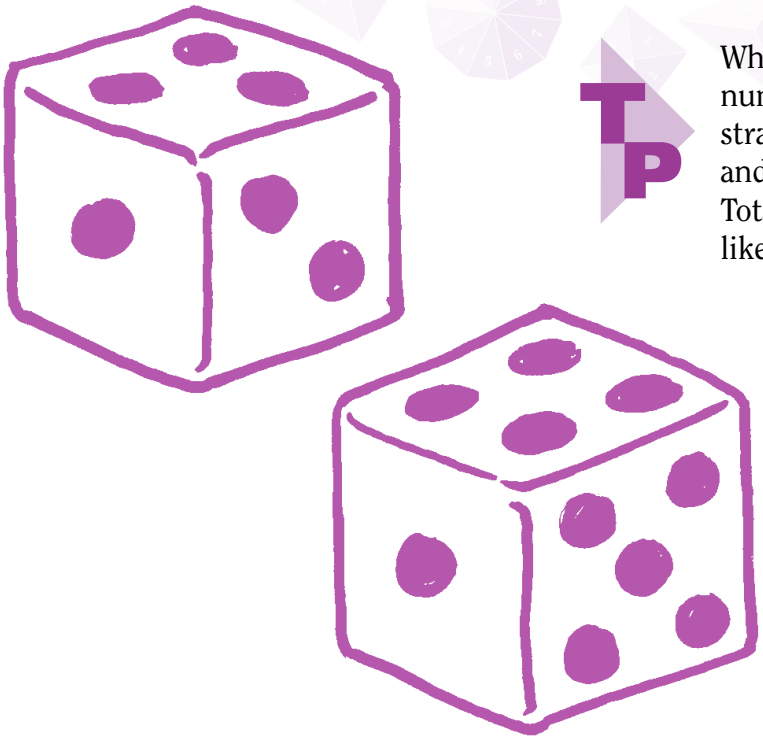
Four dice tally

Where are they now?

Students determine the sum total by counting by ones.

Where to next?

Use a variety of strategies to determine the sum total including combining numbers and counting multiples.



TP

While the students are solving the number problems, observe the strategies they are using. Model and discuss efficient strategies. Totals between 4 and 14 are more likely than 15 to 24.

Syllabus outcomes

DS1.1: Gathers and organises data, displays data using column and picture graphs, and interprets the results

NS1.2: Uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers

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

NS2.5: Describes and compares chance events in social and experimental contexts

CMIT reference

Building addition and subtraction through grouping: facile counting strategies

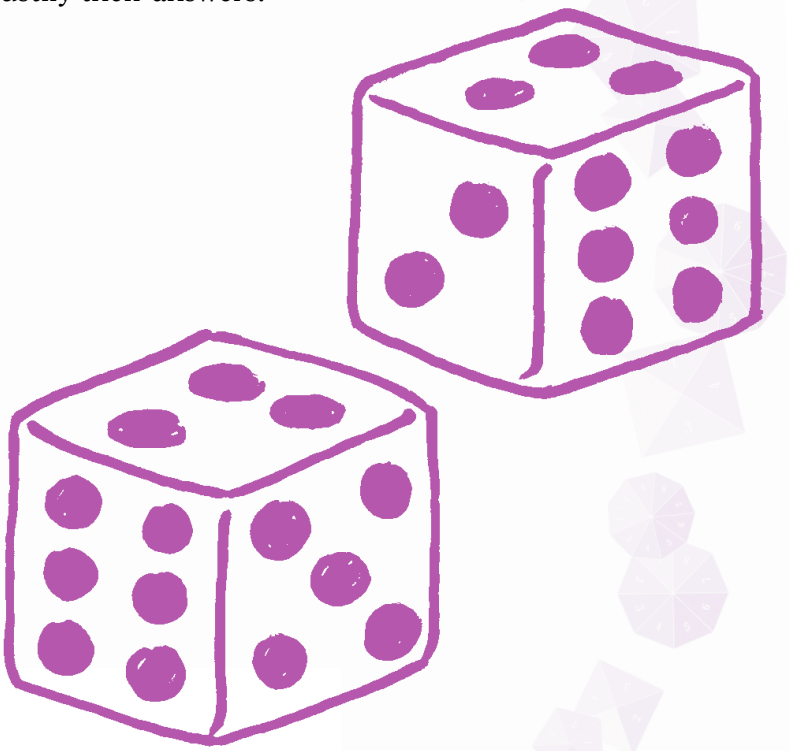
Combining and partitioning: To 20

BLM

Four dice tally, page 161

How?

Organise the students into groups and provide each group with four dice and a recording sheet. Instruct each student in the group to take turns to roll the four dice and to determine the total. The group records the answer on the recording sheet by marking a tally mark under the appropriate heading, 4–14 or 15–24. Have the groups compare their results. Combine the data from all of the groups on a single chart. Ask the students to indicate whether they believe it is more likely to score 4 to 14 than 15 to 24, about or less likely. Have them justify their answers.



Why?

To become effective users of mathematics, students need to develop and use a variety of strategies other than counting by ones to solve problems.

Knotty problems

Where are they now?

Students determine the sum total by counting by ones.

Where to next?

Use a variety of strategies to determine the sum total including combining numbers and counting multiples.

Lengths of knitting could be saved and used for the *Woolly designs* activity on page 128.

Syllabus outcomes

DS2.1: Gathers and organises data, displays data using tables and graphs, and interprets the results

MS2.1: Estimates, measures, compares and records lengths, distances and perimeters in metres, centimetres and millimetres

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

CMIT reference

Building multiplication and division through equal grouping: level 1 and 2

BLM

Knotty problems, page 162

How?

Teach the students to finger knit. Instructions are included on the *Knotty problems* BLM. Instruct the students to make a specific length of finger knitting. Have the students estimate the length rather than give them measuring devices. For example, ask the students to knit the wool to a length they think is 35 cm long. When they have finished knitting, ask the students to measure and record the amount they actually knitted to the nearest centimetre. Record the class results on a tally graph indicating the number of lengths that were knitted in the ranges, 34 to 36 cm, 30 to 40 cm, 25 to 45 cm or "other lengths" (students may only put a mark under one category). Encourage the students to use counting strategies such as counting in multiples and counting on to find the total of each group. Ask the students to determine how many links make 5 cm.

Variation

Organise the students into groups. Provide the students with directions to commence finger knitting. Periodically, signal the students to stop knitting and call out a nominated length, which the students have to estimate and indicate on their length of finger knitting. For example, the student holds one end of the knitting in one hand and firmly grasps a point along the knitting that he or she thinks is the nominated length. A group leader then measures and records each student's estimated length of knitting. The teacher graphs the results on the chalkboard or overhead. Change group leaders each time a new estimation is called.

Why?

To become effective users of mathematics, students need to develop and use a variety of strategies other than counting by ones to solve problems.

Hoops and hats

Where are they now?

Students determine the sum total by counting by ones.

Where to next?

Use a variety of strategies to determine the sum total including combining numbers and counting multiples.

Syllabus outcomes

DS1.1: Gathers and organises data, displays data using column and picture graphs, and interprets the results

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

CMIT reference

Building multiplication and division through equal grouping: level 1 and 2

How?

Draw a starting line on the ground. Place "witch hats" in a row at one metre, two metres and three metres away from the starting line. Have each student in the class attempt to throw a hoop over each of the hats. Repeat several times while using tally marks to record the number of hoops that are successfully thrown onto the hat at each distance. Encourage the students to use counting strategies such as counting in multiples to find the total of each group.

Why?

To become effective users of mathematics, students need to develop and use a variety of strategies other than counting by ones to solve problems.

Chain reaction

Where are they now?

Students need an adequate supply of units to measure the length of an object.

Where to next?

Students use one unit repeatedly to measure the length of an object.

Syllabus outcomes

MS1.1: Estimates, measures, compares and records lengths and distances using informal units, metres and centimetres

WM1.2: Uses objects, diagrams, imagery and technology to explore mathematical problems

CMIT reference

Count Me Into Measurement: Length 3.1

How?

Have the students construct a "ruler" by choosing an item and laying a nominated number of the items end-to-end on a paper strip. For example, a student may choose to make a "ruler" which is five paper clips long. Ensure the students line up the beginning of the unit with the edge of the strip. Instruct the students to mark their paper strip at the end of each unit and then cut it at the end of the last unit. Have the students measure and compare the length of various objects using their ruler. When recording the measurements, have the student record the length in terms of the number of units.

Why?

Students need to know how to precisely mark the end of each unit when measuring and that the lengths and not the marks or spaces are counted when measuring. Students also need to develop efficient counting strategies to assist them in measuring.

Nylon packing tape would make an excellent substitute for the paper strip.

Streamer design

Where are they now?

Students need an adequate supply of units to measure the length of an object.

Where to next?

Students use one unit repeatedly to measure length.

Computational skills can be developed through measurement tasks. The students may use multiplication, addition and fraction concepts to solve this problem.

Syllabus outcomes

MS1.1: Estimates, measures, compares and records lengths and distances using informal units, metres and centimetres

NS2.3: Uses mental and informal written strategies for multiplication and division

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

CMIT reference

Count Me Into Measurement: Length 3.1

Building multiplication and division through equal grouping: level 3

How?

Show rolls of coloured streamers to the students and tell them they are to create a design or picture for something to be made out of the streamers. Have the students draw their designs first. Tell the students that they are to determine the total length of streamer they will need to make their design. Provide them with a unit length of streamer, say 5 cm, to assist them to calculate the length. After, the students can measure and cut the streamer and paste onto their design.

Why?

Students need to know how to precisely mark the end of each unit when measuring and that the lengths and not the marks or spaces are counted when measuring. Students also need to develop efficient counting strategies to assist them in measuring.

WR

Students could initially record the number of units needed using tally marks.

Tile roller

Where are they now?

Students use identical units to measure area, counting the total number of units by ones.

Where to next?

Students use the row structure repeatedly to measure area and count the total number of units by counting in multiples.

Syllabus outcomes

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

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Count Me Into Measurement: Area 2.1, 3.1

Building multiplication and division through equal grouping: level 2, 3

How?

Provide the students with a supply of tiles and a die. Students roll the die and collect the corresponding number of tiles to form a row. The student then rolls the die a second time to indicate the number of rows to repeat. The student determines and records the total number of tiles needed. Encourage the student to count in multiples. Have the student verify by either making the array with the tiles or drawing the pattern on grid paper and counting.

Why?

Students should be able to use a repeated row structure as a means of measuring area. Students also need to develop efficient counting strategies to assist them in measuring.

Using nets 1

Where are they now?

Students use identical units to measure area, counting the total number of units by ones.

Where to next?

Students use the row structure repeatedly to measure area and count the total number of units by counting in multiples.

TP

Depending on the size of the carton, 2 cm grid paper may be useful as each column is ten units.

Syllabus outcomes

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

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values

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

CMIT reference

Count Me Into Measurement: Area 3.1

Building multiplication and division through equal grouping: level 3

BLM

Using nets 1, page 163

How?

Provide the students with a selection of packages that they can open to form a net. Each student will also need a paper strip, cut from a row of grid paper. Have the students place the paper strip horizontally at the top of the net, draw a line under the strip and repeat the process down the cardboard. The individual units on the strip can be used to measure and draw areas outside the rectangle by the repeated use of the paper strip. Have the student use counting in multiples to determine the number of units needed to cover the rectangle and count on any additional units.

Why?

Students need to move and align units in a systematic way when measuring. Students also need to develop efficient counting strategies to assist them in measuring.

Geoboard triangles 1

Where are they now?

The student recognises shapes in different orientations and proportions and checks by physical manipulation of materials.

Where to next?

The student is able to generate a variety of static visual images of a shape in different orientations.

TP

Encourage students to create triangles other than equilateral triangles positioned on their base. Students need to pay attention to the relative location of the parts, such as sides, when rotating a triangle.

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

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

CMIT reference

Count Me Into Space: Orientation and motion: pattern and dynamic imagery strategies

How?

Organise the students into pairs and have one student create a triangle using a rubber band on a geoboard. The student should then draw the triangle on paper or cardboard and cut it out. This is used to aid directions. The student then tells his or her partner to make a second triangle on the geoboard that would result from the first triangle being moved by either flipping or turning. Allow the first student to match the instructions with his or her actions on the cutout triangle. Repeat the process and then swap roles.

Variation

Have the partner draw the triangle in the new orientation rather than making it on the geoboard.

Why?

Students need to explore shapes to help them move from restricted or fixed images of shapes to concept images that focus on properties that make up the shape.

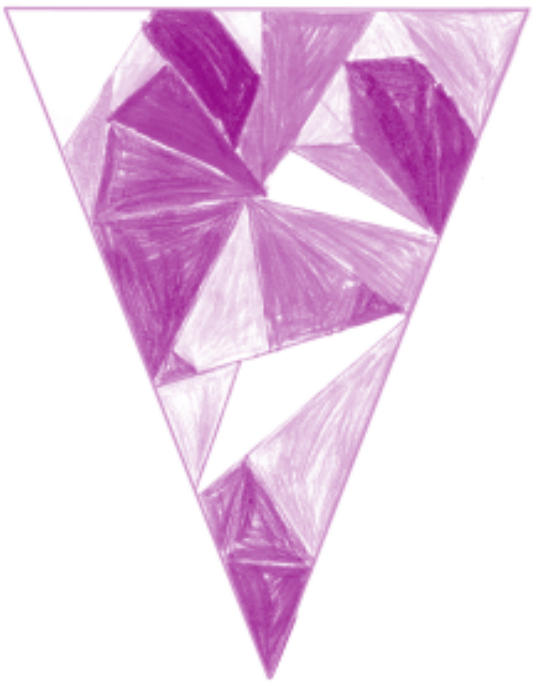
Create a triangle

Where are they now?

The student recognises shapes in different orientations and proportions and check by physical manipulation of materials.

Where to next?

The student is able to generate a variety of static visual images of a shape in different orientations.



TP

Show the students how a quadrilateral can be made into two triangles by drawing a line from one corner to another.

Syllabus outcomes

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

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

CMIT reference

Count Me Into Space: Part-whole relationships: pictorial imagery

BLM

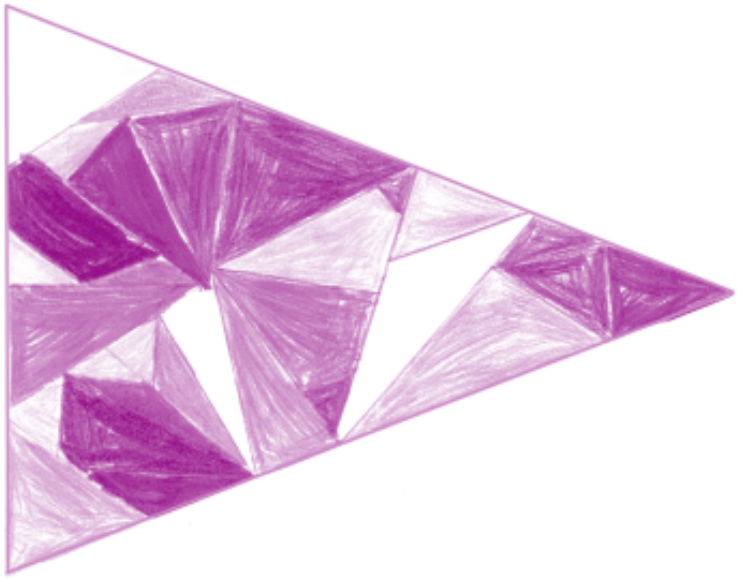
Create a triangle, page 164

How?

Provide the students with a drawing of a large isosceles triangle. In pairs, students take turns to draw a line on the triangle to form more triangles. If a quadrilateral is formed the student must add another line to turn it into triangles. The drawing might be used as part of a visual arts lesson.

Variation

Have the students cut out each triangle, group them and explain how they have classified each group.



Why?

Students need to explore shapes to help them move from restricted or fixed images of shapes to concept images that focus on properties that make up the shape.

Symmetry pattern

Where are they now?

The student recognises shapes in different orientations and proportions and checks by physical manipulation of materials.

Where to next?

The student is able to generate a variety of static visual images of a shape in different orientations.

Syllabus outcomes

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

CMIT reference

Count Me Into Space: Orientation and motion: pattern and dynamic imagery strategies

How?

Draw a line down the centre of a page and ask one student to draw a rectangle on one side of the line. One side of the rectangle should be part of the dividing line on the page. The student's partner then draws a rectangle that is the reflection of the first rectangle. The first student continues to add straight lines to the rectangle. The student's partner must then add the same line to their rectangle so that it shows a symmetrical result.

Variation

Use coloured building blocks to create a symmetrical model with a partner.

Why?

Students need to explore shapes to help them move from restricted or fixed images of shapes to concept images that focus on properties that make up the shape.

Walking the dog

Where are they now?

The student recognises shapes in different orientations and proportions and checks by physical manipulation of materials.

Where to next?

The student is able to generate a variety of static visual images of a shape in different orientations.

TP

A initial line may need to be provided on the paper and instructions given as to where the rectangle is to finish.

Syllabus outcomes

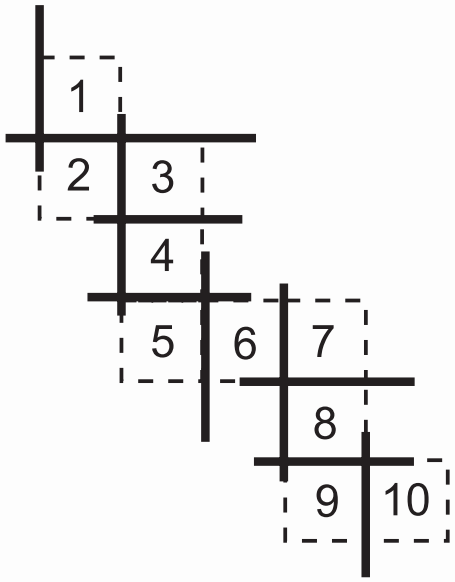
SGS2.2a: Manipulates, compares, sketches and names two-dimensional shapes and describes their features

CMIT reference

Count Me Into Space: Orientation and motion: pattern and dynamic imagery strategies

How?

Provide each pair of students with a small cardboard rectangle and a piece of paper. The first student draws a line (say 5 cm long) on the paper. The second student places one side of the rectangle on the line and traces around the other three sides of the rectangle. The first student then draws another line along one edge of the rectangle. The second student must flip the rectangle over the new line and draw the rectangle in its new position. Continue the process until the rectangle finishes in a nominated location on the page, e.g. bottom right corner.



Why?

Students need to explore shapes to help them move from restricted or fixed images of shapes to concept images that focus on properties that make up the shape.

Woolly designs

Where are they now?

The student recognises shapes in different orientations and proportions and checks by physical manipulation of materials.

Where to next?

The student is able to generate a variety of static visual images of a shape in different orientations.

Syllabus outcomes

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

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

CMIT reference

Count Me Into Space: Orientation and motion: pattern and dynamic imagery strategies

BLM

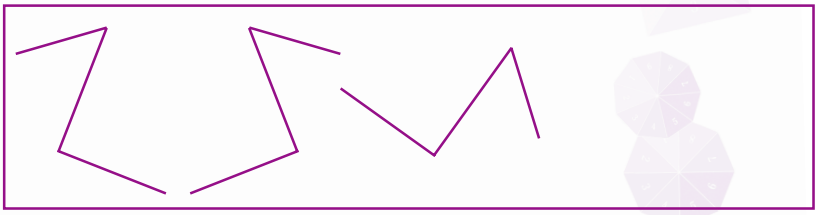
Knotty problems, page 162

How?

Have the students make a length of finger knitting. (Students may already have made their finger knitting during a previous activity *Knotty problems* page 110. Instructions for finger knitting are included in the BLM section.) Instruct the students to fold a piece of paper in half and glue the wool onto one side. Discuss the types of lines that could be made with the wool. When dry, the students then draw the reflection of the design on the other side of the paper to create a symmetrical design. Have the students continue to add patterns and lines to continue the design, ensuring that it remains symmetrical.

Variation

Use some of the finger knitting, say a 20 cm length, to make a line design and glue the design onto a long strip of paper. Students then imagine the design has moved by flipping or turning and draw the design in its new orientation. Repeat the process and draw the result. Have the students explain their drawings.



Why?

Students need to explore shapes to help them move from restricted or fixed images of shapes to concept images that focus on properties that make up the shape.

Recognising angles in shapes

Where are they now?

Students can recognise angles in shapes through physical manipulation.

Where to next?

Students are able to recognise more than one angle in shapes and describe these angles.

TP

Instruct the students to trace each type of angle in a different colour.

Syllabus outcomes

SGS2.2b: Identifies, compares and describes angles in practical situations

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

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

CMIT reference

Count Me Into Space: Part-whole relationships: pictorial imagery

BLM

Recognising angles in shapes, page 165

Recognising angles in shapes, page 166

How?

Prepare a worksheet for each student showing various 2-dimensional shapes and a set of cards displaying drawings of different angles. Place the angle cards in a pile face down. In turns, the students select a card from the pile and show it to the group. Each student in the group then demonstrates which shapes contain the same angle as the one on the card by tracing over the angles within the shapes on the worksheet. Have the students then compare their solutions. The students may check by placing the angle onto the shapes.

Variation

Prepare the angle cards on OHT acetate. The students could then place them on top of the worksheet to verify their solutions.

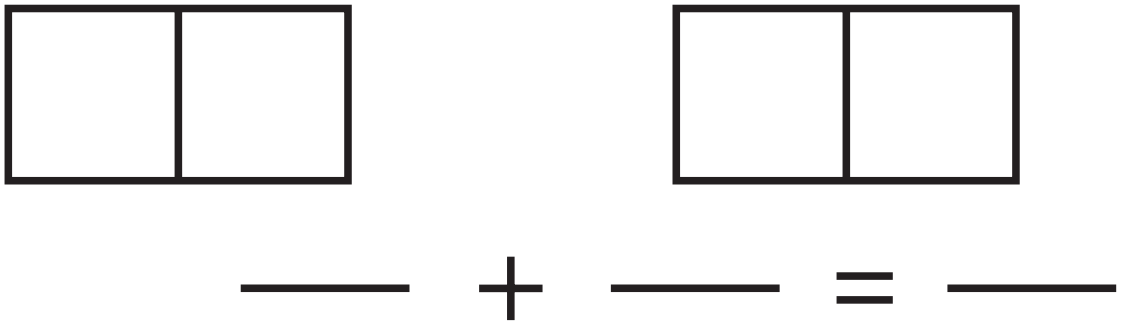
Use a set of pattern blocks instead of the shapes worksheet.

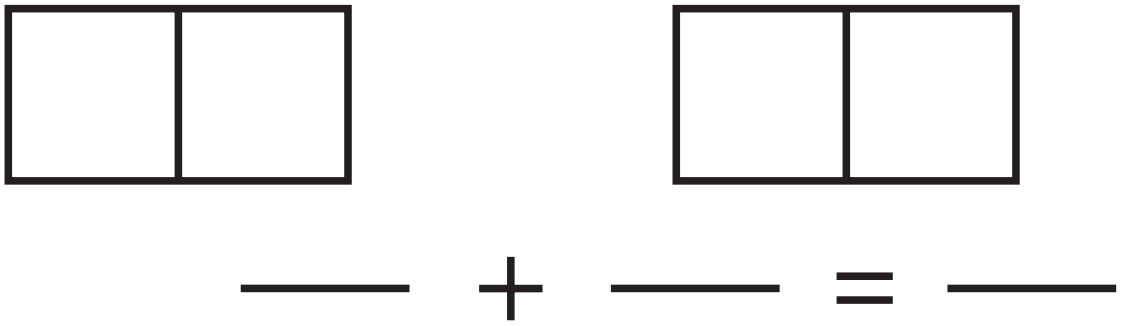
Why?

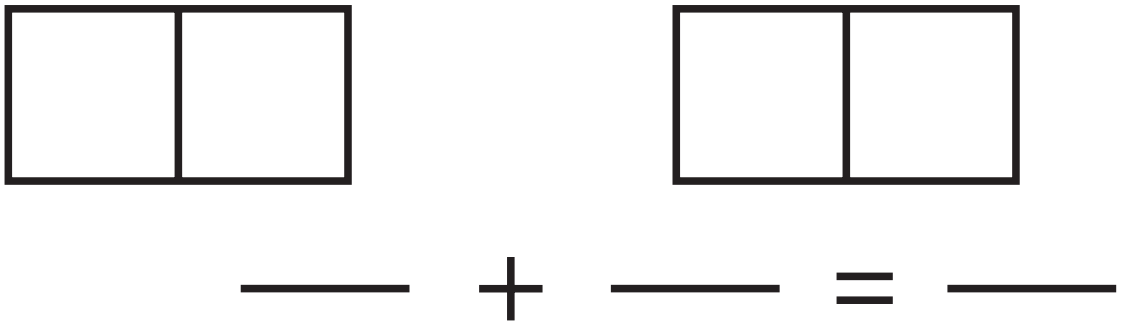
Students need to be able to identify and describe angles in a range of situations.

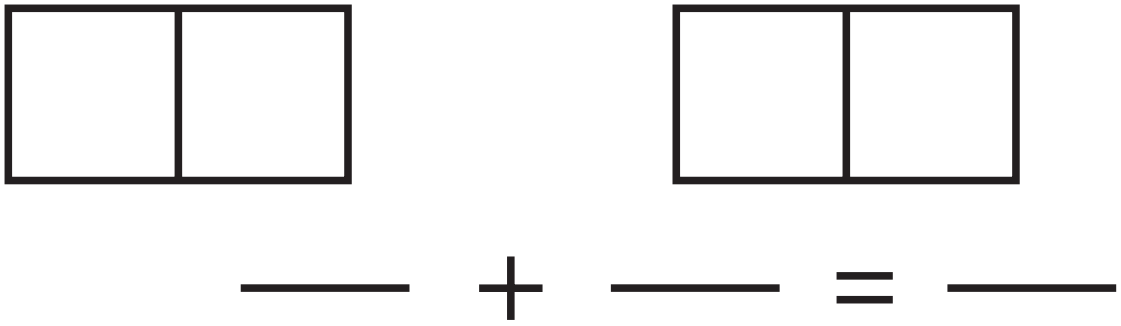
Counting by ones blackline masters

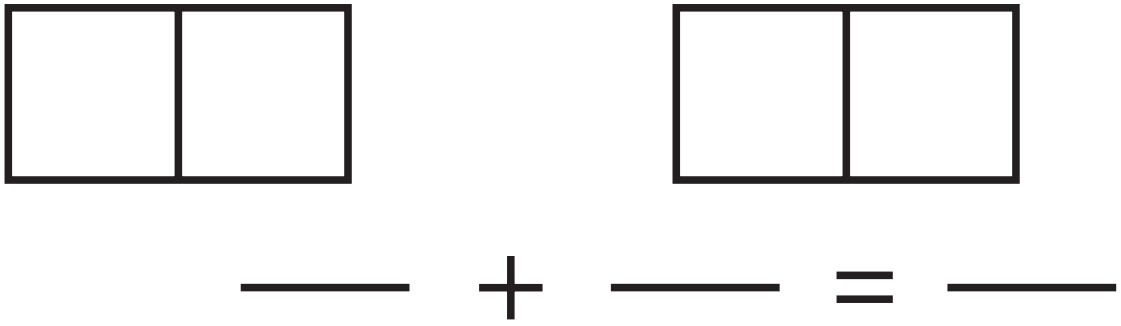
Domino adding pairs



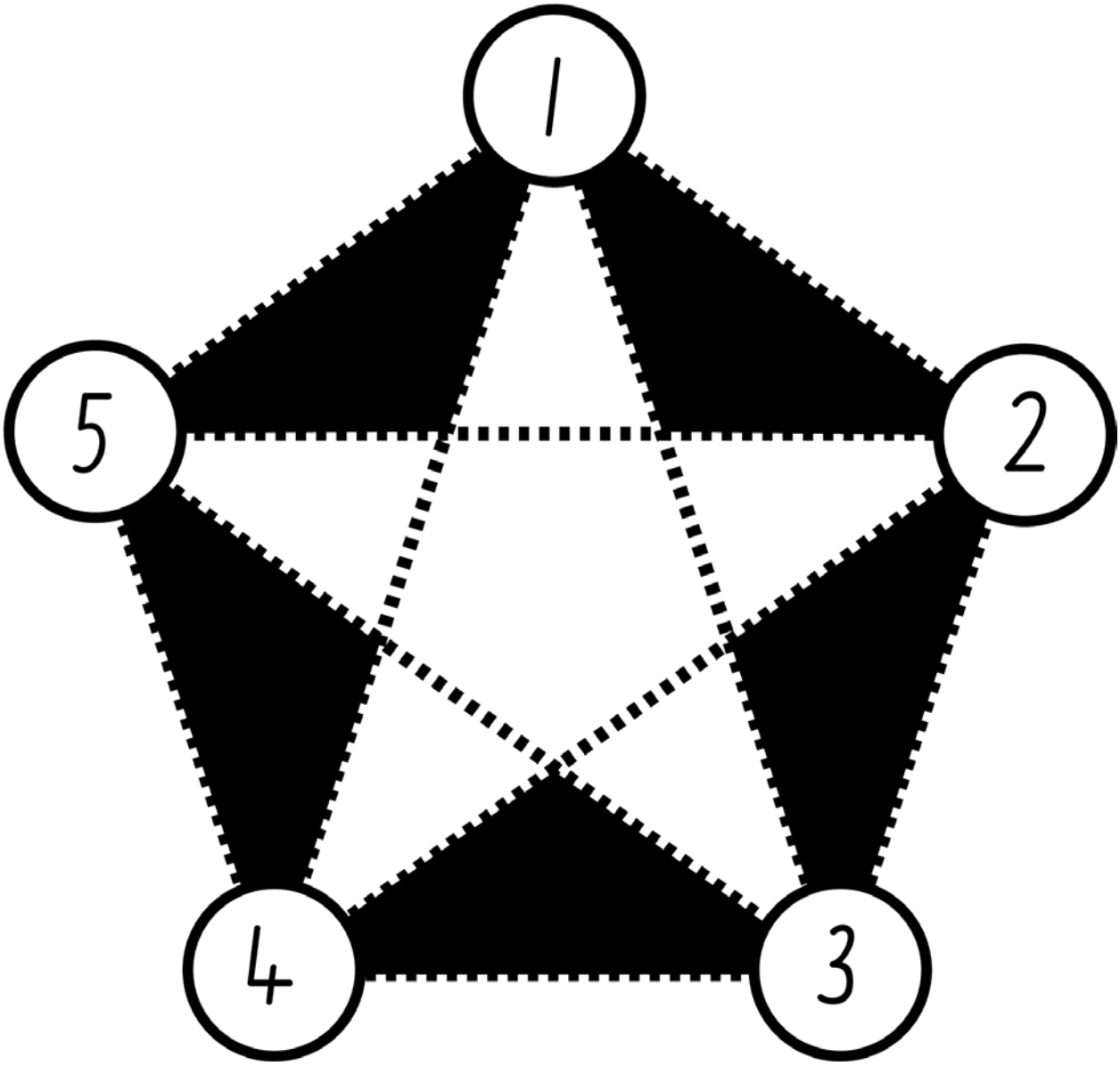




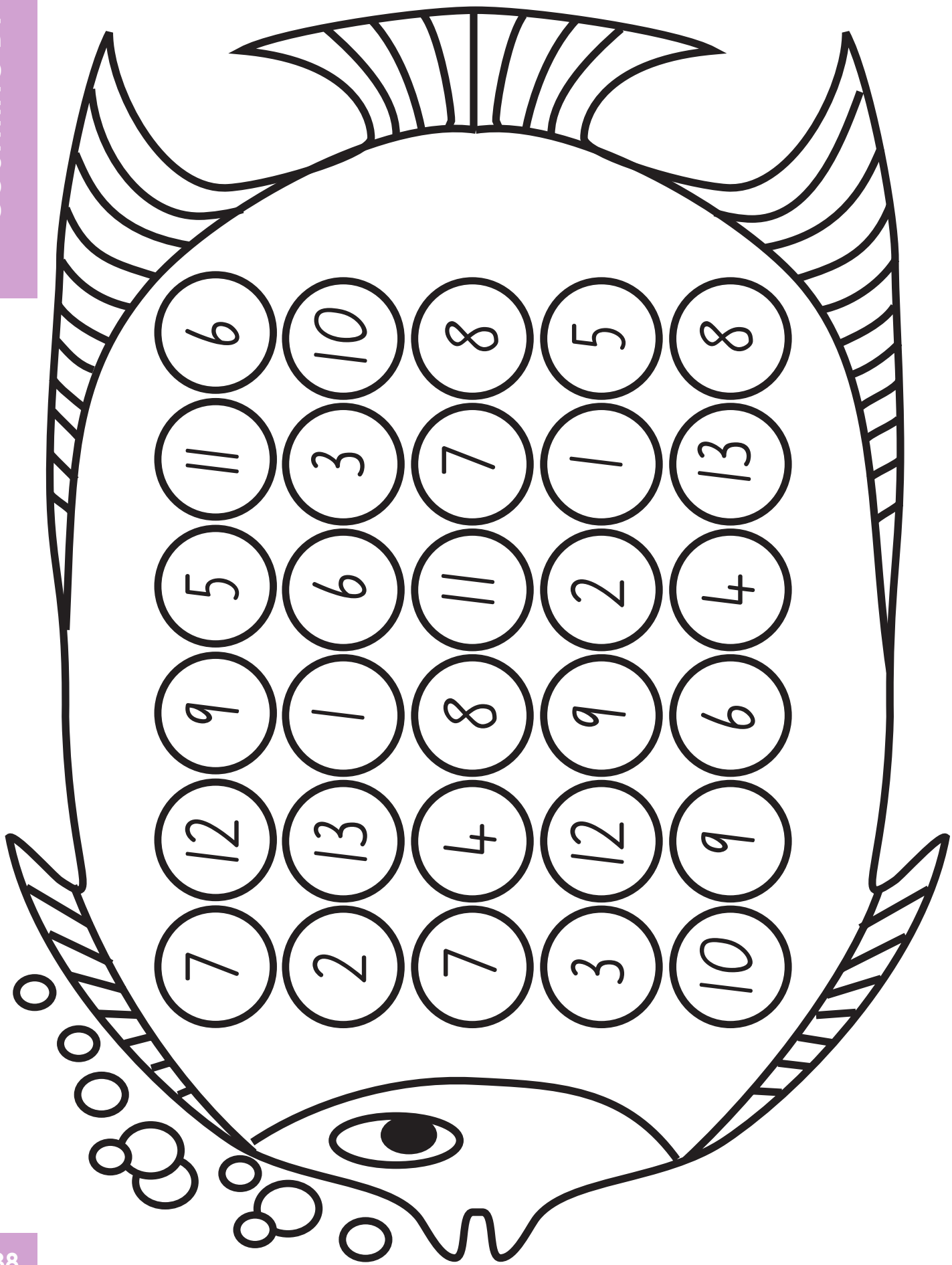




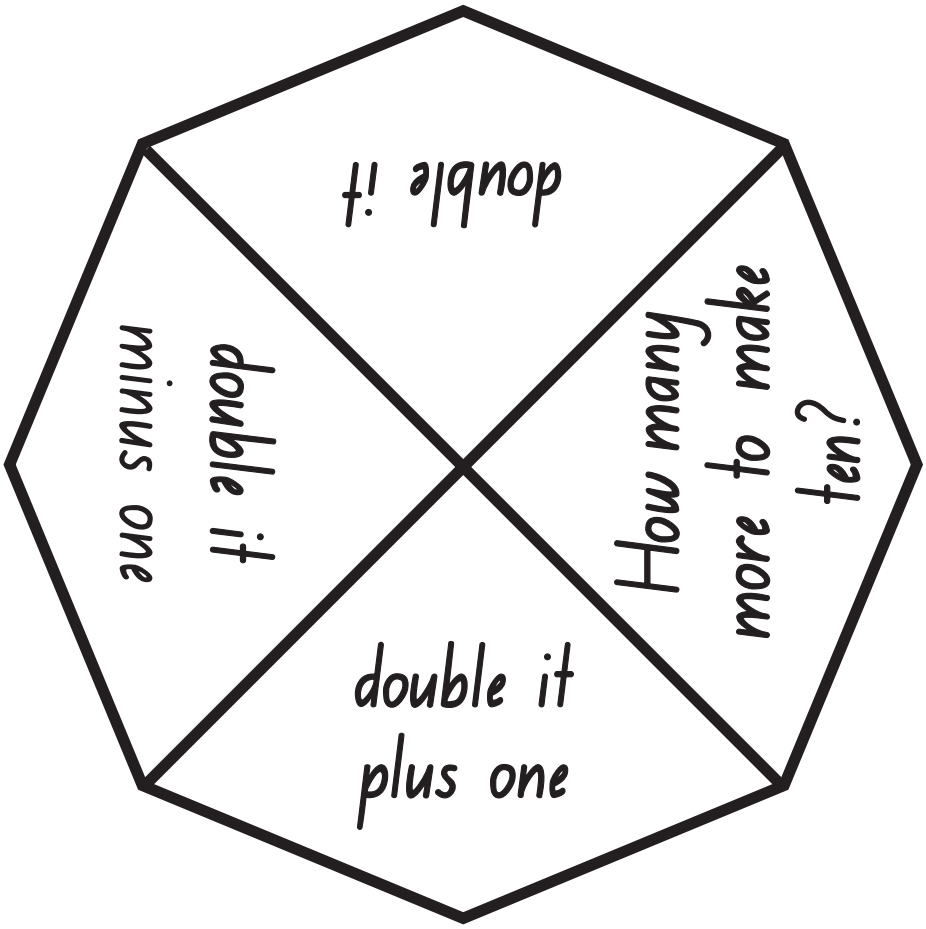
Addition star



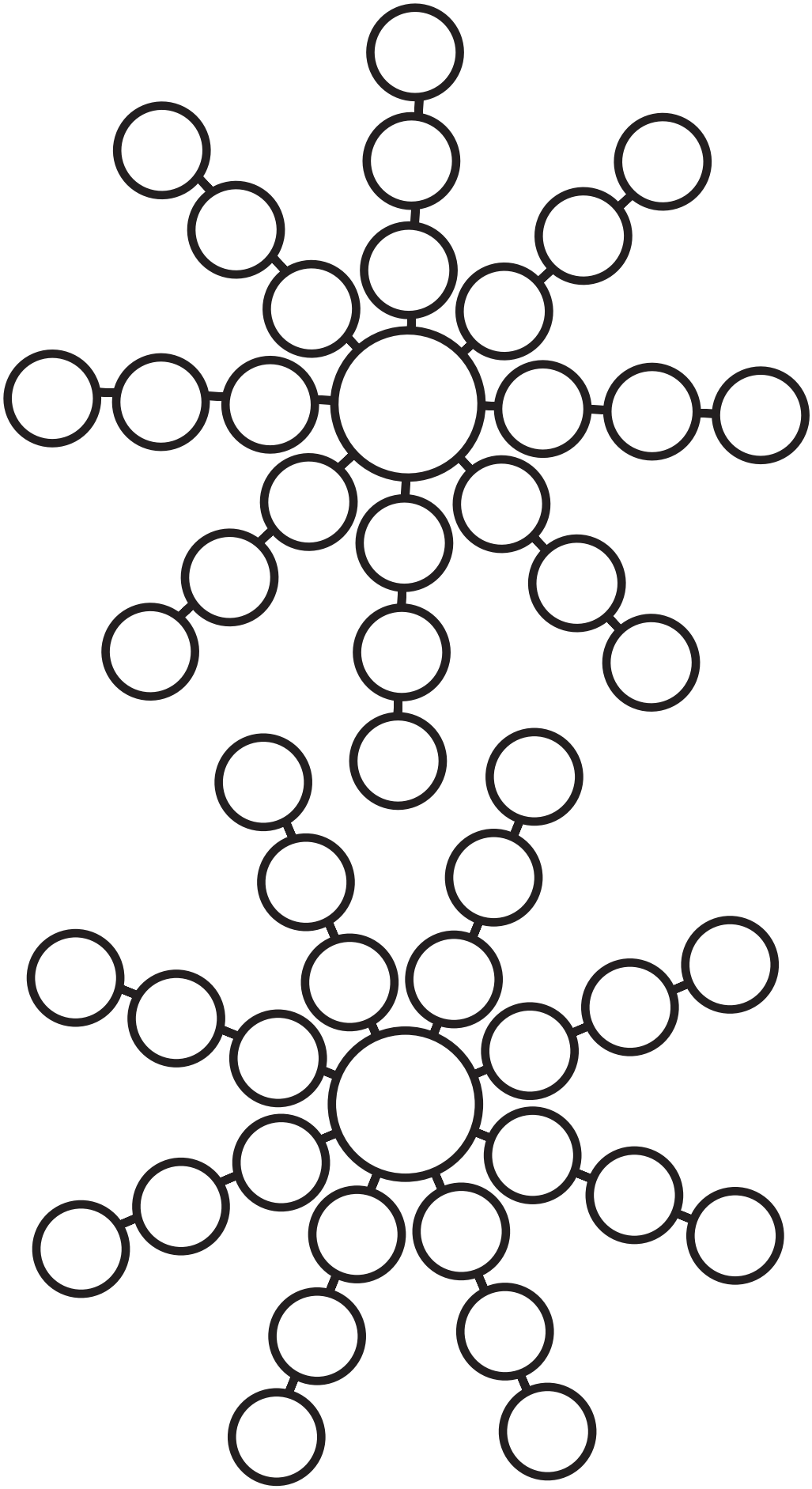
Brainy fish



Brainy fish spinner



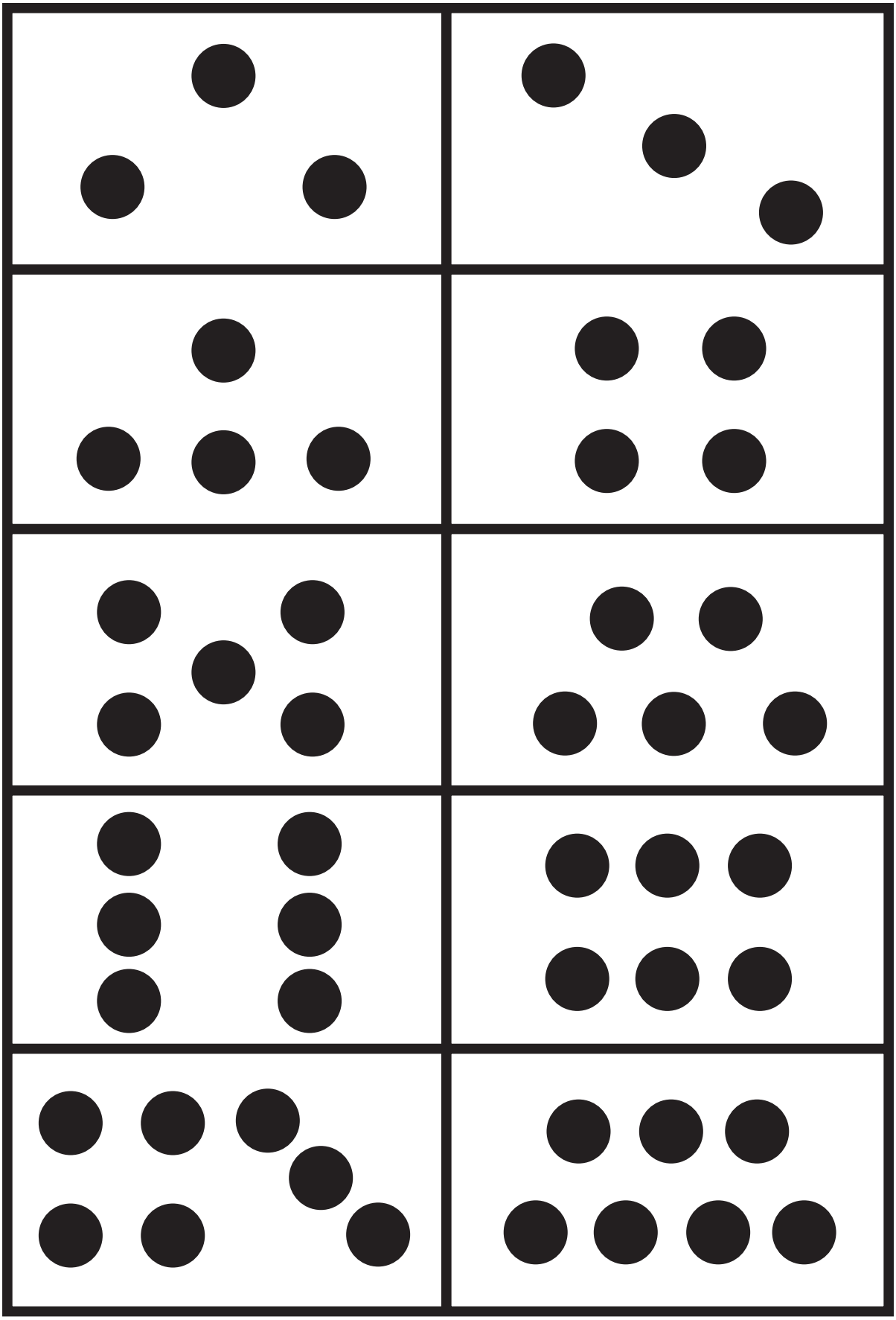
Addition wheel pairs



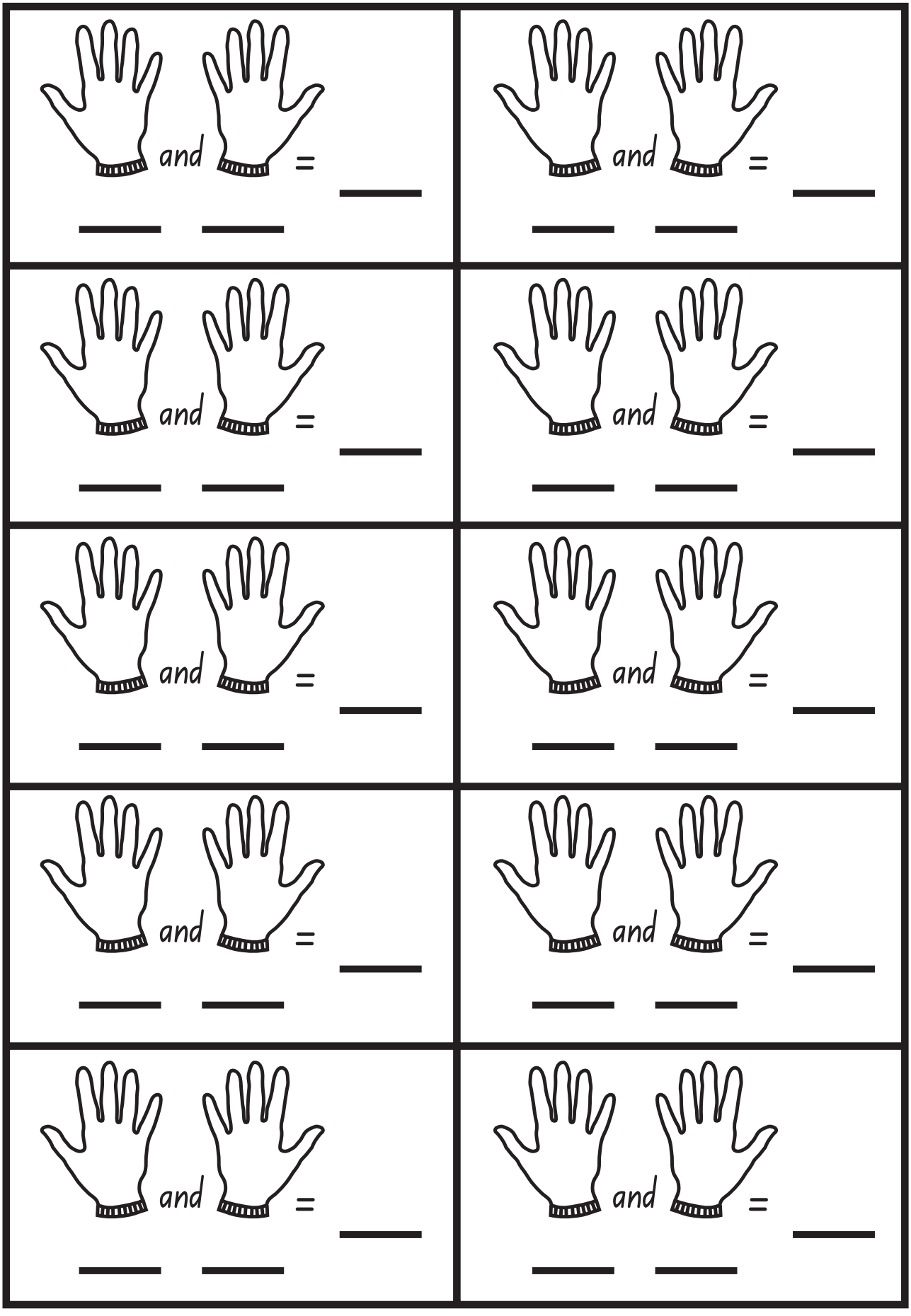
Counter play

4	3	8
9	5	1
2	7	6

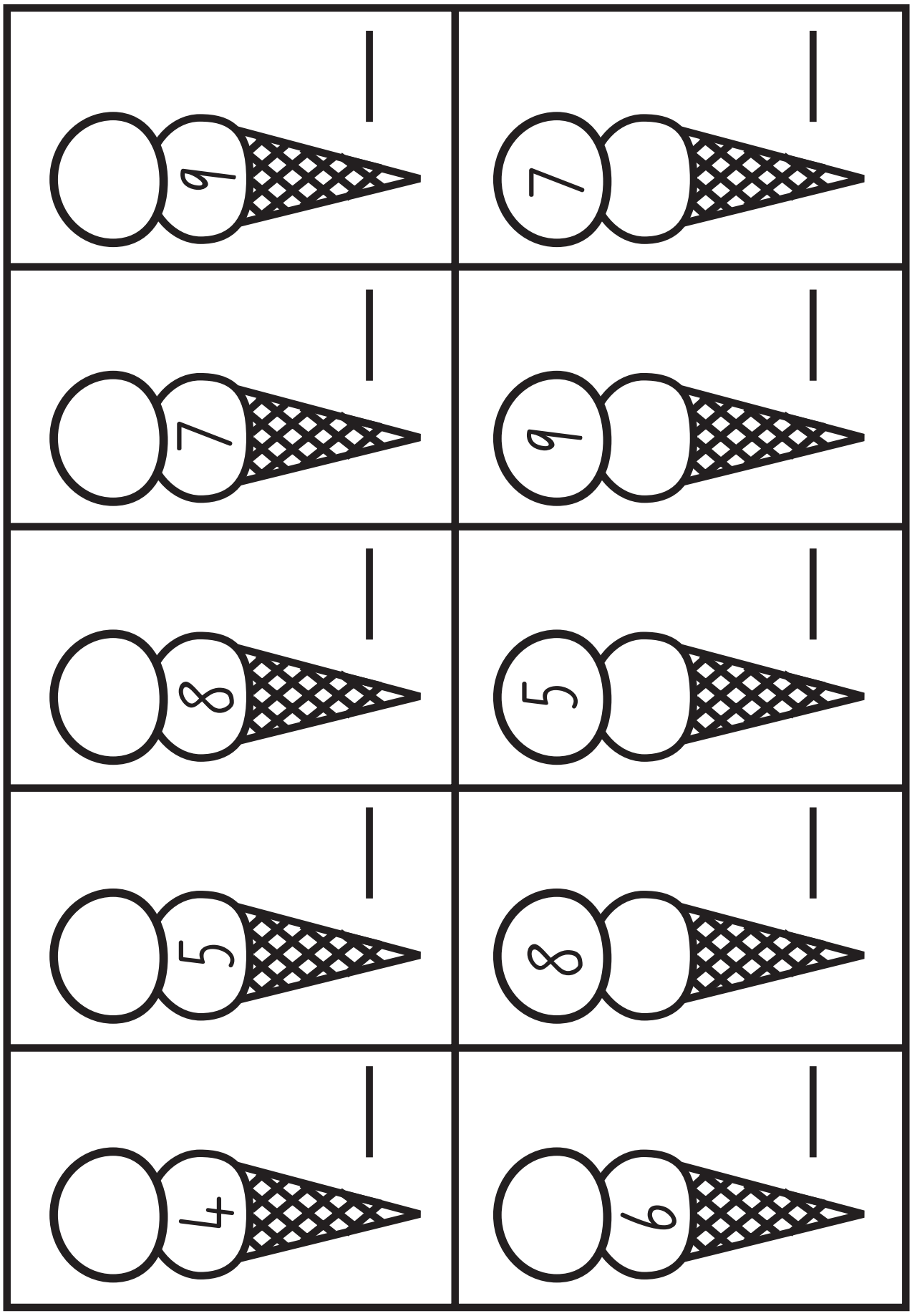
Copy that



Bunches of five



Double scoops



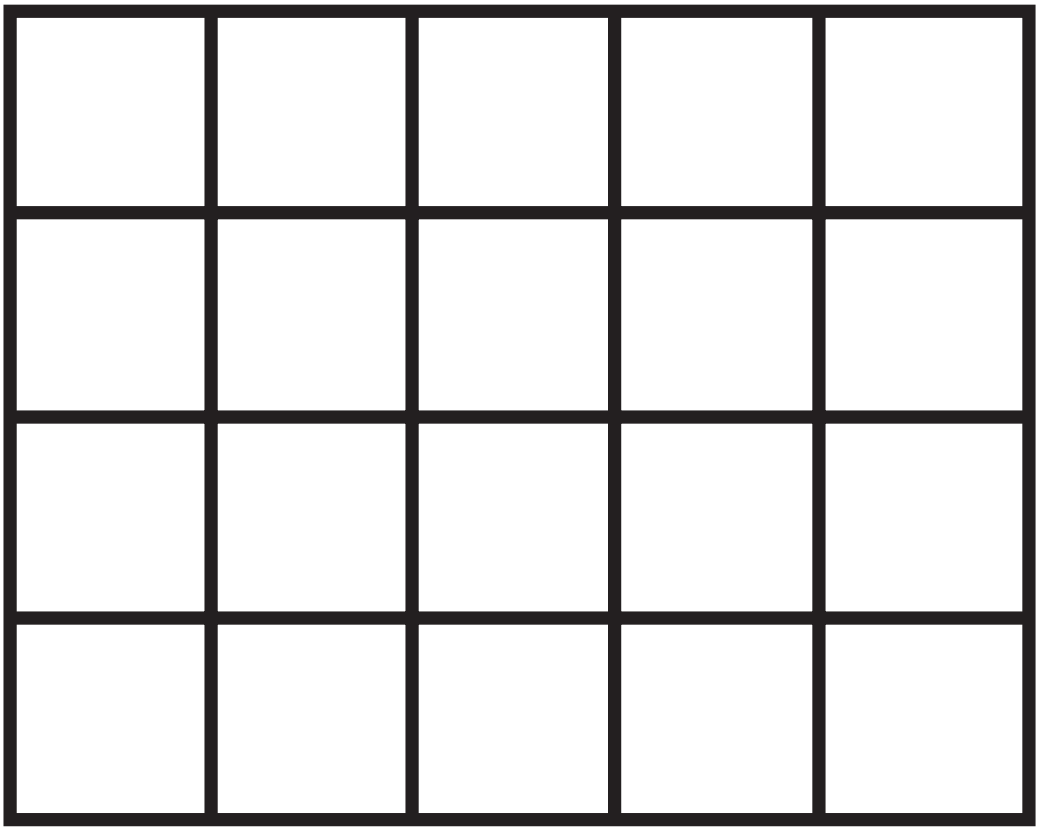
"Make ten" grids

1	6	9	2	9
9	8	3	10	4
5	7	4	9	2
6	6	7	10	5
3	8	8	3	1

7	1	2	5	4
4	10	6	8	1
7	7	6	3	2
6	8	9	5	3
5	9	10	5	8

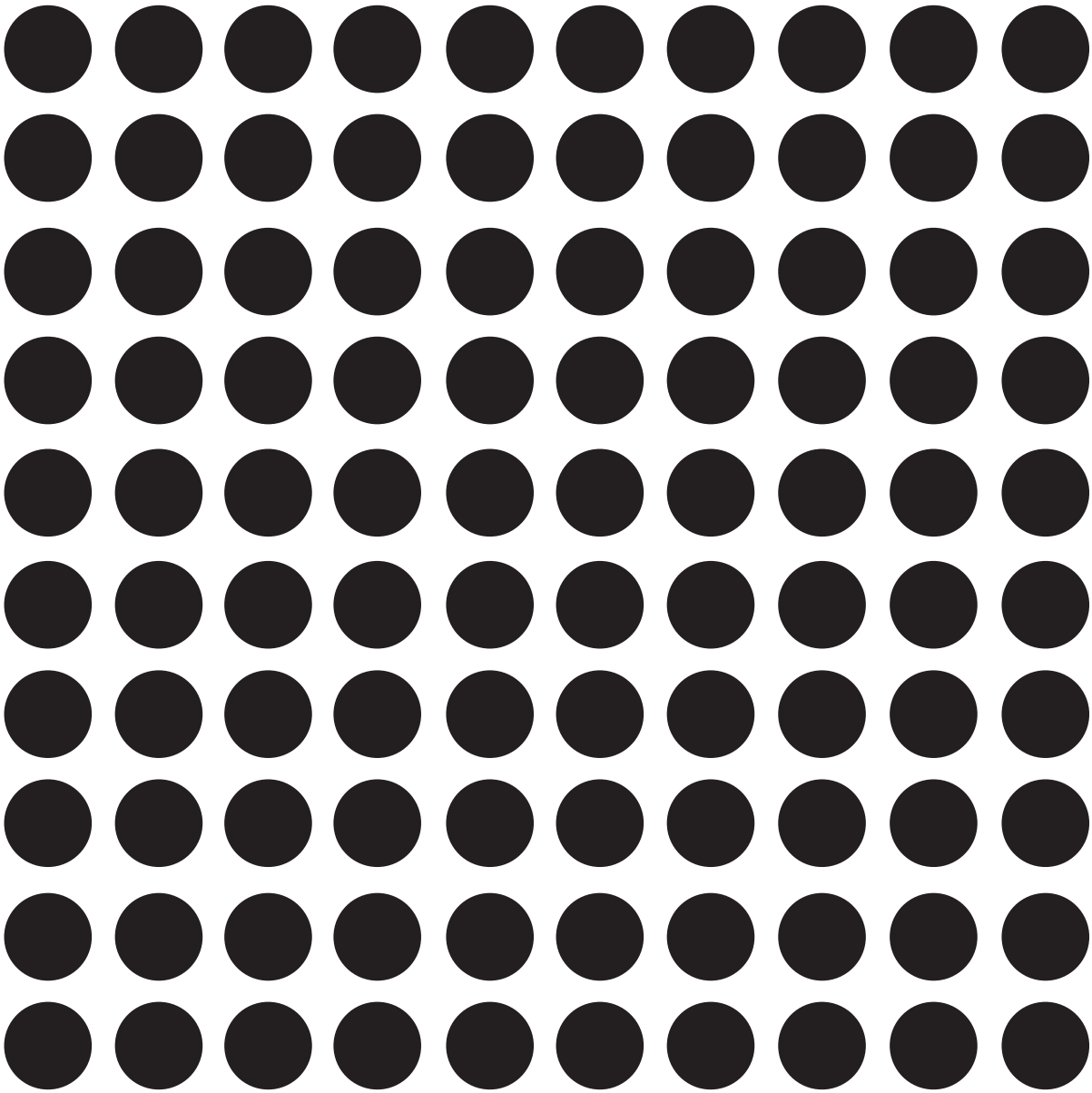
1	2	3	4	5
10	1	9	7	6
3	2	5	6	10
4	3	4	5	8
5	6	7	8	9

Number draughts

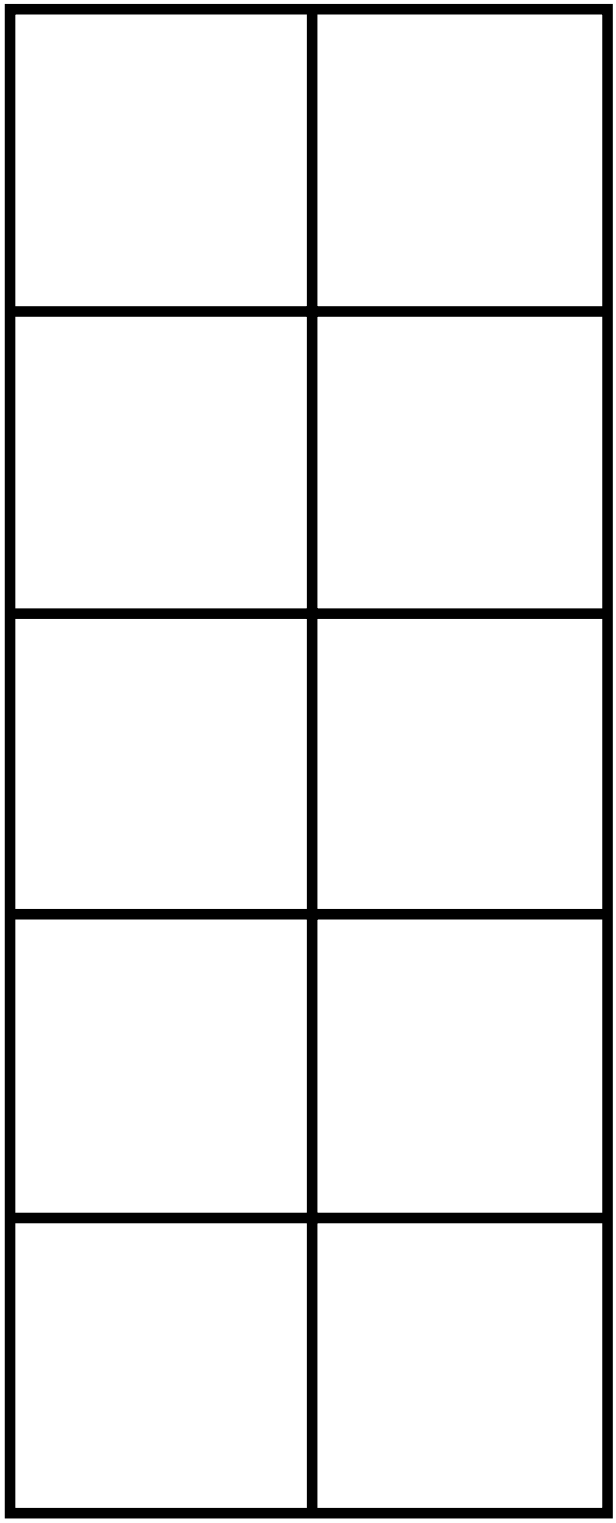


1	2	3	4	5
6	7	8	9	11
12	13	14	15	16
17	18	19	20	★

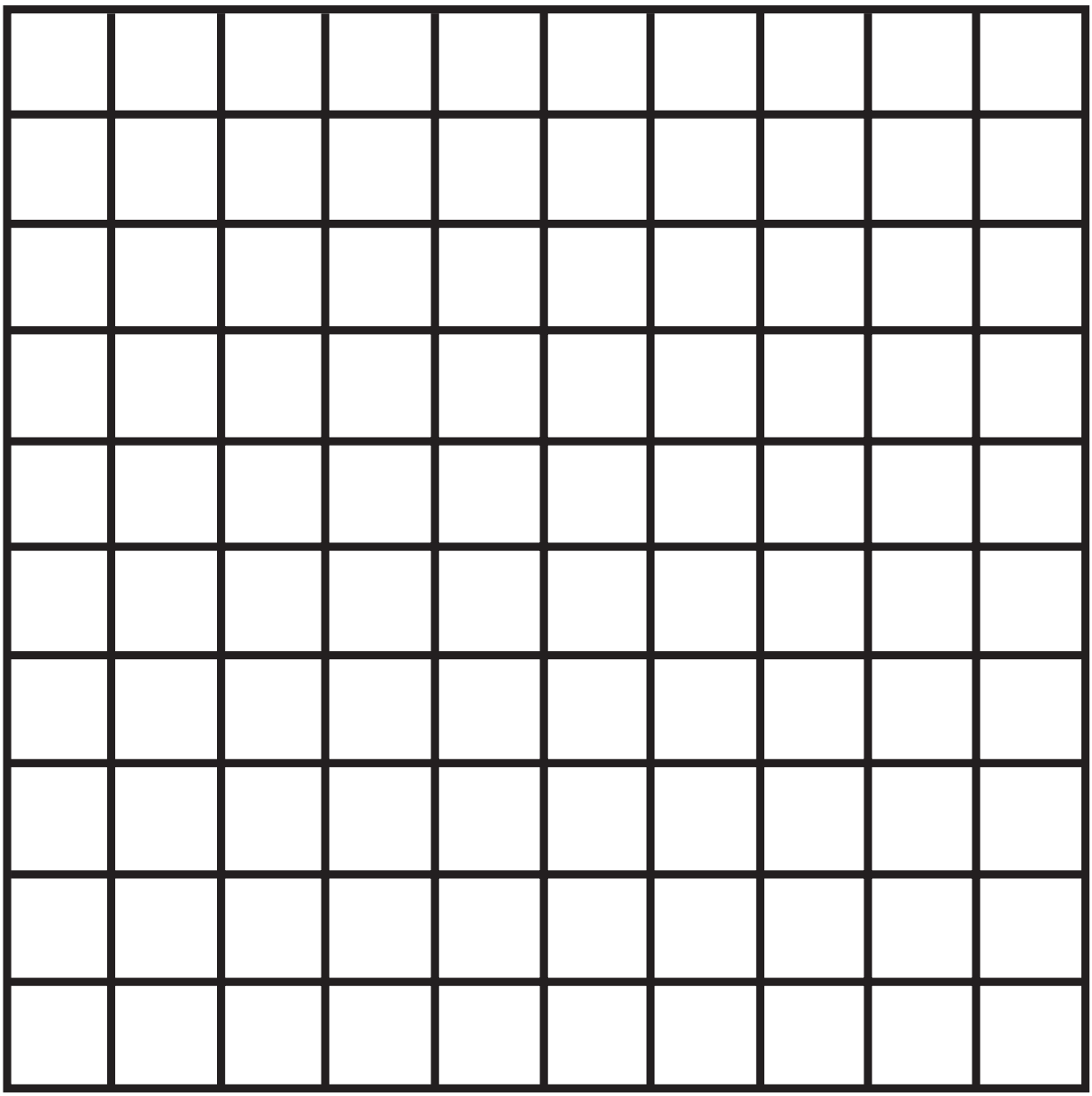
Dizzy dots



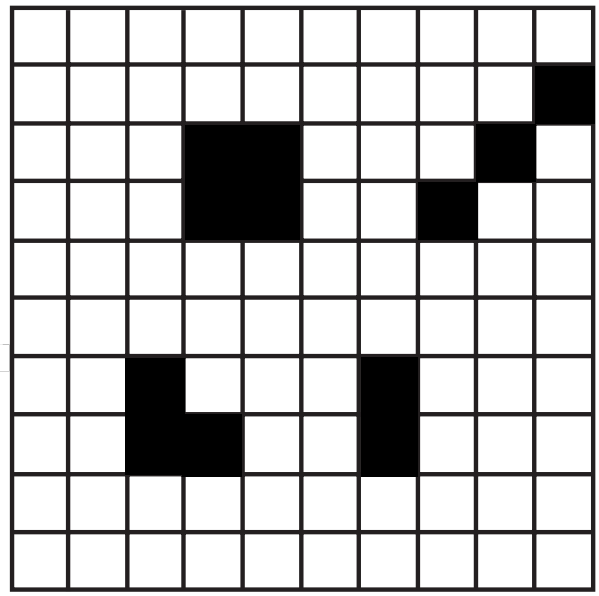
Ten-frame



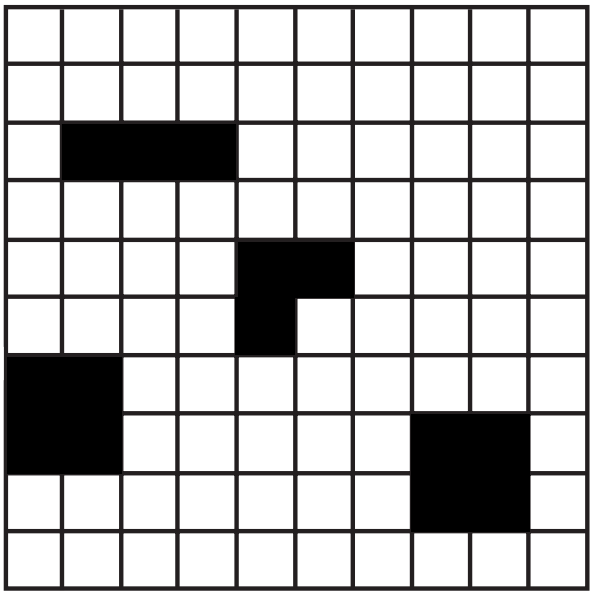
Hundred chart windows

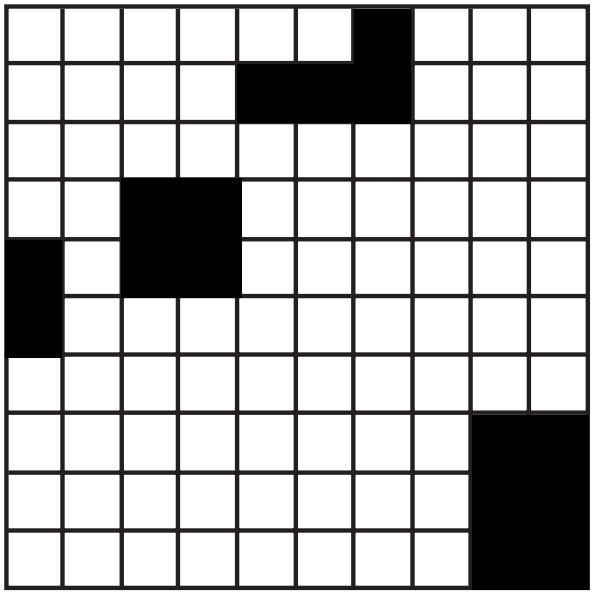


Hundred chart windows sample



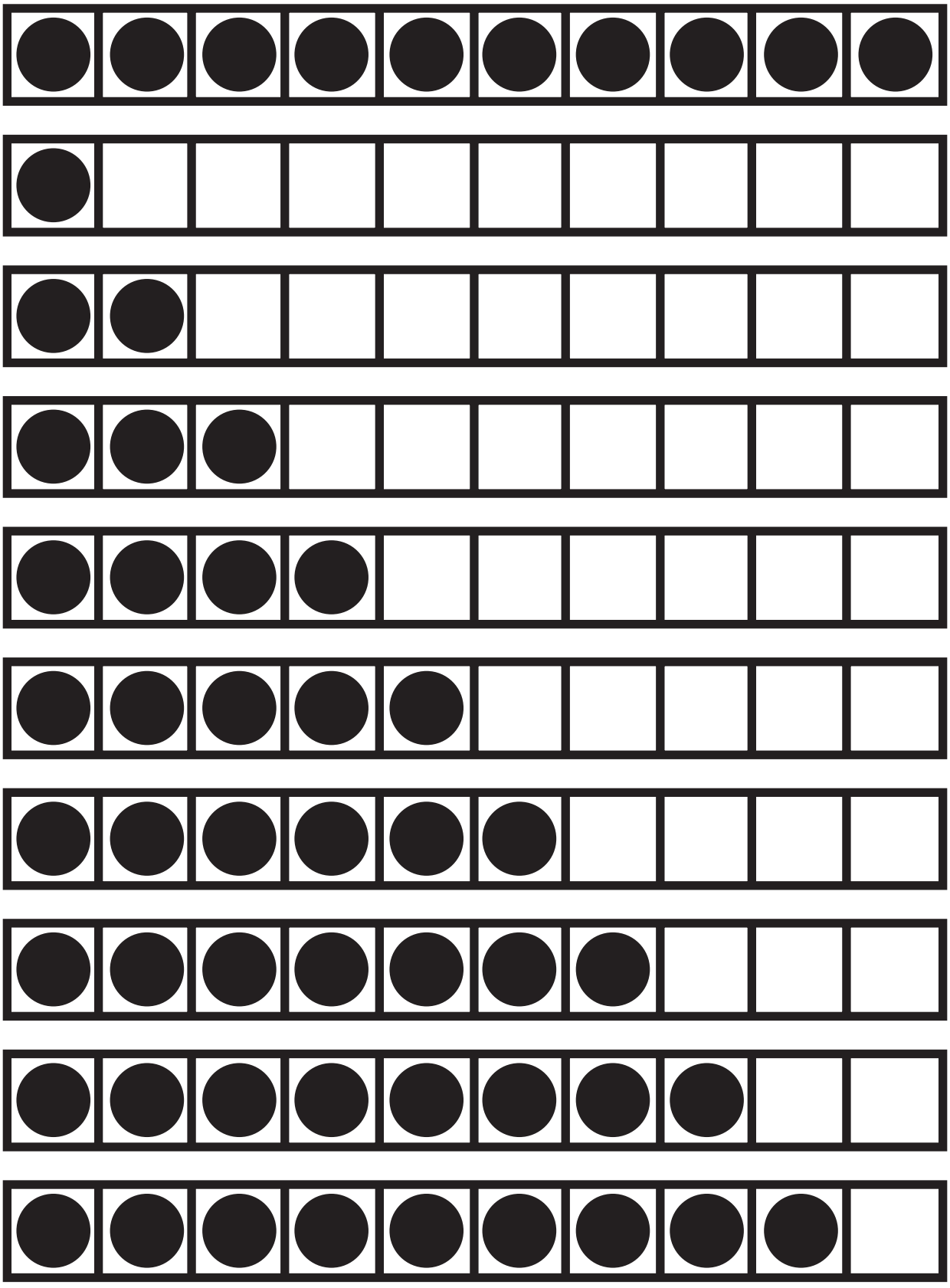
Using all three cards will reveal all numbers on the hundred chart.





Cut out black areas on cards.

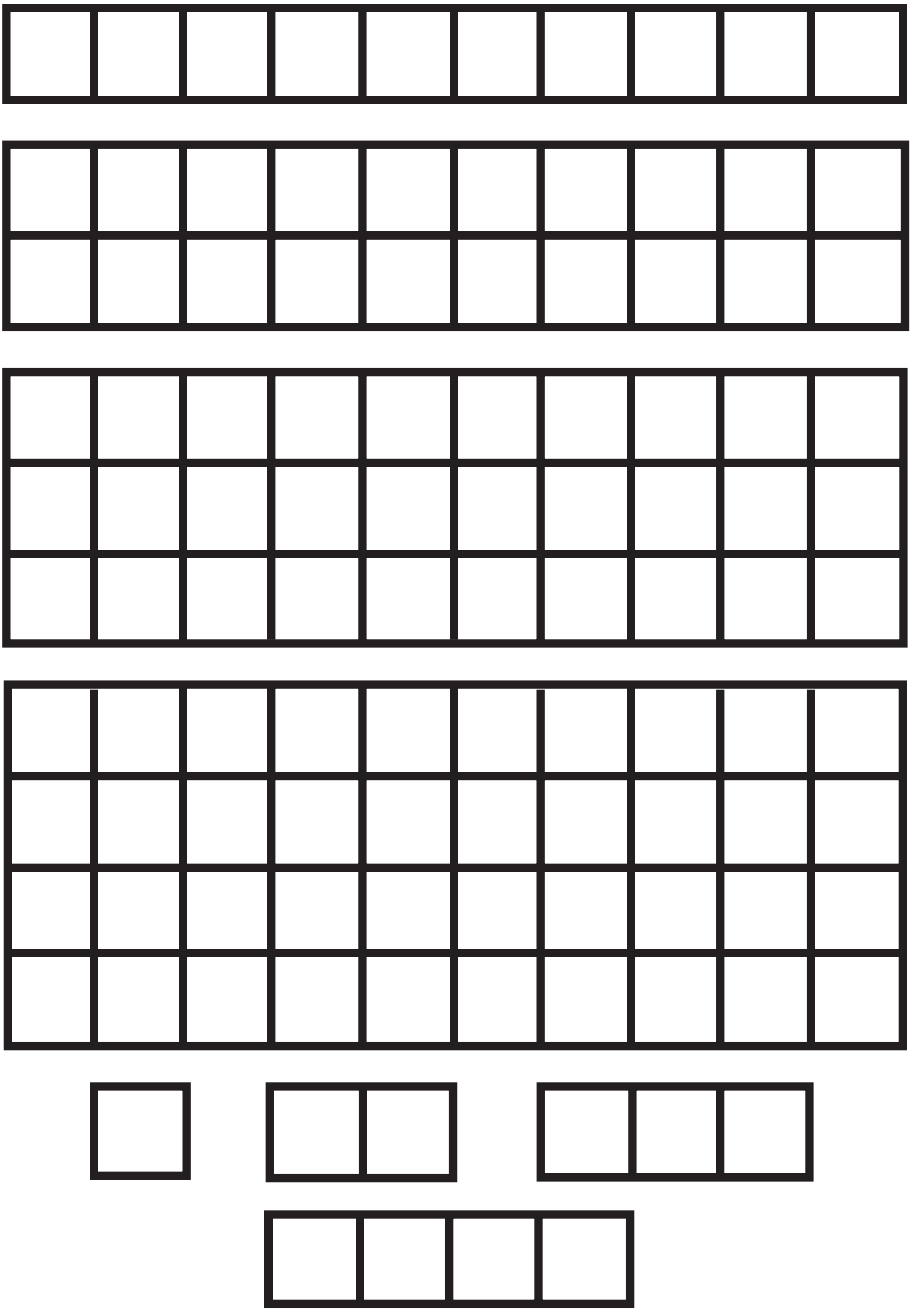
Eggsactly



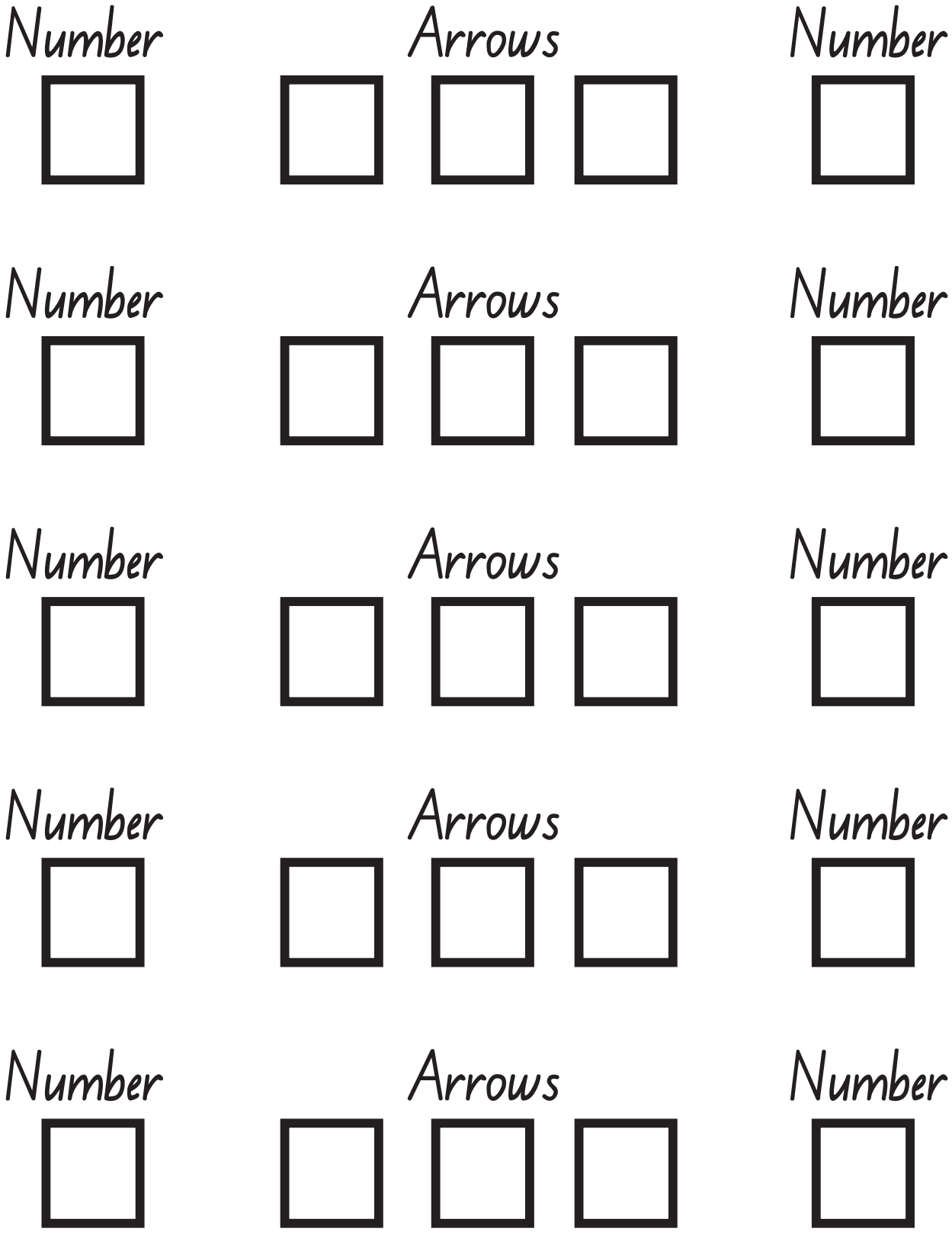
Hundred chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

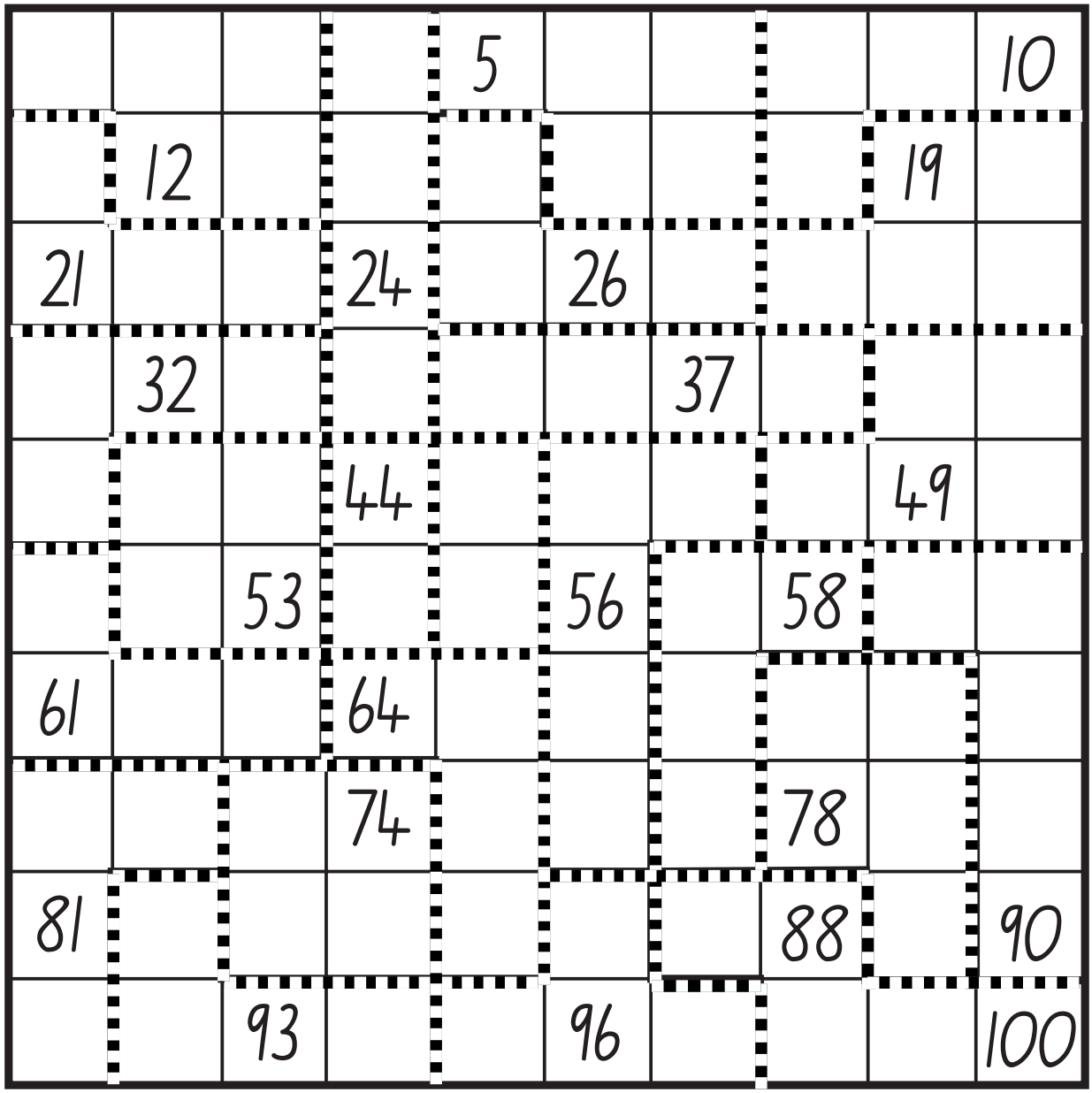
Cover-up strips



Tracks

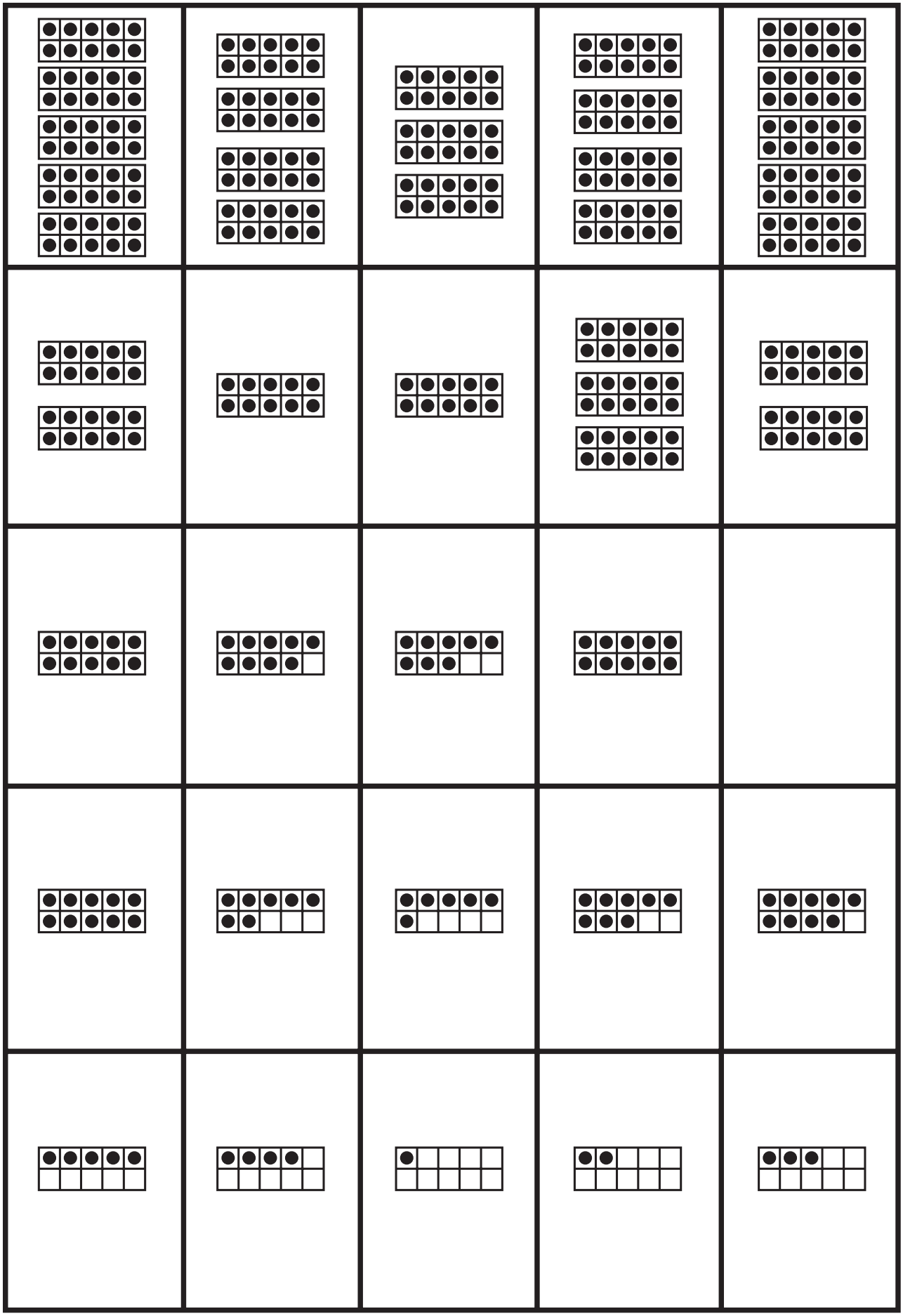

Number
Arrows
Number
Number
Arrows
Number
Number
Arrows
Number
Number
Arrows
Number
Number
Arrows
Number

Hundred chart jigsaw

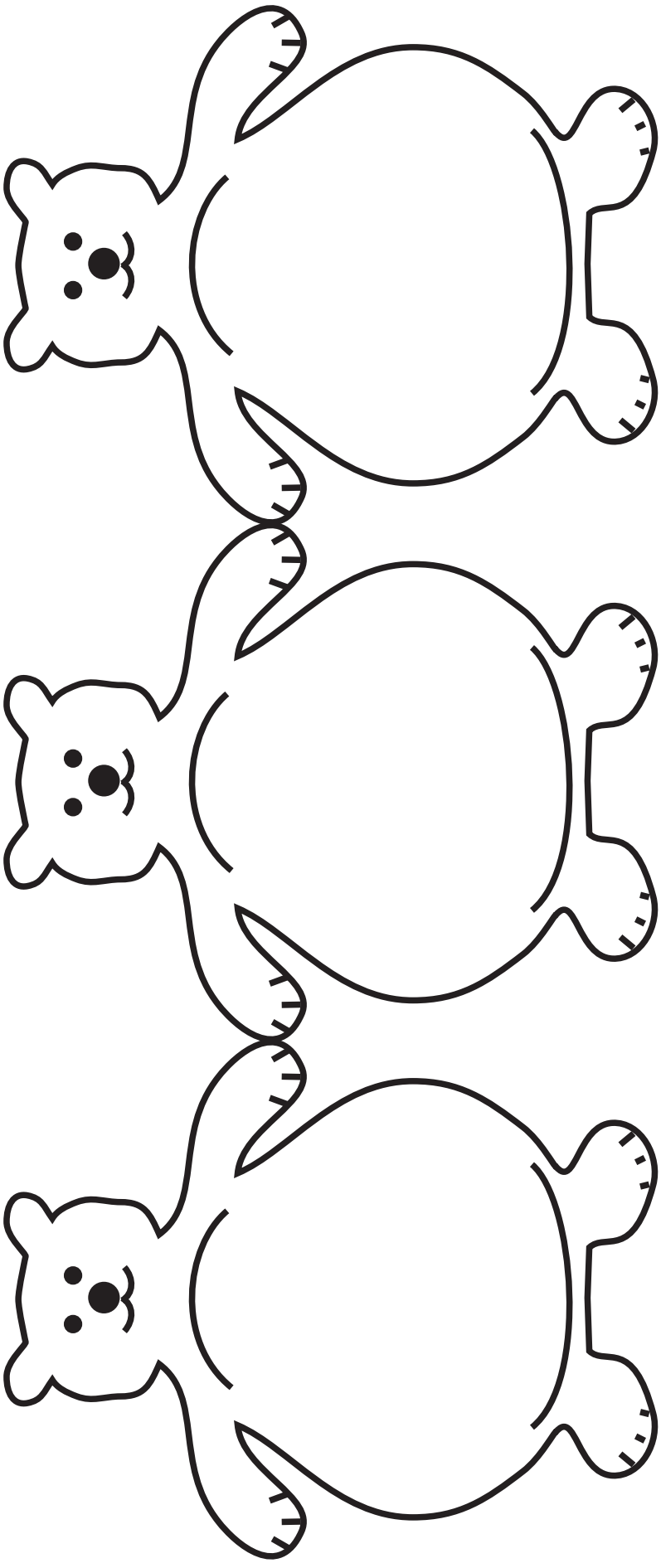


* Cut along broken lines

Teeny tiny ten-frames



Teddy tummies



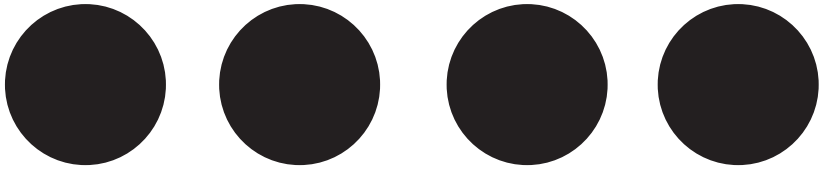
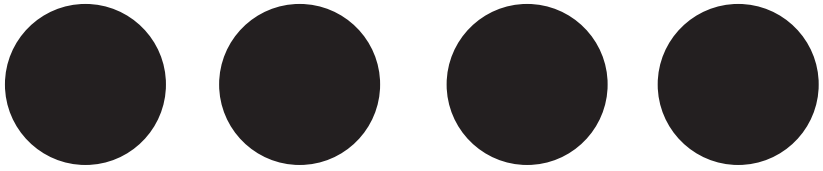
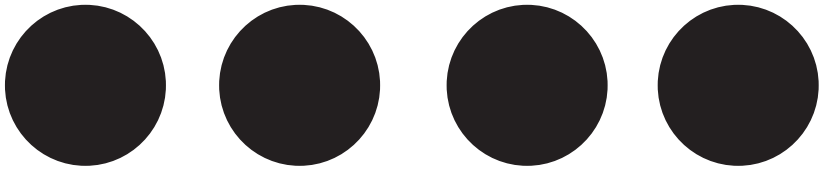
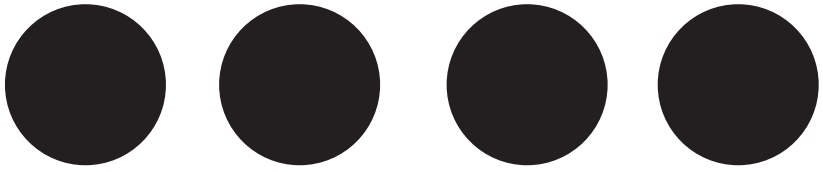
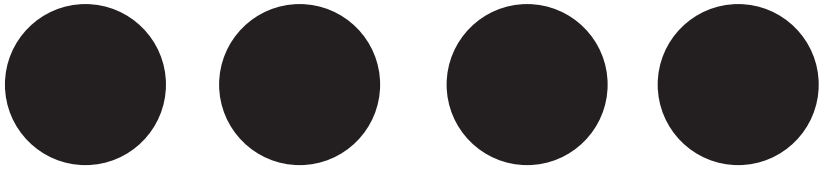
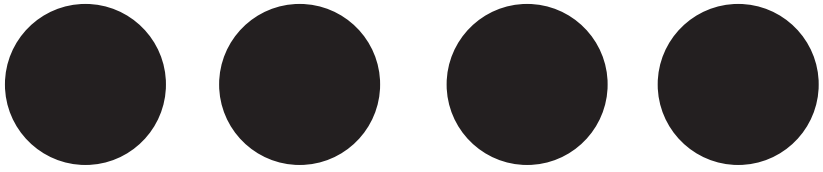
Counter grab

Estimate	How many groups of___?	How many remainders?	Total
	___groups of___		
	___groups of___		
	___groups of___		
	___groups of___		
	___groups of___		
	___groups of___		
	___groups of___		

Self-correcting arrays

Cut out this black section and discard

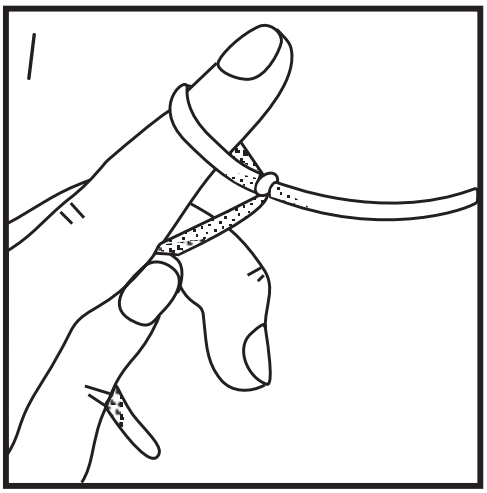
fold

1		4
2		8
3		12
4		16
5		20
6		24
7		28
8		32
9		36
10		40

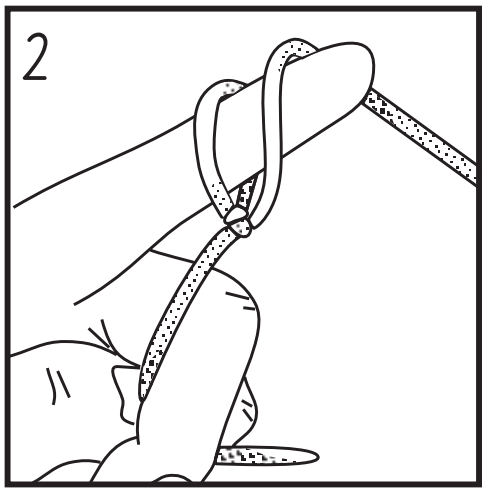
Four dice tally

4 to 14	15 to 24

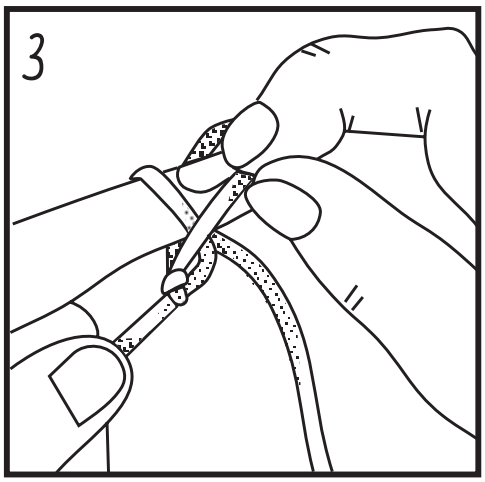
Knotty problems



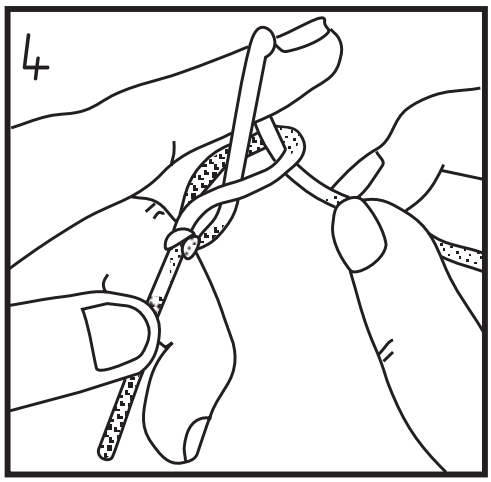
First, tie a loop of one end of your wool around your index finger and make a secure knot.



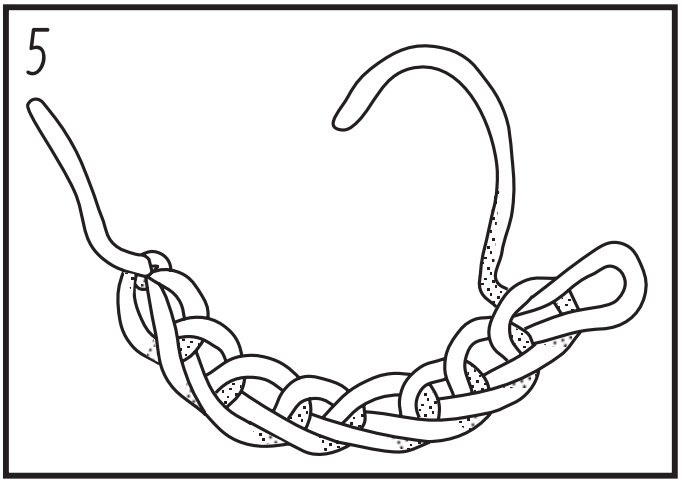
Then lift the longer part of your wool over your finger in front of this loop. Do not make a knot this time.



Lift the first, back loop up and forward over the front loop and drop it off your finger.

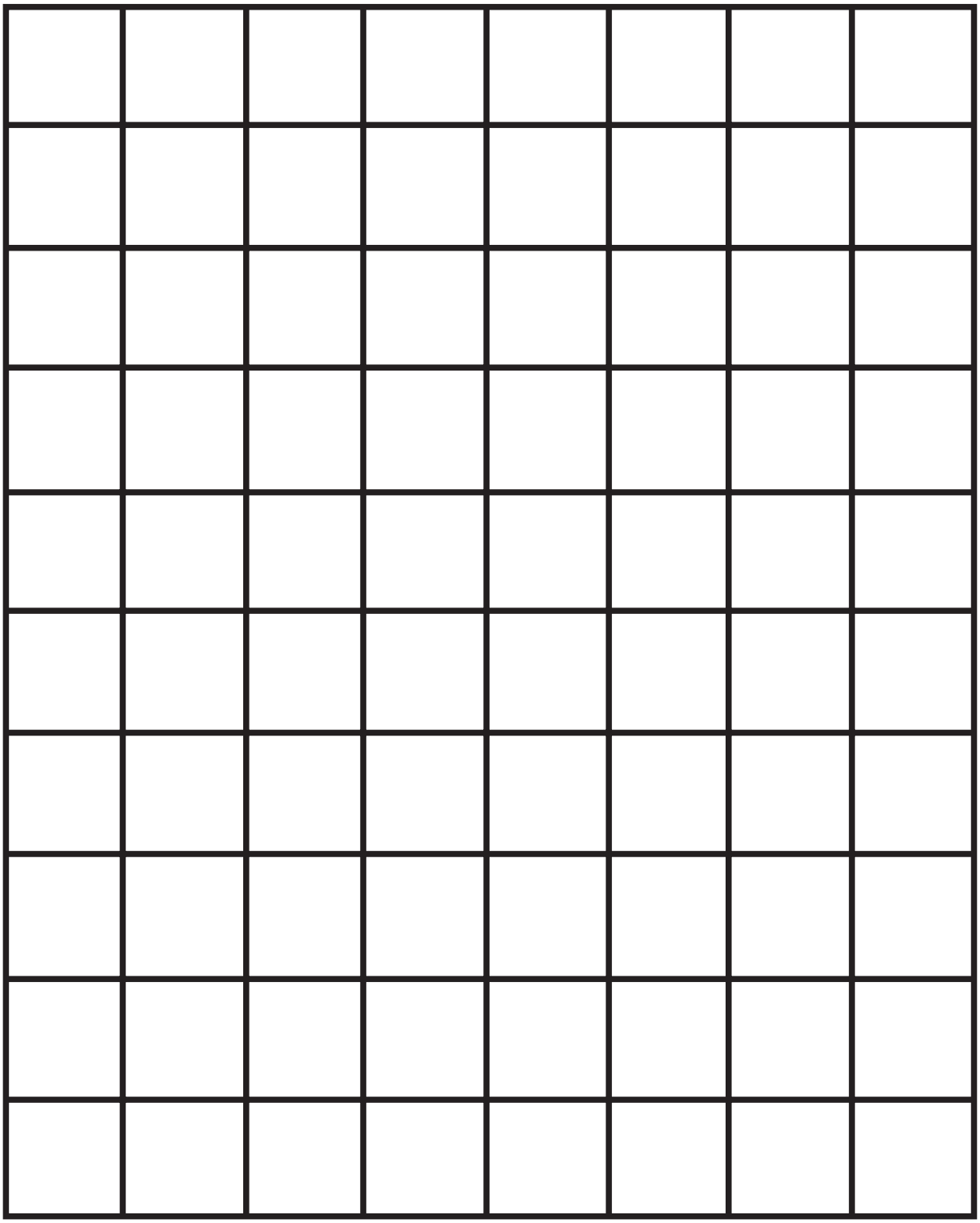


This makes your first knitted stitch. Pull your bottom short thread gently down to tighten the stitch.

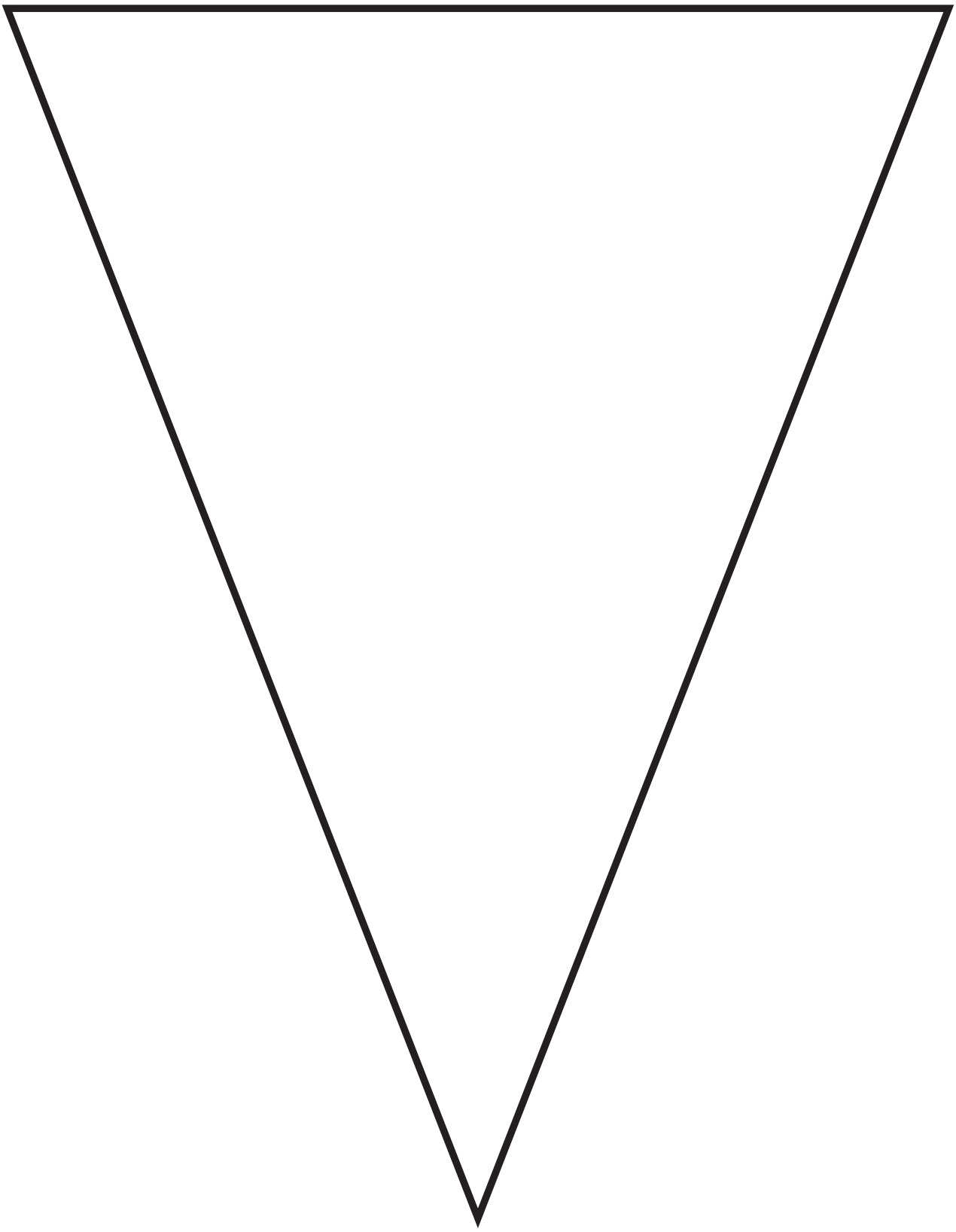


Lift more wool over in front of the loop you have left on your finger and lift the back loop over and off again. Repeat this until you have a long chain.

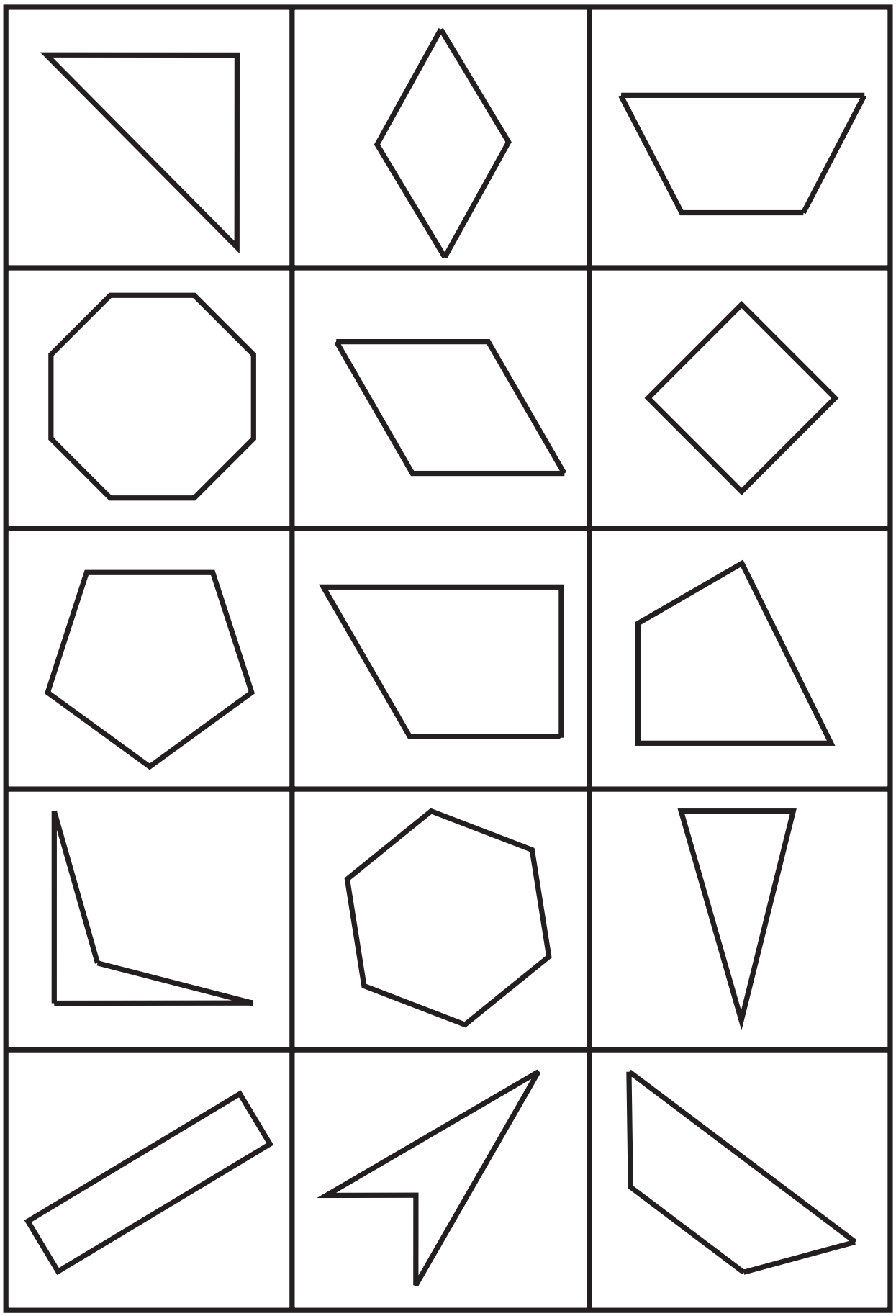
Using nets 1



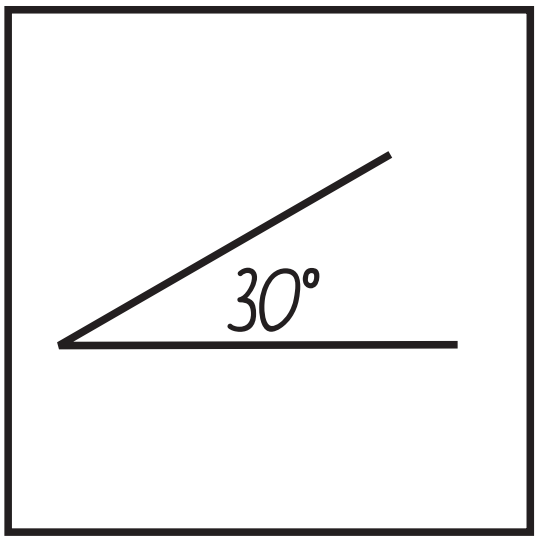
Create a triangle

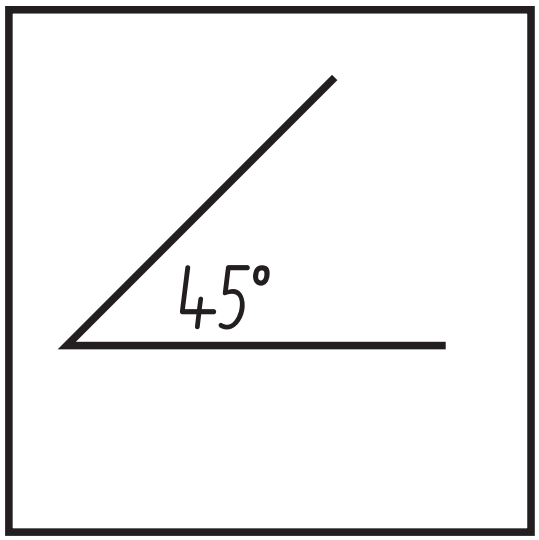


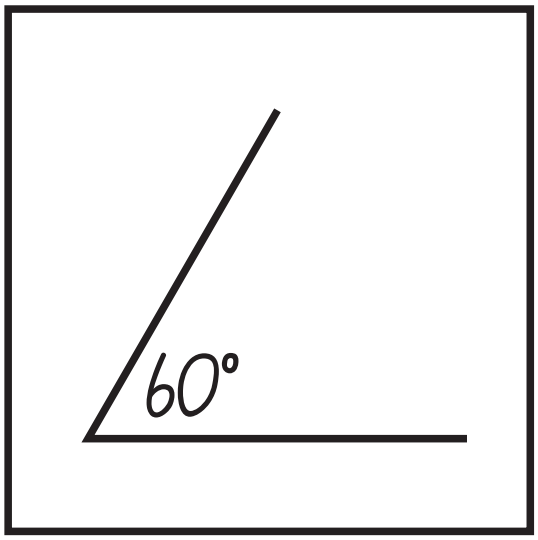
Recognising angles in shapes

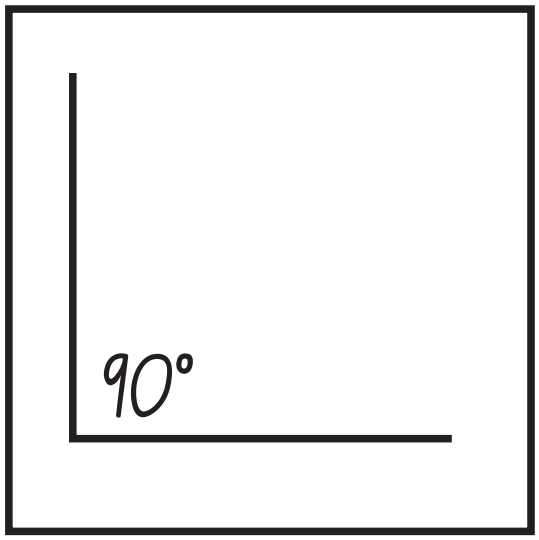


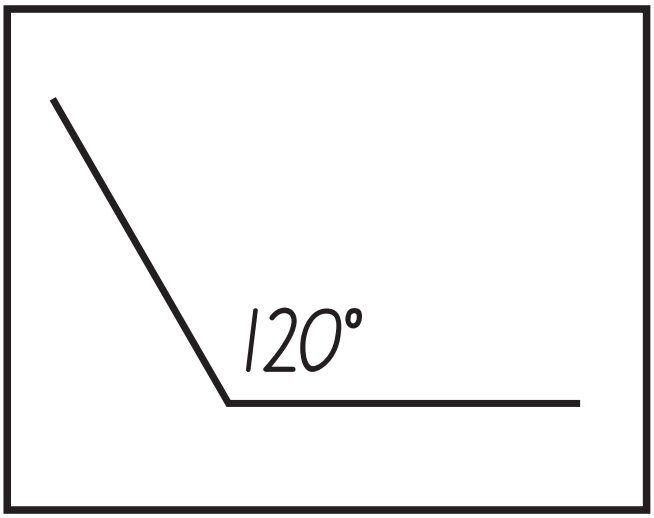
Recognising angles in shapes











Assessment tasks

Task	Student response	Assessment
T: *Here are nine counters.* Briefly display counters and then screen. T: *Here are four counters.* Briefly display counters and then screen. T: *How many counters are there altogether?*	Able to correctly find the total without the use of material or fingers to represent the counters.	Note the strategy the student uses to solve the task. Do they use a non-count-by-one strategy?
T: *Can you tell me two different numbers that add up to 19?*	Uses 10 and 9 as one combination or two non-standard combinations for 19.	Does the student need to calculate the answer for each combination or do they automatically recall the combinations?
T: *Start from 7 and count on by 10s. I'll tell you when to stop.*	Counts by tens from 7 to 107.	Is the student able to count forwards and backwards off the decade?
Present a pile of counters (more than 18) to the student. T: *Using these counters, make three groups with six in each group. How many counters are there altogether?*	Able to form equal groups. Determines the total.	Does the student count by ones or skip count to find the total?

Task	Student response	Assessment
Provide the student with a streamer 20cm long. T: *Find three objects that are more than 100 cm.*	Student uses the streamer to measure objects, marking the end of each measurement precisely to preserve size.	Does the student know that the lengths not the marks or spaces are counted?
Provide the students with a geoboard and rubber bands. T: *Make three different triangles with one side of each triangle the same length.*	Explains what is the same and what is different.	Does the student talk about angle size or lengths of sides?

Maths bites

Using numeral cards 0 – 30

- Using the numeral cards 1–20, randomly select a card and show it to the students. Ask the students how many more to make 20?

- Use the numeral cards to solve verbal problems. For example, "I have 20 marbles. My sister has…(hold up a selected numeral card). How many altogether?"

- Distribute the numeral cards to the students. Ask the students to sequence themselves (without speaking) from highest to lowest.

- Place two sets of numeral cards face down on the floor. Ensure each set is on a different coloured card. Invite students to select two cards from one of the sets. The student with the highest total wins.

- Construct a set of numeral cards in the range 1–10. Invite a student to select five cards and display the cards to the class. Ask the students to use any of the selected numbers to make "12" by adding, subtracting, dividing or multiplying. Replace the cards used, shuffle the deck and repeat the activity.

- This activity could be used with two students playing or with two teams, each person in the team taking a turn. Place the numeral cards from 0–21 on the floor in sequence. The first player starts at "0" and adds on 1, 2 or 3 and states the total. The second player then adds on 1, 2 or 3 to the total and states the accumulated total. The players continue to take turns adding 1, 2 or 3 until one player reaches 21. This player or team is the winner. After playing for a few turns discuss with the students if there are any strategies you could use to try and win.

- Display the numeral cards 0–10. Ask the students to select the pairs that equal ten.

- Use numeral cards 0–10. Select a card from the pile and ask students to subtract the number from ten and state the answer. Alternatively, ask the students to add the number to ten. Vary the activity by asking students to subtract or add to 20.

- Place the numeral cards from 1–30 face down on the floor, in random order, in three rows of ten. Tell the students these are the numbers 1–30, but they are not in correct sequence. Ask a student to select a card and turn it face up. Have the student read the numeral and then place it where it should go in the correct sequence. The next student is handed the card that has been replaced and finds its correct location. Encourage the students to count up or down by tens and forwards and backwards by ones. Alternatively, ask the students to sequence the cards from highest to lowest.

- Hand out numeral cards in the range 1–30 to the students. Instruct the students to organise themselves (without speaking) into two rows, one of sequenced odd numbers and the other sequenced even numbers. The first row completed correctly is the winner.

- Hand out numeral cards for multiples of three. Instruct the students to organise themselves (without speaking) into the correct counting sequence. Repeat with other multiples.