

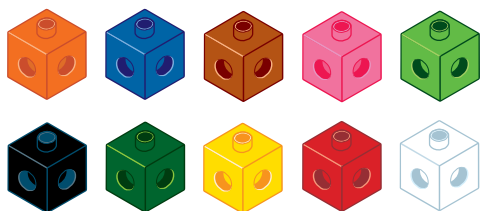
The Disappearing Train

OBJECTIVE

Children will use subtraction and estimation within 20 to determine how to get down to 0. They will collect data and interpret a graph of the data collected.

WHAT YOU WILL NEED

Snap Cubes, 20 per pair



Die, 1 per pair



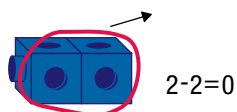
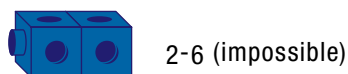
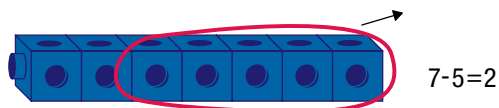
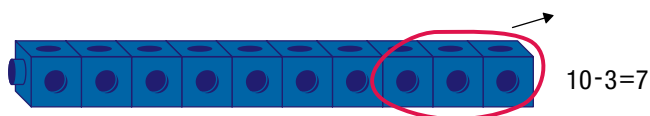
OVERVIEW

In this activity, children roll a die to determine how many cubes to remove from a Snap Cube train. They collect data about how many rolls of the die it would take to make their train disappear.

THE BIG IDEA

This activity gives children practice with subtraction as they calculate how many cubes they have left to remove. The concrete model reinforces the symbolic number sentences that they write.

For example, in the *Introducing*:





Looking at the Snap Cubes remaining in their trains, children predict which numbers they need to make the train disappear. Keeping a tally of the number of rolls and making a class graph will also give them practice in collecting and analyzing data from a situation that they have created.

If children have done the activity a sufficient number of times, the shape of the class graph should begin to resemble a normal curve. It will require at least four rolls of the die to make the twenty-cube train disappear because the greatest number that can occur with each roll is 6, and so the greatest number that can be rolled on three rolls is 18. Theoretically, the greatest number of rolls could be 20 if the number 1 came up each time the die was rolled. More likely, the class graph will reveal a number closer to 10 as the greatest number of rolls.

Having children figure out possible combinations of how to make the train disappear in only four rolls gives them practice in finding multiple representations for a given number. Here are some of the ways in which the train could disappear in as few as four rolls:

$$20 - 5 - 5 - 5 - 5 = 0$$

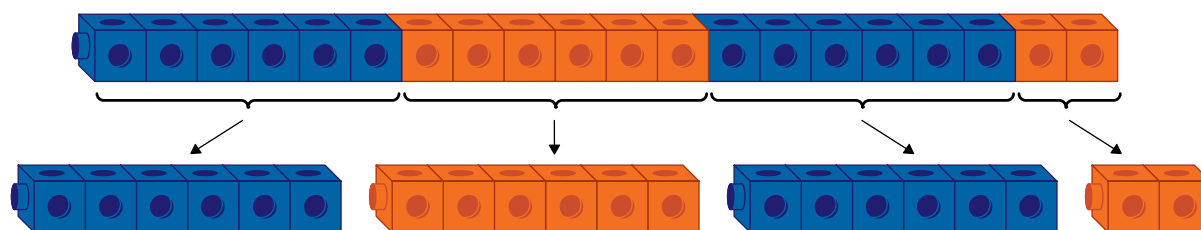
$$20 - 6 - 6 - 6 - 2 = 0$$

$$20 - 6 - 5 - 5 - 4 = 0$$

$$20 - 6 - 6 - 4 - 4 = 0$$

You may wish to have children figure this out with a train in front of them. This would enable children to pull the train apart into various configurations of four groups with no group being larger than 6, since that is the greatest possible roll of the die.

For example, for $20 - 6 - 6 - 6 - 2 = 0$:



The extended versions of the activity provide practice with addition as well as subtraction. For example, with two dice, children work with the sums 2 through 12 and would need to switch to rolling just one die if there is only one cube remaining in the train.

1 INTRODUCTION

- ▶ Build and display a Snap Cube train with 10 cubes.
- ▶ Call on a volunteer to take turns with you at rolling a die. After each roll, remove that number of Snap Cubes from the train. If the number rolled is greater than the number of Snap Cubes left, then roll again.
- ▶ Continue until all the Snap Cubes have been removed and the train has disappeared.
- ▶ Record each roll on a chart that looks something like this:

Roll	Number rolled	Number sentence
1st	3	$10 - 3 = 7$
2nd	5	$7 - 5 = 2$
3rd	6	$2 - 6$ (impossible)
4th	2	$2 - 2 = 0$

- ▶ Point out that number sentences help to keep track of how many cubes are left.
- ▶ Repeat the activity with another volunteer.

3 MATH TALK

Use prompts such as these to promote class discussion:

- ▶ What information can you learn from this graph?
- ▶ Why couldn't you make the train disappear with just three rolls?
- ▶ What do you think is the greatest number of rolls it would take to make the train disappear? Why?
- ▶ What do you think is the least number of rolls it would take to make the train disappear? Why?
- ▶ What might the number sentences look like if it took four rolls to make the train disappear?
- ▶ Why didn't anyone need 21 rolls to make his or her train disappear?

2 ON THEIR OWN

Children will complete the On Their Own. During this time, the teacher's role is to:

- ▶ ask probing questions to guide and extend
- ▶ record student thinking
- ▶ record student conversation that promotes collaboration

Use the information gathered to inform the Math Talk.

You can adapt the difficulty of the On Their Own to the level of your students by starting with 10, 15, or 30 cubes instead of 20.

4 EXTENSION

- ▶ Have children repeat the activity starting with a train built with more than 20 Snap Cubes.
- ▶ Have children repeat the activity, this time using a pair of dice. For each roll, they should find the sum of the numbers rolled and subtract that number of Snap Cubes from the train.

The Disappearing Train

ON THEIR OWN

How many rolls of the die does it take to make a Snap Cube train disappear?

- 1 With a partner, build a Snap Cube train that is 20 cubes long.
- 2 One partner keeps rolling the die and removing exactly that number of cubes from the train until there are no cubes left.
- 3 The other partner keeps a record of how many rolls of the die it takes to make the train disappear and writes a number sentence to show what happens after each roll. If the number rolled is greater than the number of cubes left in the train, count that roll even though you can't remove any cubes.
- 4 Switch roles and repeat the activity several times.
- 5 Compare your recordings. Try to predict how many rolls you would need to make your train disappear if you did the activity again.



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B

THE DISAPPEARING TRAIN

FOLD / FOLD

A

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