At home materials

Reception Weeks 7—10

Depth of numbers within 20

Using the at home materials

This pack contains seven activities to develop depth of understanding of numbers within 20.

Each day choose one of the activities to work on with your child, the activities do not need to be completed in order and you may want to play some of the games/activities more than once.

Many of the ideas and activities included require more than one player and therefore participation with an adult or sibling. Provide lots of opportunities to get children to use mathematical vocabulary and explain their reasoning and reveal their thinking.

Key Learning

Activity 1: To explore numbers, strategy and patterns within ten
Activity 2: To explore conservation of numbers
Activity 3: To apply knowledge of addition, subtraction and doubles
Activity 4: To apply knowledge of number, shape and measures in their surrounding environment.
Activity 5: To practise counting forwards and backwards from a number
Activity 6: To explore different ways of making ten
Activity 7: To recognise and extend a pattern

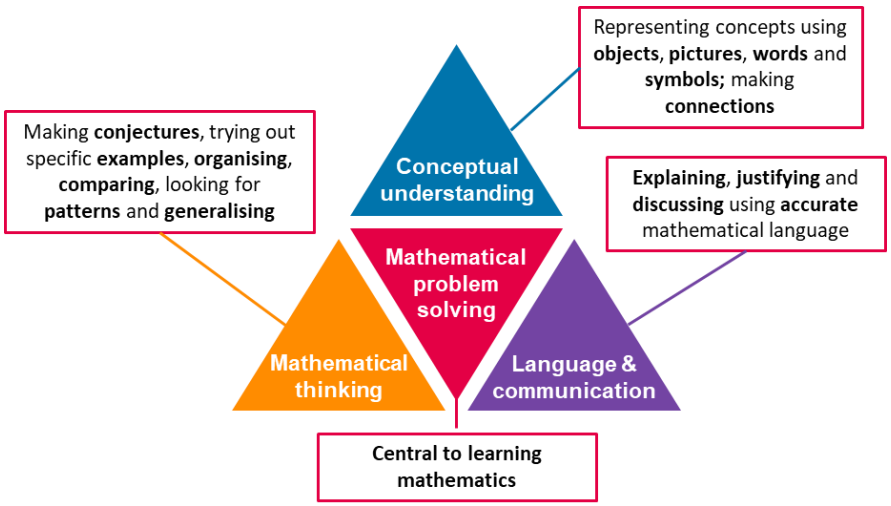
Printable resources can be found at the back of the pack.

Mathematics Mastery

Mathematics Mastery

What is 'Mastery'?

The 'mastery approach' to teaching mathematics is the underlying principle of Mathematics Mastery. Instead of learning mathematical procedures by rote, we want your child to build a deep understanding of concepts which will enable them to apply their learning in different situations. To achieve this we aim to develop **Conceptual Understanding, Mathematical Thinking** and **Language and Communication** (see diagram).



Success for all

At school we believe all pupils can achieve success in maths. We encourage pupils to have a belief that effort leads to success and that challenges are opportunities to learn.

Here are a few tips to encourage your children at home with maths:

✓Talk to your children about everyday maths

✓Play games with them

✓Value mistakes as learning opportunities

✓Recognise that there is more than one way to work things out

✓Praise children for effort over outcome

✓Avoid saying things like "I'm useless at maths"

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Activity 1: Take down the wall

Key learning: To explore numbers, strategy and patterns within ten

Activity overview This activity is based on an ancient strategy game called Nim. At this stage in the year, your child should be confident with the numbers one and two and so there is much scope within this activity for them to develop their mathematical thinking within ten, by making predictions and generalising. In this activity you will need to take down the wall by removing one or two bricks at a time. The winner is the person who takes off the last brick.

Note: to win at this game, you want to ensure it is your opponents turn when there are three bricks left. The strategy can be worked back from this to pinpoint key numbers.

Resources: A wall template sheet, ten counters or paper bricks (included)

Key vocabulary:
One, two, first, second

Suggested sentence structures:
"I will take one/two bricks off."
"I think I can win if I go first/second because..."

Language and communication

Important aspects to draw attention to:

- When there are three bricks left on the wall, ask your child to think about what the other person might do next if they remove one/two bricks.
- Give your child fewer bricks to start with (six perhaps) so they can focus on the strategy of how to win.
- Encourage your child to record how many they are taking away each time. Can they see a pattern?
- Repeat the game several times and draw attention to who went first and how many they took away. Encourage your child to notice if a pattern emerges.
- Use different coloured bricks for a specific number of remaining bricks (either the last four or the last three) so that it is easier for your child to notice a key number in deciding who will win.
- Provide a recording chart (e.g. on a whiteboard) that shows how many bricks your child and their partner removed on each go so that this can be considered and discussed to identify 'why' (incorporating both of the last two points already in there)

Allow your child to explain their own thinking to allow connections to be made between this and the representations used.

Likely misconceptions related to this learning:

- Children may find it challenging to think of the steps they are making and retain what their partner did. Fewer bricks on the wall would support them.
- Children may think their choice between 1 and 2 doesn't matter; winning is determined by who goes first; and/or there is no particular strategy that supports winning

Conceptual understanding

Suggested key questions and opportunities for reasoning

- At what point did you realise you would win/lose the game?
- When there are three bricks left and it is my turn next, can I win? How do you know?
- How can you ensure that you will always win?
- What happens if there are four bricks left and it is your turn, can you win?

Problem solving and developing mathematical thinking

- Does the strategy still work if I build the wall instead of taking it down?
- What if I could take three or four bricks off at a time - would the strategy be the same?

Mathematical thinking

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Activity 2: Equal and unequal sharing

Key learning: To explore conservation of numbers

Activity overview In this activity children explore sharing people between houses. Allow your child opportunities to explore equal and unequal grouping. Explore zero as a set and what it would mean to have zero people in a house. Children can begin to make connections between the number of houses and the number of people, for example, multiples - six people can be shared equally between three houses but not four.

Resources: Countable objects to represent people e.g. figures, cubes, counters. Rows (of various sizes) of paper houses (included)

Key vocabulary:

Number names 0-15, group, share,

equal, unequal, odd, even

Suggested sentence structures:

Language and communication

"There are __ people in each house."

"I would need __ more/fewer people to have the same number in each house."

"There cannot be the same number of people in each house because..."

Important aspects to draw attention to:

- Encourage your child to look for a connection between the number of people, houses and if they can be shared equally.
- Encourage your child to notice that when the number of people in one house decreases, then the number of people in another house will increase. The total number will remain unchanged.
- Encourage your child to begin exploration of odd and even numbers: having an odd number of people to share when each house needs two people - can you share everyone equally? Why not? Introduce this vocabulary and use it in the correct context.

Allow your child to explain their own thinking to allow connections to be made between this and the representations used.

Likely misconceptions related to this learning:

! Some children may find it challenging to see the relationship between the number of people in each house - specifically modelling this using accurate vocabulary may be required.

Conceptual understanding

Suggested key questions and opportunities for reasoning

? There are nine people and four houses. Each house has two people. Does this work? Why/why not?

? How many more houses would I need to share six people equally (if there were four houses to start with)?

? There are 11 people and four houses. There are five people in one house and three in another. How many people might the other houses have? Have you found all possibilities? How do you know?

Problem solving and developing mathematical thinking

- Encourage your child to work systematically to find all possible solutions for sharing, equally and unequally.

Mathematical thinking

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Activity 3: Target

Key learning: To apply knowledge of addition, subtraction and doubles

Activity overview This is a two player activity. Roll a one to six sided die. They then count out this number of cubes and place them onto a ten frame. Continue to take turns until one person has ten cubes. They must land on a number that will give them exactly ten cubes.

Alternatively, begin with ten cubes and subtract the number that they select. The winner is the first person to have zero cubes. Once children are familiar, introduce a 'magic number' which can be doubled.

Resources: A die, cubes (or replace with any countable objects), ten frame (included)

Key vocabulary:

Number names 0-10, add, subtract, plus, minus, double, exactly

Suggested sentence structures:

Language and communication

"I want to roll a __ because that will get me closer to ten."

"I do not want to roll a five because I will then have more than ten."

"I need to count out four cubes because double two is four."

Important aspects to draw attention to and possible modifications:

- Before rolling the die, encourage your child to think about what number they would like to land on and why. What number do they not want to land on? Why?
- The target number of ten can be increased/decreased to allow more focused attention on the preferred numbers to win.
- Vary the resources: they could complete the activity using a bead string, counters, pictorial representations, abstract, etc.
- Encourage to think more than one step ahead about what numbers they would like to roll, for example, a five and a five; or a five, three and two, etc.

Allow your child to explain their own thinking to allow connections to be made between this and the representations used.

Likely misconceptions/potential difficulties related to this learning:

! Some children may find it challenging to think one/two steps ahead about what numbers they might need and might just play the game one step at a time. Repeating the activity several times, should encourage more pattern seeking.

! Some children may struggle to remember what number of cubes they have and may have to recount them each time. Encourage your child to count on from the number they have rather than count all.

Suggested key questions and opportunities for reasoning

? You have seven cubes now, what number do you want to roll to win the game? What number do you not want to roll?

? Does it make a difference who has the first turn? How do you know?

? What is the least number of turns you could have to win the game?

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Activity 4: Maths Trail

Key learning: To apply knowledge of number, shape and measures in their surrounding environment

Activity overview Explore your surrounding environment with your child. Children should not be limited to finding just numbers in their surrounding environment but shape and measures as well. Suggested prompts have been given below but these will need to be adapted to suit your home/garden. Afterwards, have a sharing session to discuss what they have found.

Key vocabulary:

Number names, shapes, size,

big, small, round, tall, short, more, fewer, etc.

Suggested sentence structures:

"I can see the number __ on the _____."

"I can count __ trees. Some are taller than the school."

"I can wrap my arms around this tree trunk - it is not very thick. We need two children to 'hug' this tree though. The trunk is very thick."

Language and communication

Important aspects to draw attention to:

- Aspects to draw attention to will depend on the setting in which you complete the trail. Encourage your child to find the maths around them - it is everywhere; ask questions such as; how many, are there more __ or ____; how do you know? Look at that plant and the leaves - what maths can you see there?
- If there is passing traffic near your home, how many red cars pass in one minute? Model how to record using a tally to help your child count them.
- Explore the registration plates on the cars, what numbers can they see? Is there a pattern between some/ any of the number plates?
- Look for tessellations and patterns in footpaths/walls/etc. How many of each shape do they see? What shapes are they? How many hops would they need to hop on each stone or to get to the end of the path?

Allow your child to explain their own thinking to allow connections to be made between this and their knowledge of maths.

Likely misconceptions related to this learning:

! Some children may find it challenging to spot the maths around them. Think carefully about the small groups in which they are placed to support them in this.

! Children may not see shape/patterns/size as being part of maths and may find it challenging to find the maths in natural objects, such as a tree, plant, etc. Have discussion around these

Mathematical thinking

Conceptual understanding

Suggested key questions and opportunities for reasoning

? Look at these three plants. Which is the odd one out and why?

? Find as many links as you can to the number nine. What is the same and what is different about them?

? What is the longest line you can find? How could you measure how long it is?

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Activity 5: Waterspouts and Spider silk

Key learning: To practise counting forwards and backwards from a number

Activity overview Play a version of the traditional game of Snakes and Ladders. It is recommended that die with spots (rather than die with numbers) are used so children are developing their subitising skills as they play. In this game, children can climb up the water spout and slip down spider silk.

Resources: a die, waterspouts and spider silk board (included)

Key vocabulary:

Number names 0-20, forwards, backwards, on, back

Language and communication

Suggested sentence structures:

"I have rolled at three; one, two, three, I have landed on the number nine."

"I have landed on a spider silk - I need to go back to space number one."

Important aspects to draw attention to:

- Counting on from the number they are currently on and relating that to addition, for example, rolling a four when on 11: 1, 2, 3, 4. 11 plus four is equal to 15.
- Ask your child to think one/two steps ahead - what number would they like to land on? Why? What would you need to roll to land on that space?
- If a player is ahead or behind their opponent, how many steps would you need to pass the other player? Can you do this in one turn/two turns? How do you know?
- Ask your child about the number of steps you can take when you land on a drainpipe or spider silk. Will you always win if you land on a drainpipe?

Allow your child to explain their own thinking to allow connections to be made between this and the representations used.

Mathematical thinking

Likely misconceptions related to this learning:

Conceptual understanding

! Some children may find it challenging to think one/two steps ahead when playing. Focus on one step at a time with them. Recording the moves they make may help them to see patterns more clearly.

! Some children may not connect that as they move on the board the numbers are increasing and as they fall down the spider silk the numbers are decreasing.

Suggested key questions and opportunities for reasoning

? What number would you like to land on next? Why? What would you need to roll to land on that number?

? In how many moves can you win the game? What numbers would you need to roll to do so? Will you land on any drain-pipes or spider silks with these numbers?

? What other rules could you add to the spaces, for example, go forward one/two spaces? Which numbers would you place these rules on? Why?

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Activity 6: Make ten

Key learning: To explore different ways of making ten

Activity overview

Place the number/dotted cards face up on the table. Take it in turns to select two cards which must pair together to make ten. If the cards do not make ten, they must place both back on the table. They can place a dotted card with a number and/or two dotted cards together or two number cards together. This activity can be repeated using a different total number so that your child can practice their number bonds to and within ten.

Resources: Number and dotted cards (included)

Key vocabulary:

Number names 0-10, make ten, add, plus, is equal to

Suggested sentence structures:

"Five dots add five dots is equal to ten dots."

"I have three dots and the number nine. That is not equal to ten."

Important aspects to draw attention to and possible modifications:

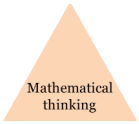
- Encourage them to work systematically - have they found all the possible pairings using their cards? Can they order them?
- Are there any pairings they could make that are not on the cards?
- Can you find all possible pairings for ten - how do you know you have found them all?
- Draw their attention to commutativity - is 1 + 9 = 10 the same as 9 + 1 = 10? Why/why not?
- When your child can no longer make a pairing, then have them take one card from their partner's hand to see if that makes the desired number.

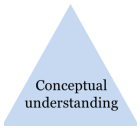
Allow your child to explain their own thinking to allow connections to be made between this and the representations used.

Likely misconceptions related to this learning:

! Some children may still count all when pairing the cards. Encourage them to count on from the card with the greatest number.

! Some children may find it challenging to recognise commutativity. Using concrete resources such as bead strings, cubes, a ten frame, should show them more clearly that they are the same.





Suggested key questions and opportunities for reasoning

? Does it matter which way I add the cards? Will I still have ten? How do you know?

? Have you found all pairings to ten? How do you know? Are there more pairings to ten? What about pairings to nine? Can you see a pattern?

? Could you use three cards to make ten? How many different pairings of three cards can you make?

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Activity 7: Number patterns

Key learning: To recognise and extend a pattern

Activity overview

Children use the template attached and place cubes on each square in the first pyramid. They can then repeat this for the second pyramid. Your child must then decide what the third and fourth pyramid would look like. Create the pyramids and articulate how it is changing.

Resources pyramid template (included) , cubes (or other countable small objects.)

Key vocabulary:

Number names 0-15, pattern, bigger, smaller, one more, above, below

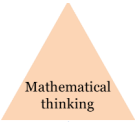
Suggested sentence structures:

"This pyramid has three fewer cubes."

"We are adding one row each time to the bottom of the pyramid. The bottom row has one more cube than the row above it."

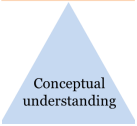
Important aspects to draw attention to and possible modifications:

- Ask your child to describe the relationship between each row. *They may recognise that pyramid two has three more cubes that pyramid one, pyramid three will have four more cubes than pyramid three, etc. How many more cubes will the next pyramid have?*
- Can they spot a relationship between the total number of cubes in each pyramid? What might the total number of cubes be in the next pyramid? *They may recognise that they will need to add the bottom row plus one to find the next total, for example, pyramid two has six cubes and there are three cubes in the bottom row. The next pyramid will have four cubes in the bottom row: 6 + 4 = 10. The next pyramid will have ten cubes.*
- Share different methods that you may have for extending the pattern, for example, you may add one cube to each row rather than adding on a bottom row. Are there any other ways?
- You could be given the first four or five pyramids in the pattern and just asked to talk about what they notice. What's the same and what's different?



Allow your child to explain their own thinking to allow connections to be made between this and the representations used.

Likely misconceptions related to this learning:



! Some children may find it challenging to spot the pattern and just see the pyramid as 'getting bigger'. Model for your child how the number of cubes in each pyramid is increasing or each pyramid could be laid on top of the next pyramid to show that it has an extra bottom row.

Suggested key questions and opportunities for reasoning

? What's the same and what's different?

? What might come before the first pyramid? What would come next? Can you show me what the 7th one would be?

? Which one is the odd one out? Why?

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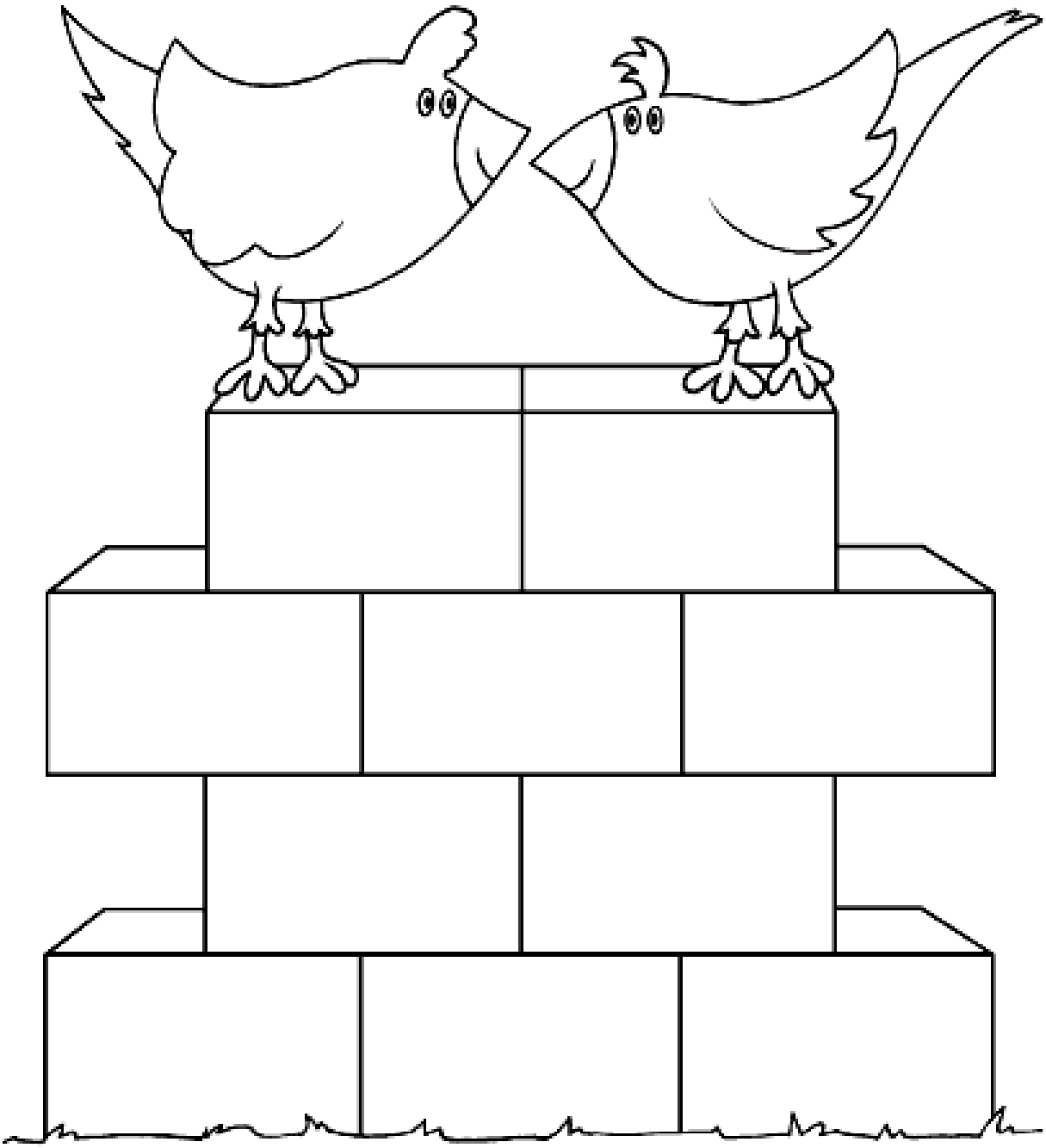
Activity 1—Take down the wall



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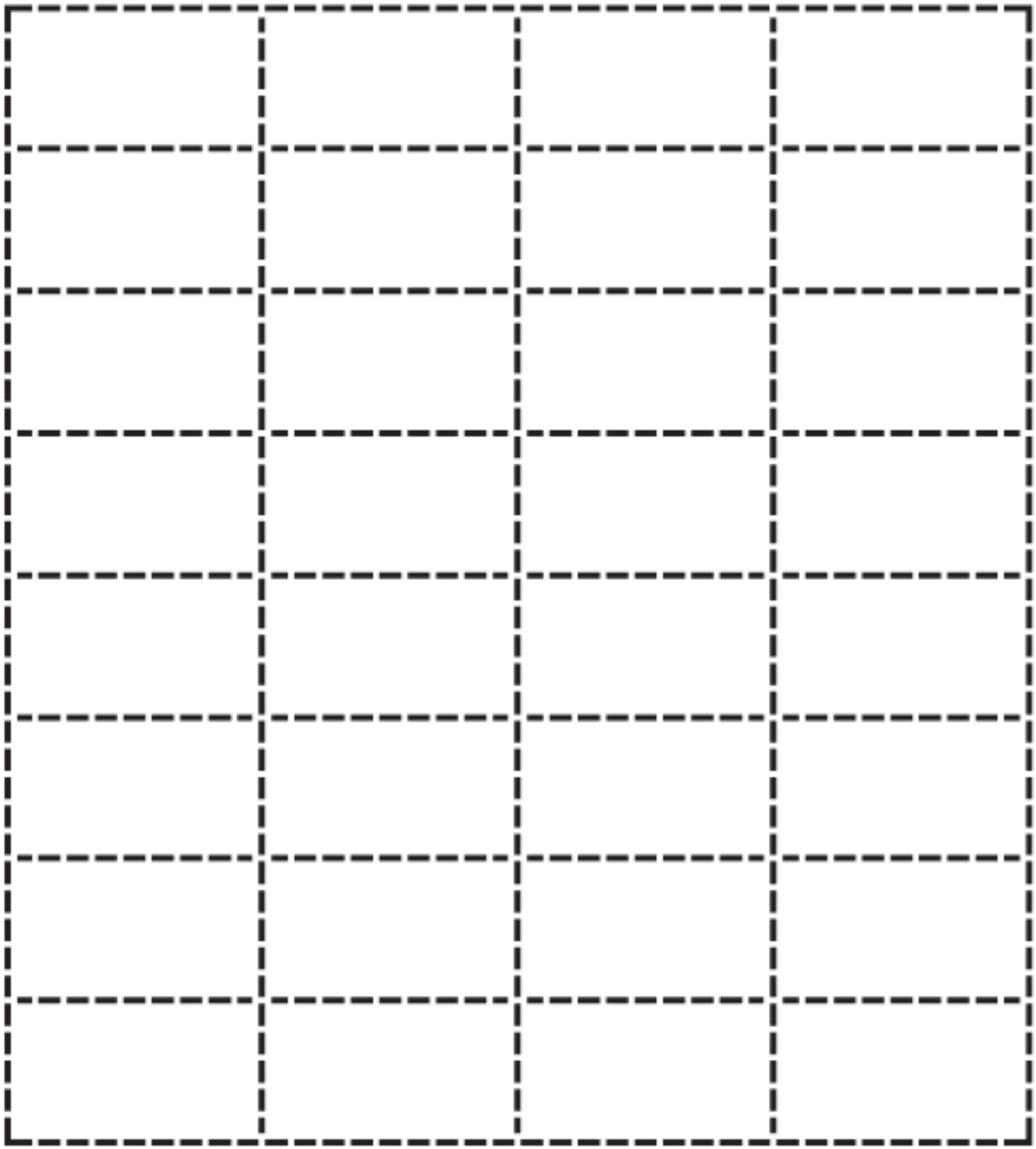
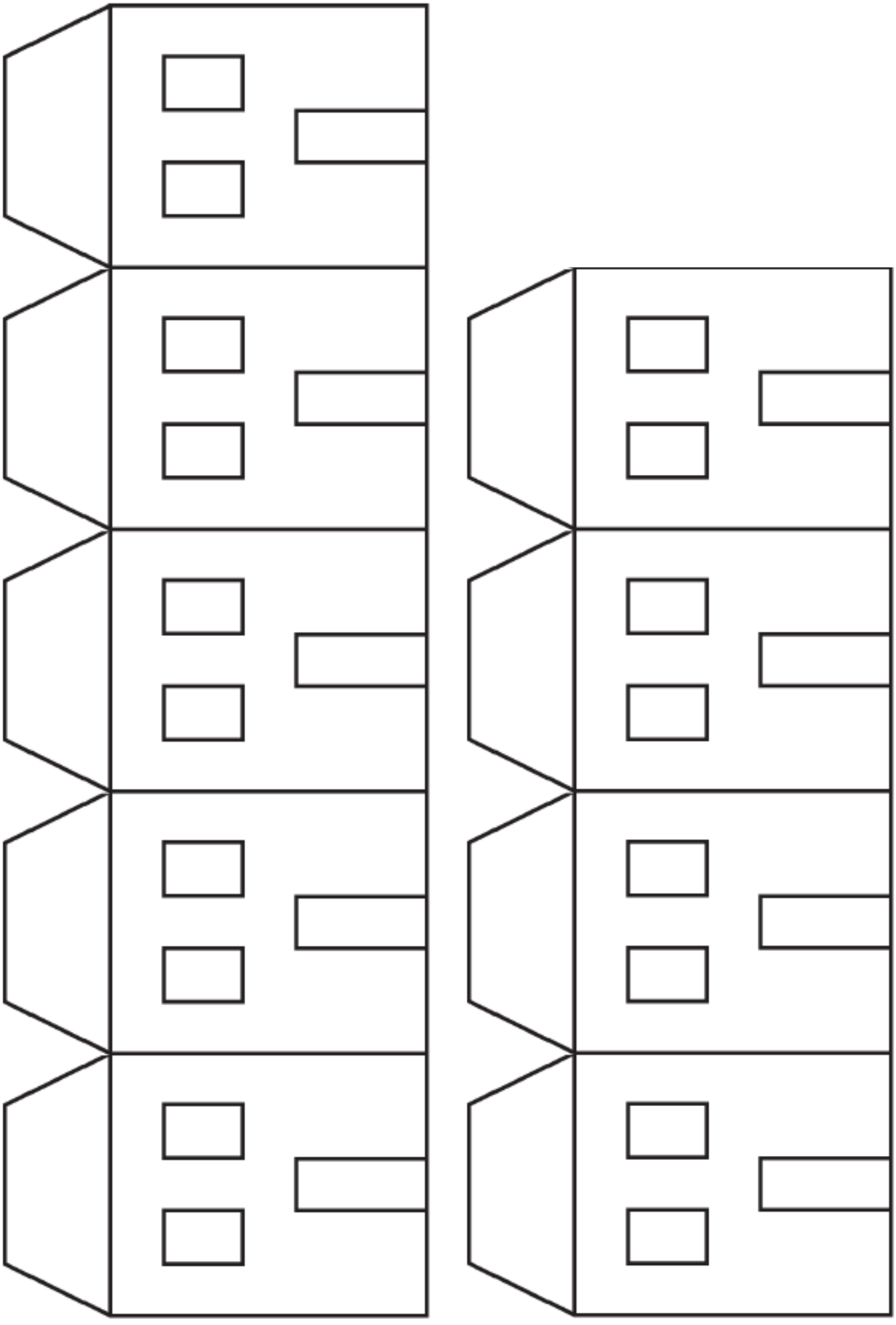
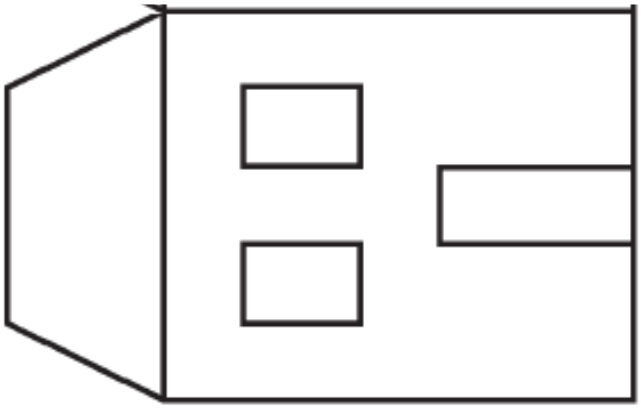
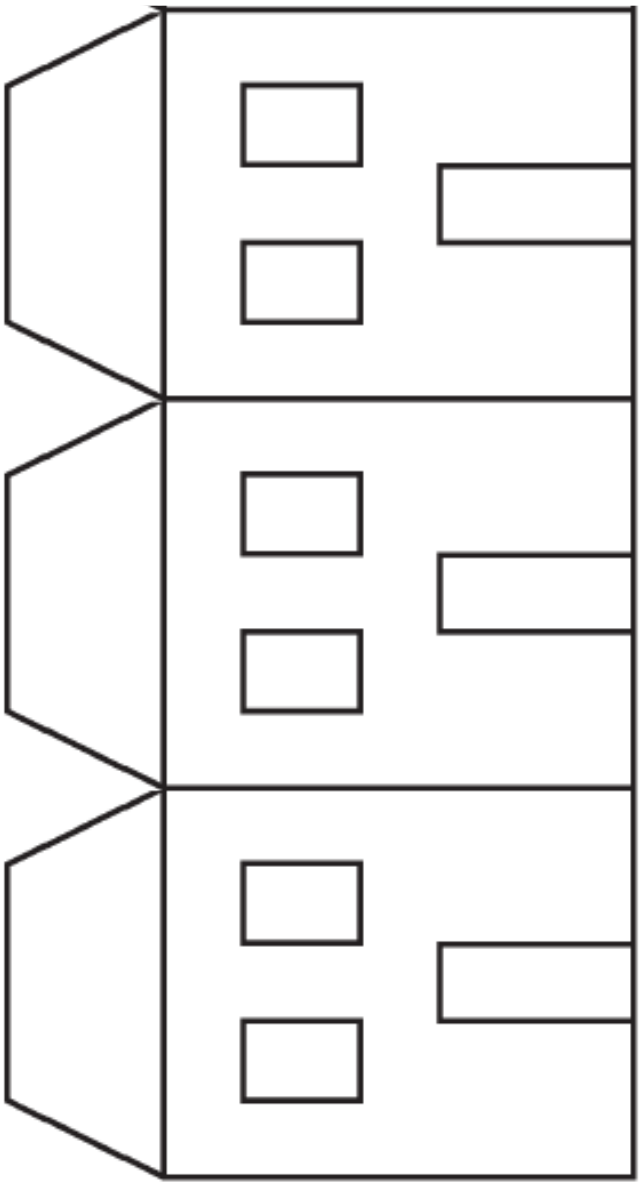


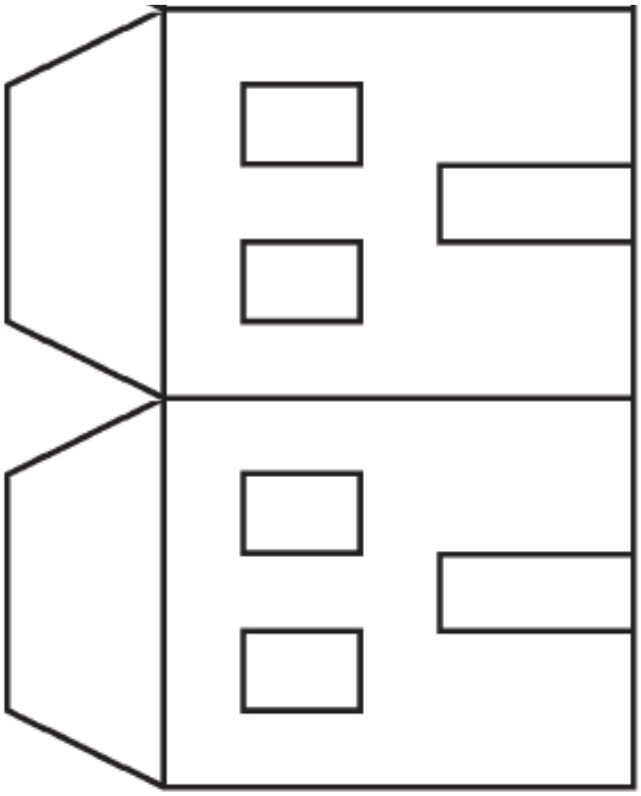
Activity 2— Equal and unequal sharing



Activity 2— Equal and unequal sharing

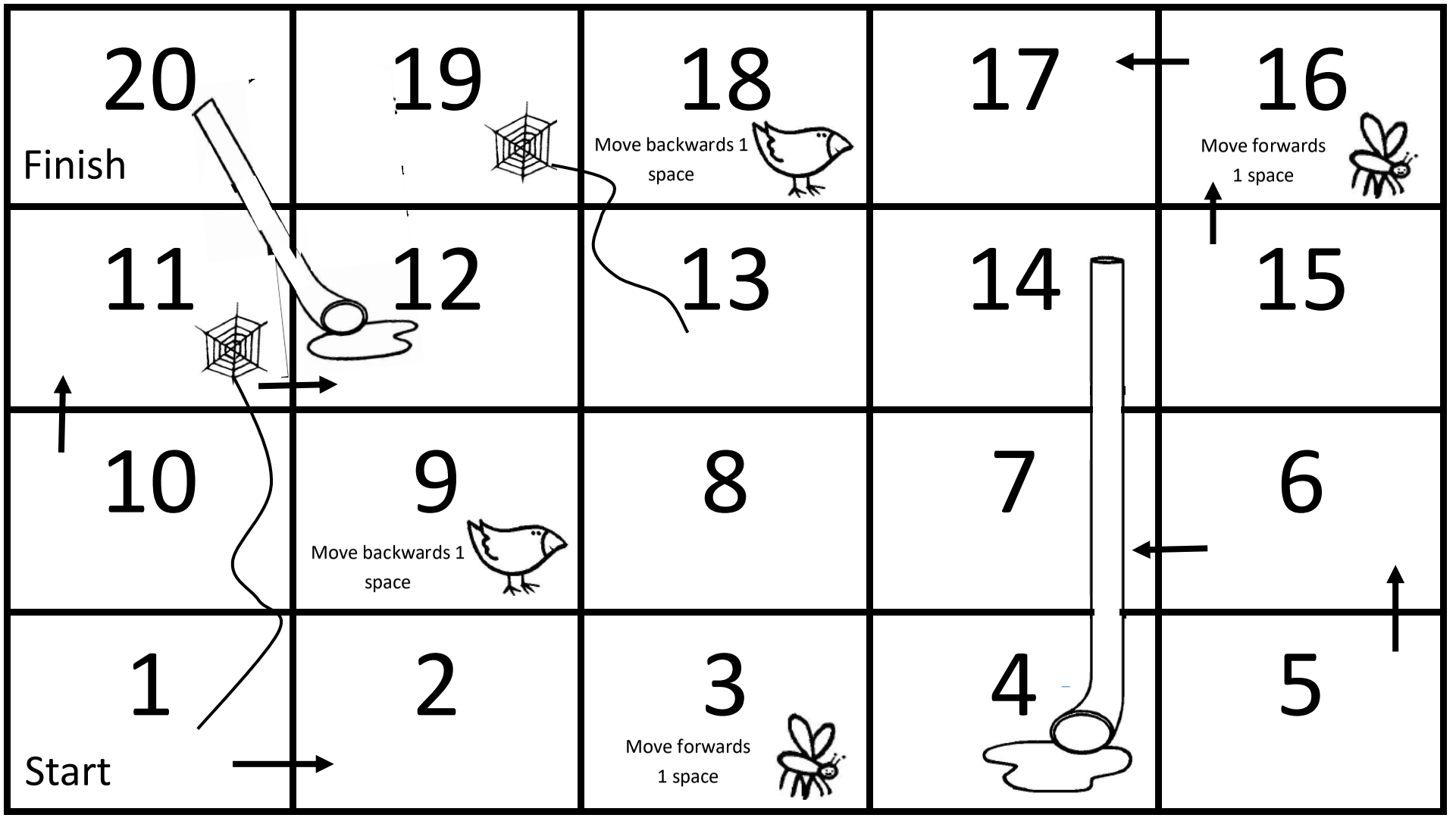






Activity 3 — Ten frames

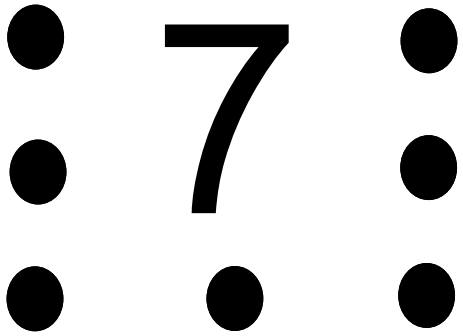
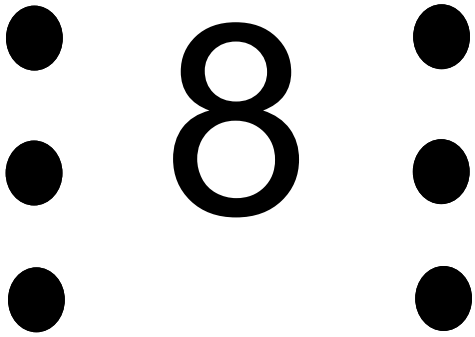
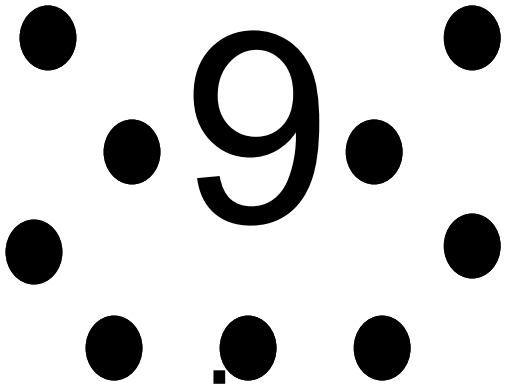
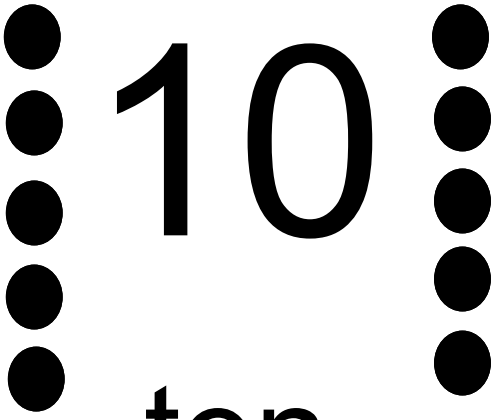
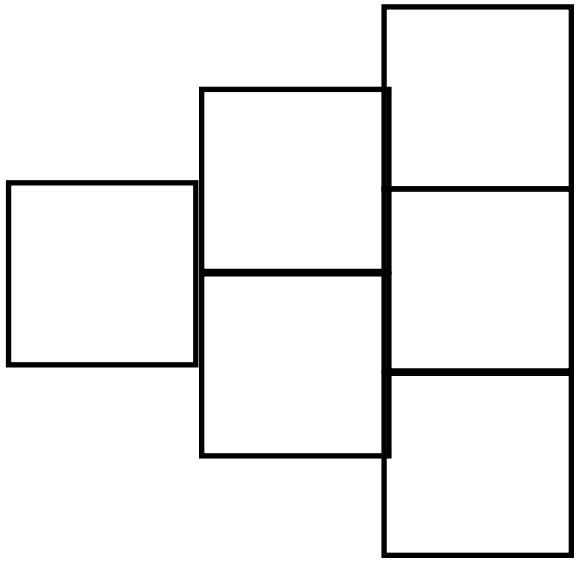
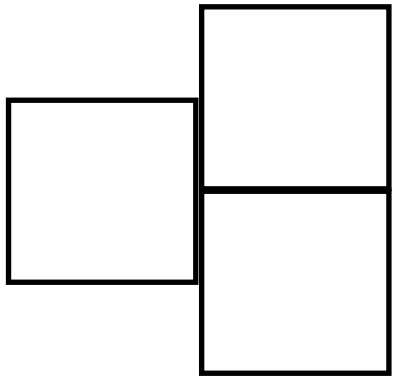
Activity 5 — Waterspouts and Spider silks



Activity 6 — Make 10

1 one	2 two
3 three	4 four
5 five	6 six

Activity 6 — Make 10

 seven	 eight
 nine	 ten
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