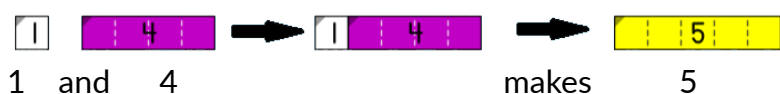# Composing and Decomposing Whole Numbers to 20

Mathematical Ideas

The ability to compose and decompose numbers is foundational to understanding numbers and their relationships.

Composing is when numbers are combined to create a larger number.
For example,

| 1 | | 2 | | 3 | → | 1 | 2 | 3 |

| 1 | | 4 | → | 1 | 4 | → | 5 |

1 and 4   makes   5

| 1 | → | 2 | → | 3 | → | 6 |

1 and 2 and 3   makes   6

Decomposing is when a number is broken down into smaller numbers. A number can be decomposed in multiple ways. For example,

| 5 | decomposed into | 1 and 4 |
| 5 | | |

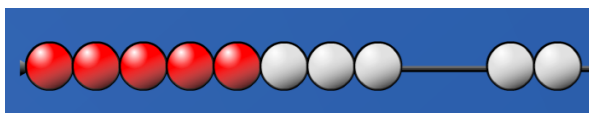| 6 | decomposed into | 1, 2, and 3 |
| 6 | | |
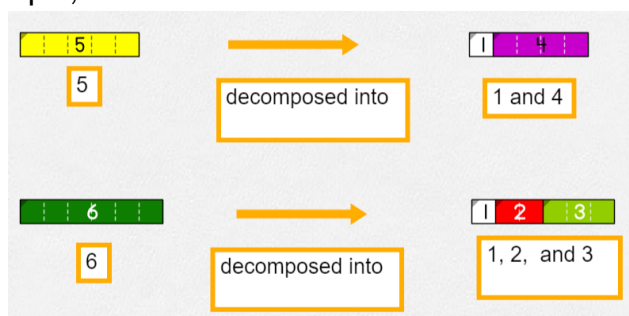
Understanding the relationship of numbers to 5 and 10 is helpful for knowing combinations of numbers. For example,

8 can be thought of as three more than 5
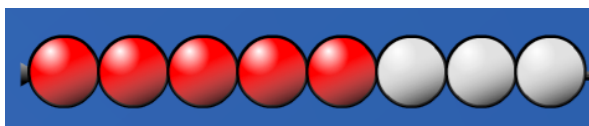
8 can be thought of as two less than 10

Understanding numbers relative to place value is important when working with our decimal system. For example,
18 can be thought of as 1 ten and 8 ones.

WINS

Helpful Information

Tips

- Learning tools are used to explore mathematical ideas and are a way for children to share their thinking. Encourage your child to take the time to use the learning tools in each activity.
- Organized concrete and visual representations can help with understanding numbers and the relationships between numbers.

For example,

| 1 | 7 |

| 2 | 6 |

From this visual, you can spatially see that when one number increased, the other number is decreased.

Mathematical Words/Symbols

Attribute – a characteristic of an object (e.g., colour, size, thickness, or number of sides).

Digits –the numerals 0 to 9 that form numbers. For example, the digits 2 and 7 can form the two-digit numbers 27 and 72.

Place value – the value of a digit that appears in a number. The value depends on the position or place in which the digit appears in the number. For example, in the number 54, the digit 5 is in the tens place and represents 50.

Materials

Activity 1:
- Whole Number Rods
- Numbers cards 11 to 20

Activity 2:
- Set Learning Tool
- Numbers cards 11 to 20

Activity 3:
- Money
- 4 Sets of Number Cards 1 to 4

Activity 4:
- Rekenrek
- Numbers cards 10 to 20

Activity 5:
- Whole Number Rods
- Numbers cards 7 to 20

Activity 6:
- Numberline

Activity 7:
- Pattern Blocks
- Number cards 2 to 4
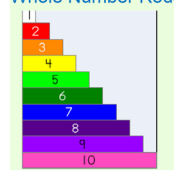
Activity 8:
- Rekenrek

Activity 9:
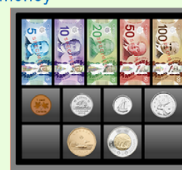- Set Learning Tool

Activity 10:
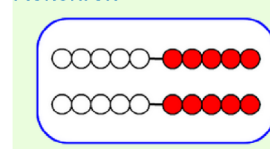- Colour Tiles
- Numbers cards 2 to 4

Whole Number Rods

Set Tool

Money

Rekenrek

Number Line
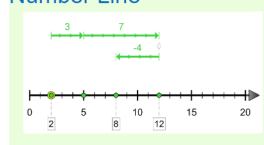
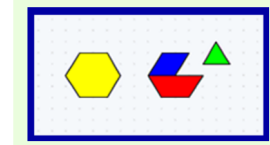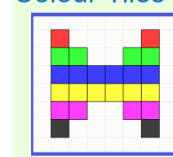Pattern Blocks

Colour Tiles

Learning Tools and Games can be accessed at mathies.ca

How Am I Composed?

Set Up for the Activity:
- Open the Whole Number Rods learning tool.
- Shuffle one set of number cards 11 to 20 and place them face down in a pile.

How to Do the Activity:
1. Have your child pick a number card from the pile.
2. Ask your child to use Whole Number Rods to create this number in a variety of ways.
3. Ask your child to compose the number on the card using the greatest number of rods.
4. Ask your child to compose the number on the card using the greatest number of different types of rods.
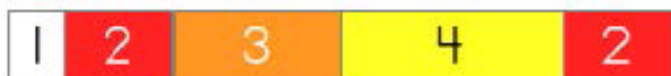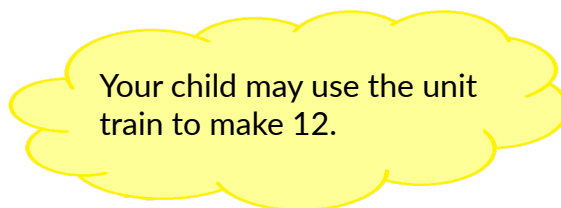5. Repeat activity as desired.

Example:

Using the greatest number of rods

Using at least two rods

Your child may use the unit train to make 12.

Using the greatest number of different types of rods

Let's Talk About It

What patterns do you see with the numbers you used to create the number on the card?
How many different ways can you compose the number on the card?

How Many in Each Group

Set Up for the Activity:
- Open the Set learning tool.
  - » Select Auto Mode.
  - » Select all three shapes (star, circle, gingerbread).
- Shuffle one set of the number cards 11 to 20 and place face down in a pile.

How to Do the Activity:
1. Have your child pick a number card from the pile.
2. Input this number into the Number of Objects and press New..
3. Have your child sort the objects into groups. Ask your child to tell you how many objects are in each group. Have your child find one or two more ways to sort the objects. Count the groups each time.
4. Select New [New] to create a new set with the same number of objects. Have your child repeat step 3. Repeat at least once more.
5. Change the number and repeat activity as desired.

Example:

12
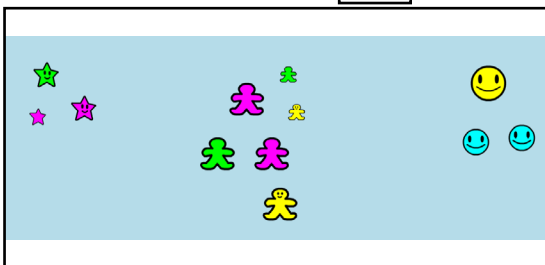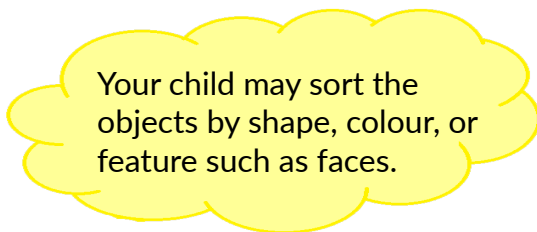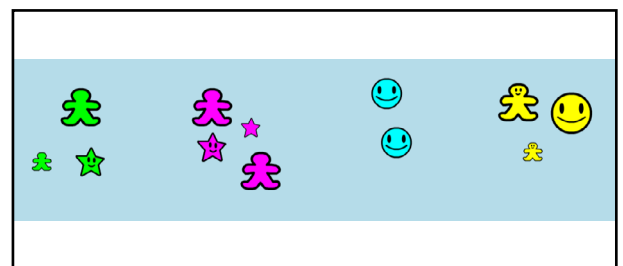
3 stars, 6 gingerbread, 3 happy faces

5 without a face , 7 with faces

Your child may sort the objects by shape, colour, or feature such as faces.

3 green, 4 purple, 2 blue, 3 yellow

Let's Talk About It

How many ways can you decompose the number you picked?
What patterns do you see?

Making 2 Dimes

Activity 3

Set Up for the Game: **Number of Players: 2**
- Open the Money learning tool.
    - » Customize the money tray to only show 1 cent, 5 cents, and 10 cents.
    - » Create a game board as shown in the example below, using the annotation tool 🖊
- Shuffle four sets of number cards 1 to 4 and place them face down in a pile.
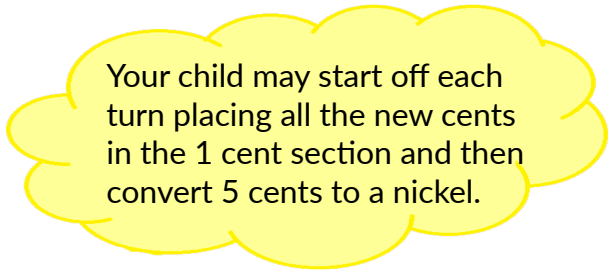
How to Play the Game:
1. Decide who goes first.
2. Each player takes a turn to pick a card from the pile. The number shown on the card is the number of 1 cent coins removed from the money tray and placed into the player's 1-cent coin section on the game board.
    - » Once a player has 5 1-cent coins, the coins must be traded in for a nickel which is placed in the nickel section on the game board.
    - » Once a player has 2 nickels, the nickels must be traded in for a dime which is placed in the dime section on the game board.
3. The first player to get a dime wins that round.
4. The one with the most dimes after 5 rounds wins the game.

Example: Player 1's turn

3 cents placed in Player 1's 1 cent section

Your child may start off each turn placing all the new cents in the 1 cent section and then convert 5 cents to a nickel.

Money Tray

Game Board

Let's Talk About It

How many 1 cents are worth the same as a nickel?
How many nickels are worth the same as a dime?

WINS

## Ways to Compose a Number

Set Up for the Activity:
- Open the Rekenrek learning tool.
  - » Show 4 racks with all the beads on the right side.
- Shuffle one set of number cards 10 to 20 and place them face down in a pile.

How to Do the Activity:
1. Have your child pick a number card from the pile. This is the target number.
2. Have your child create the target number using the beads on the Rekenrek in three different ways.
3. Ask your child to tell you what combinations of beads make up the target number.
4. Repeat activity as desired.

Example:

16

Target Number
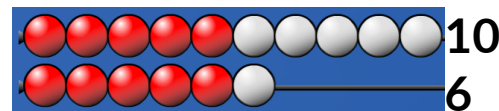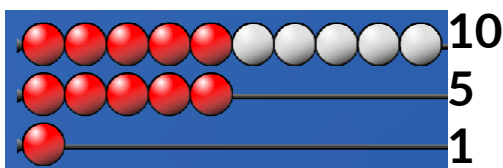
Your child may move 5 beads at a time and then singles to create the target number.
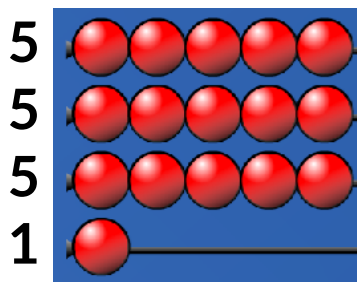
Let's Talk About It

Can you have an equal number of beads on each rack? Why or why not?
How many different ways can we compose the target number?

WINS

Composing to 20 Using Whole Number Rods

Set Up for the Game: **Number of Players: 2**

- Open the Whole Number Rods learning tool.
  - » Use the annotation tool to create a rod bank at the top of the workspace (see example).
- Shuffle one set of number cards 7 to 20 and place them face down in a pile.

How to Play the Game:
1. Place 20 rods into the rod bank. Ensure there is at least one rod of each type.
2. Ask your child to pick a number card and read it aloud.
3. Player 1 uses rods from the rod bank to form a train that matches the number card.
4. Player 2 uses rods from the rod bank to form a train that matches the number card.
5. Each player continues to take turns making trains until all the rods are gone from the rod bank or no one can find another way to form a train.
6. The player who made the most trains wins one point.
7. Repeat. The first person to earn 5 points wins the game.

Example:

At the beginning of Round 1:
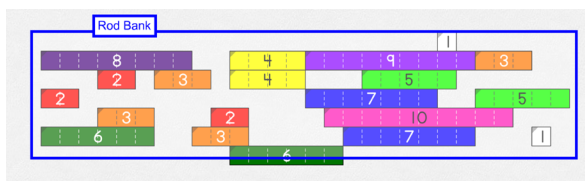
At the end of Round 1:
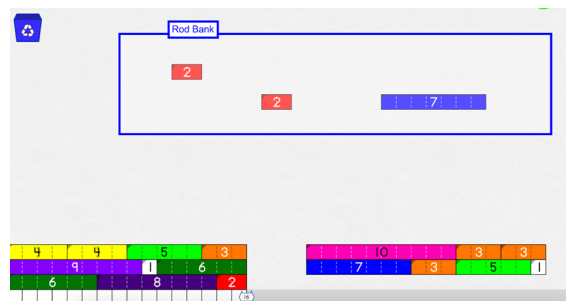
Player 1 made three trains with a value of 16.
Player 2 made two trains.

Your child may use the unit train to check the length of the train while it is being built and count the number of units still needed.

Let's Talk About It

Which rods in the rod bank are the most useful? Why?
How can I make the number another way using rods from the rod tower, not the rod bank?

WINS

Composing 20 Using a Number Line

**Set Up for the Activity:**
- Open the Number Line learning tool.
  - » Select 0 to 20.
  - » Select number ribbon
  - » Turn on the guidelines using the icon.
  - » Put a point on one of the hash marks on the number line.
- Shuffle one set of number cards 10 to 20 and place them face down in a pile.

How to Do the Activity:
1. Ask your child to start at zero and drag the number ribbon to the point on the number line. Ensure your child notices that the value on the ribbon is the same value as the point on the number line.
2. Now ask your child to use two ribbons to make the same value.
   - » Your child can use the guidelines lines to help see how each ribbon is connected to the number line.
3. Turn the guidelines off.
4. Ask your child to make the same number five more times using a different combination of two ribbons.
5. Repeat the activity changing the placement of the point on the number line and/or the number of ribbons used.
   - » You may wish to only show the numbers on the number line by selecting

Example:

Make 18 using two ribbons
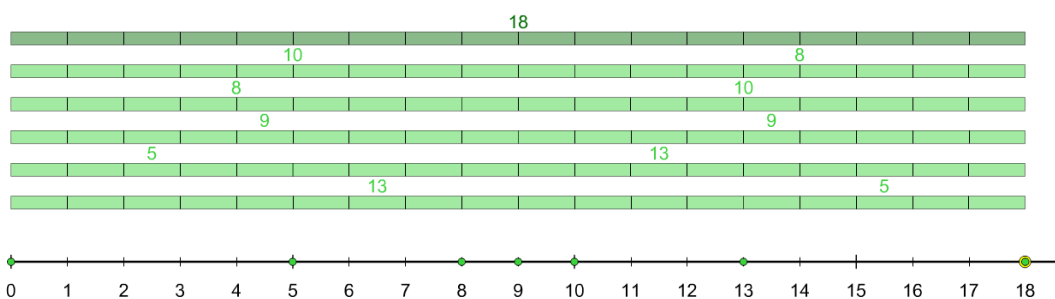
Your child may find a pair of ribbons and then reverse its order to find another pair.

Let's Talk About It

What patterns do you see?
How can the number be made another way using the same number of ribbons?
How can the number be made another way using a different number of ribbons?

WINS

Composing Blocks

Set Up for the Activity:
- Open the Pattern Block learning tool.
- Shuffle one set of number cards 2 to 4 and place them face down in a pile.

How to Do the Activity:
1. Pick a target number from 10 to 20.
2. Have your child pick a card and read the number. This is the number of different block colours your child will use to create the target number.
3. Ask your child to make the target number by moving blocks onto the workspace.
4. Challenge your child to create the target number again using a different combination of blocks.
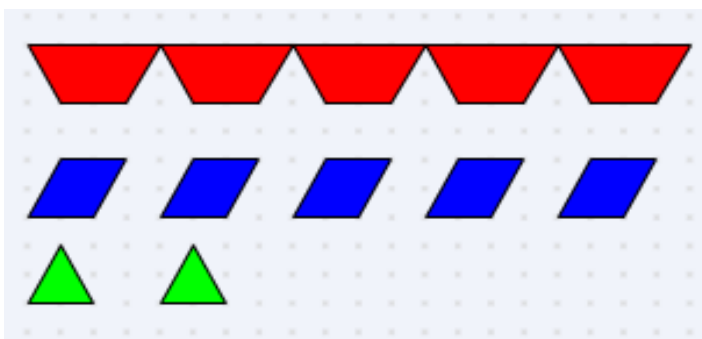
Example: Target number: 12 | **3** | 3 colours of blocks
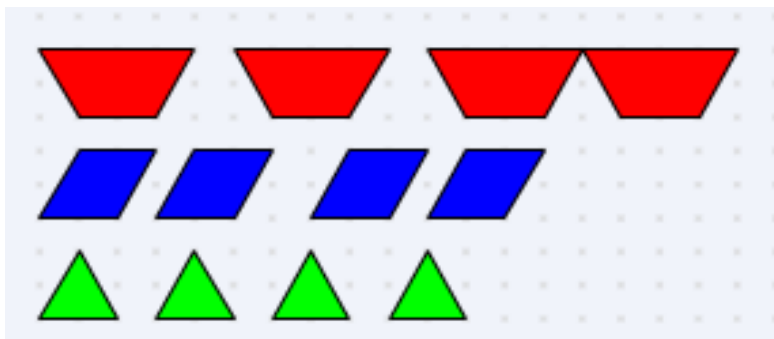
> Your child may select one block of each colour, then a second block of each colour, etc. until the target number is reached.

2nd combination

Let's Talk About It

What are the two ways you made this number?
How are your two sets of blocks the same? How are they different?

Composing and Decomposing Whole Numbers to 20

WINS

## Decomposing Numbers Up to 20 Using the Rekenrek

Set Up for the Activity:
- Open the Rekenrek learning tool.
  - » Turn settings on ⚙
  - » Show 10 to 20 beads with all the same colour.
  - » Hide extra beads with the shade 🔲

How to Do the Activity:
1. Ask your child to count the number of beads shown.
2. Ask your child how many fives can the number be decomposed into and how many beads would be remaining.
3. Have your child check by switching the right side colour setting to reveal the fives.
4. Repeat activity for different numbers of beads.

Example:
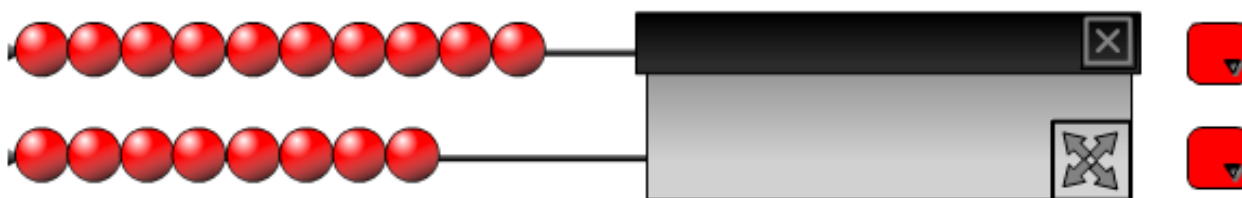
Count: 18 beads
18 decomposed into "three 5s and three left-over"
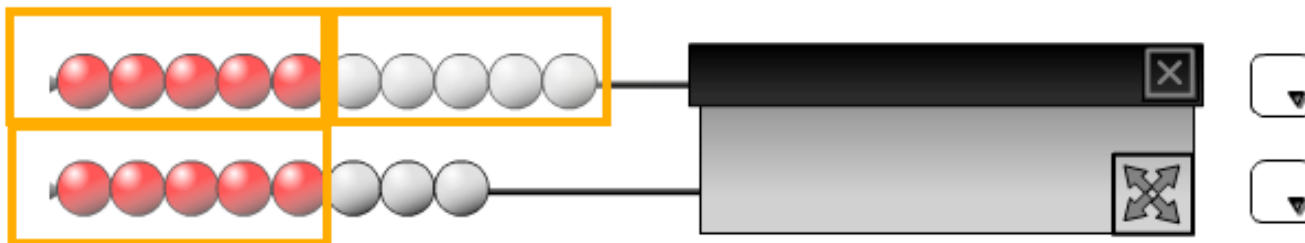
Your child may think of 18 as 10 and 8 and see that there are two 5s in 10 and one 5 in 8.

Let's Talk About It

How did you figure out how many fives that the number can be decomposed into?
How did you figure out what amount of beads was left-over?

Decomposing Numbers to 20 Using the Set Tool   **Activity 9**

Set Up for the Activity:
- Open the Set learning tool.
    » Drag out four ten frames.

How to Do the Activity:
1. Select a number between 11 and 20 and ask your child place that number of objects in two of the ten-frames. Ensure your child fills the first ten-frame before filling the second ten-frame.
2. Confirm the total number of objects in the ten-frames and then ask your child to say how that number was composed (e.g., 10 and 8). Record these numbers using the annotation tool.
3. Ask your child to move some objects out of one or both of the ten-frames and move them into the two empty ten-frames.
4. Ask your child to check the total number of objects still in the ten-frames.
5. Ask your child to describe how the original number was decomposed (e.g., 8 and 5 and 2 and 3). Record these numbers using the annotation tool.
6. Have your child rearrange the objects using three ten-frames.
7. Ask your child to describe how the original number has been decomposed. Record these numbers using the annotation tool.
8. Repeat activity using different initial amounts of objects in the ten frames and/or with different numbers of ten-frames.

Example:
Starting Frames
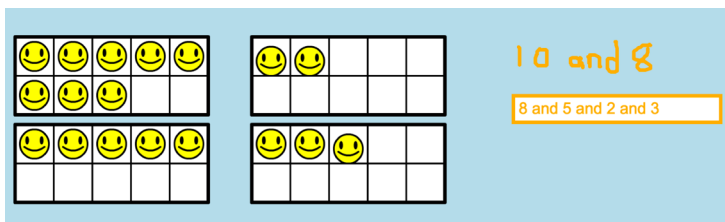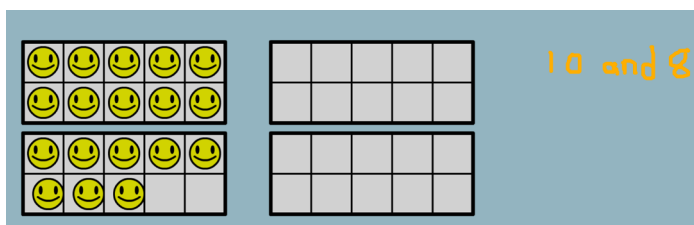
Your child may use x5 multiplier function to fill the frames.

Let's Talk About It

How did you know how many objects are in each ten-frame?
What are other ways you can decompose this number?
How does the ten-frame see the numbers?

## Composing and Decomposing to 20 Using Colour Tiles

Activity 10

Set Up for the Activity:
- Open the Colour Tiles learning tool.
  - » Select Few.
- Shuffle one set of number cards 2 to 4 and place face down.

How to Do the Activity:
1. Pick a number from 10 to 20. This is the target number.
2. Have your child move this number of same colour tiles into the workspace using the multipliers x2, x5, x10, and x1.
3. Pick a card.
4. Have your child change the number of tile colours used to match the number on the card.
   - » To change the colour select the tile(s) and the palette icon 🎨 .
5. Ask your child to describe how the original number has been decomposed. Record these numbers using the annotation tool.
6. Repeat as desired.

Example: Target number: 16

4   colours

10 and 1 and 2 and 3
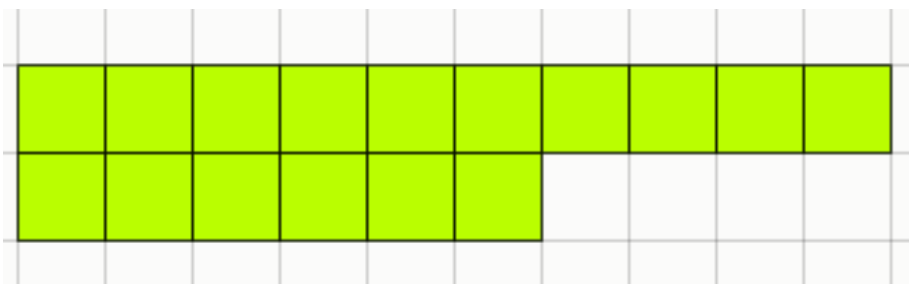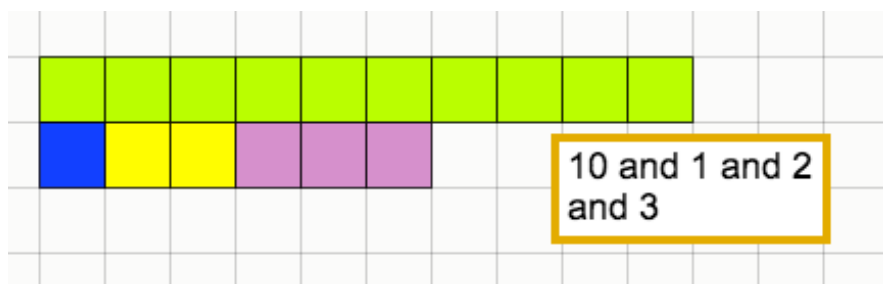
> Your child may have created 16 by using x10, x5, and x1 or using x2 eight times.

Let's Talk About It

What is another way to compose the target number?
What is another way to decompose the target number?