

The Fun Machines

A book about addition and subtraction








Aim

The Fun Machines explores the inverse relationship between addition and subtraction.

These whole-class activities provide students with the opportunity to:

- listen to a story about addition
- use pictures to represent addition and subtraction
- explore the idea of backtracking to “undo” an operation
- discuss the change (rule) that occurs in various addition and subtraction problems
- add, subtract, double and halve numbers

Activities

1. Listening to the story
2. Using pictures to act out the story
3. Using the teaching tool to act out the story 
4. Using pictures with a subtraction rule
5. Exploring backtracking
6. Backtracking using the story
7. Using numerals to represent addition and subtraction 
8. Identifying the rule using the teaching tool 
9. Working with multiple operations 
10. Doubling and halving 

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I. Listening to the story

Resources

- *The Fun Machines*

Activity

Show the cover of *The Fun Machines* and read the title aloud. Encourage volunteers to predict what they think the story might be about. Read the story without discussion. Read the story again and ask, **What is happening in the story? What do you see in each picture?** Explain that when the frames come to each machine they have a certain number of things inside them. Each machine has the job of putting more things in the colour frames. Read pages 4–5 and point to one of the blue frames on the left side of the double-page spread. Ask, **How many things are in the frame? How many more things will the machine put in the frame? How many things will be in the frame once the machine is finished with it?** Repeat for each double-page spread of the storybook.

2. Using pictures to act out the story

Resources

- *The Fun Machines*
- A robot mask or similar
- Support 1 (see attached)
- 2 non-permanent markers and cleaning cloth

Preparation

The robot mask is for a student to pretend they are one of the fun machines. Other materials can be substituted.

Print and laminate each of the five frames in Support 1.

Activity

Arrange three students in a row at the front of the room. Give the middle student the robot mask to wear. Explain the three students' roles: the student on the left will mark things in the frames from Support 1 and pass them to the middle student; the middle student is a "fun machine" who has to mark extra things on the frames; and the student on the right takes the finished frames, verifies the correct number of things have been added, and says the total. Read pages 4–5 of *The Fun Machines*. Give the first student the 2-by-5 frame and ask them to draw a number of crosses on the frame to match one of the frames on the left side of the double-page spread. That student then passes the frame to the "fun machine" who draws one extra cross to match the story and passes it to the student on the right to verify. Repeat the process with each double-page spread of the storybook.

Retain the robot mask and laminated copies of Support 1 for use throughout these activities.



3. Using the teaching tool to act out the story

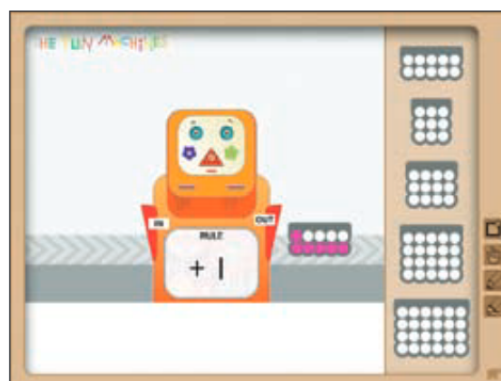


Resources

- *Teaching Tool*
- *The Fun Machines*

Activity

Make sure all the students can see the *Teaching Tool*. Read pages 4–5 of *The Fun Machines*. Ask, **How many things does this machine put in each time?** Use the drawing tool to write $+1$ in the RULE part of the machine in the work area. Point to one of the frames on the left of the machine in the storybook. Ask, **How many things are in this frame?** Click and drag a 2-by-5 frame onto the work area, on the IN side of the machine. By clicking on each circle in the frame, fill the frame with the correct number of things. Confirm that the correct number of things is in the frame then drag the frame by its handle to sit above the head of the machine and ask, **How many things does the machine put in each frame?** Click in a circle of the frame to add an extra thing then drag the frame to the OUT side and ask, **How many things are in the frame now?** Write $5 + 1 = 6$ in the white panel at the base of the screen. Repeat with each double-page spread of the storybook.



4. Using pictures with a subtraction rule

Resources

- The robot mask from Activity 2
- Laminated frames from Activity 2
- 2 non-permanent markers and cleaning cloth

Preparation

If the materials are not available from Activity 2, the robot mask is for a student to pretend they are one of the fun machines. Other materials can be substituted. Also, print and laminate each frame from Support 1 (see attached).

Activity

Discuss how the machines in *The Fun Machines* add things to the frames. Say, **Imagine there was a machine that took things out of the frames.** Arrange three students in a row at the front of the room. Give the middle student the robot mask to wear. Explain the three students' roles: the student on the left will mark things in the frames from Support 1 and pass them to the middle student; the middle student is a "fun machine" who has to erase things on the frames; and the student on the right takes the finished frames, verifies the correct number of things have been subtracted, and says the total. Say, **This machine takes five things out of each frame.** Give the student on the left the 2-by-5 frame and ask them to draw crosses on the frame to represent eight things. They then pass the frame to the "fun machine" who erases five of the crosses and passes it to the student on the right to verify. Repeat with other starting amounts and other amounts to subtract.



5. Exploring backtracking

Resources

- The robot mask from Activity 2
- Laminated frames from Activity 2
- 2 non-permanent markers and cleaning cloth

Preparation

If the materials are not available from Activity 2, the robot mask is for a student to pretend they are one of the fun machines. Other materials can be substituted. Also, print and laminate each frame from Support 1 (see attached).

Activity

Discuss how the machines in *The Fun Machines* add things to the frames. Say, **Imagine somebody flicked a switch and made all the machines go backward and do the reverse of what they have been doing.** Arrange three students in a row at the front of the room. Give the middle student the robot mask to wear. Explain the three students' roles: the student on the left deals with amounts going IN the machine; the middle student is a "fun machine" who has to add or erase things on the frames; and the student on the right deals with numbers coming OUT of the machine. Say, **This machine adds two things to each frame. Let's have the machine do what it normally does.** Give the IN student the 2-by-5 frame and ask them to draw crosses on the frame to represent six things. They then pass the frame to the "fun machine" who draws two extra crosses on the frame and passes it to the OUT student to verify. Ask, **If we make the machine run backward, it has to take two things out of the frame. This will show us how many things went into the machine the first time.** Have the OUT student pass the frame back to the "fun machine" who erases two of the crosses and passes the frame to the IN student. Repeat with other amounts and other rules, having a few frames going IN and coming OUT then going in reverse. Afterward, reverse the process (OUT, IN and then back to OUT) with different frames and rules.

6. Backtracking using the story

Resources

- *The Fun Machines*

Activity

Read pages 4–5 and point to one of the blue frames on the right side of the double-page spread. Ask, **How many things are in this frame? How many more things does the machine put in each frame? How many things were in this frame before it went in the machine?** Point out that this could be thought of in two ways: by thinking, for example, of what number plus 1 equals 7, or by subtracting 1 from 7. Repeat for each double-page spread of the storybook.

$$\underline{\quad} + 1 = 7$$

$$7 - 1 = \underline{\quad}$$



7. Using numerals to represent addition and subtraction

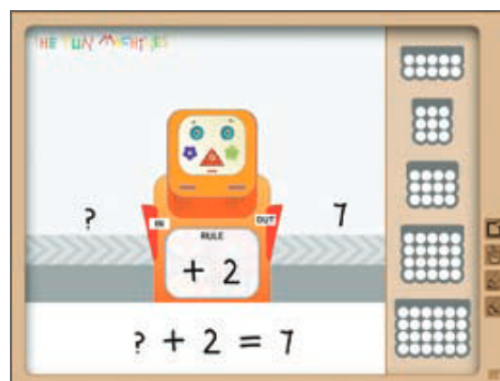
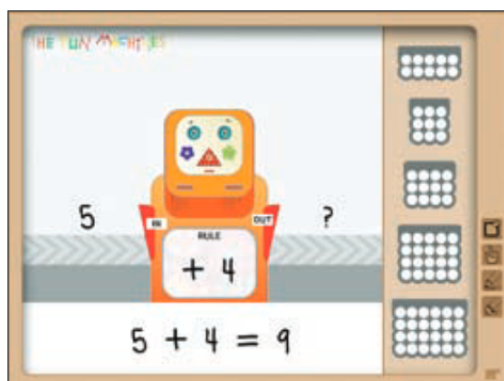


Resources

- *Teaching Tool*
- *The Fun Machines*

Activity

Make sure all the students can see the *Teaching Tool*. Referring to the storybook as needed, discuss the machines' jobs in *The Fun Machines*. Use the drawing tool to write the RULE as you say, **One machine added four to everything.** We can show this rule in the middle. Write **5** on the IN side of the machine as you ask, **If we had five things going into the machine, how many would come out? How would we write this as a number sentence?** Reset the *Teaching Tool* and repeat with other IN numbers and rules, both addition and subtraction. Then write an OUT number on the OUT side of the machine and the RULE as you say, **Another machine in the book added two to everything.** If seven things came out of the machine, **how many went in? What number sentence would we write to show this?** Reset the *Teaching Tool* and repeat with other OUT numbers and rules, both addition and subtraction.



8. Identifying the rule using the teaching tool



Resources

- *Teaching Tool*
- *The Fun Machines*

Activity

Make sure all the students can see the *Teaching Tool*. Referring to the storybook as needed, discuss the machines' jobs in *The Fun Machines*. Click and drag two 2-by-5 frames onto the work area. Put one on the IN side and the other OUT side of the machine. Click in the circles of the IN frame to show four things and write **4** below. Click in the circles of the OUT frame to show six things and write **6** below. Say, **Imagine these frames started with the same number of things. After one of them went in the machine it came out with six things. What is the rule for the machine? How many things did it add to the frame?** Invite a student to suggest and write a rule in the RULE space on the machine. Drag the IN frame by its handle to sit above the head of the machine and click in the circle of the frame to add more things to match the rule. Have the students confirm the number of things matches the OUT frame. Repeat with other numbers of things, other rules, and other frames.



9. Working with multiple operations

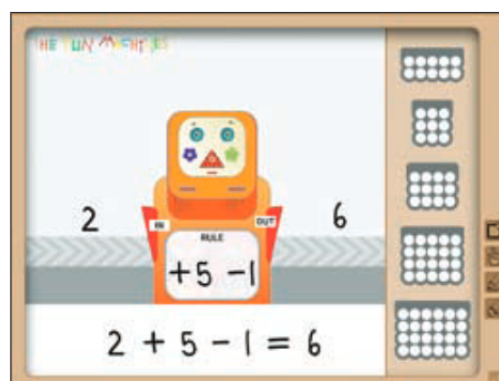
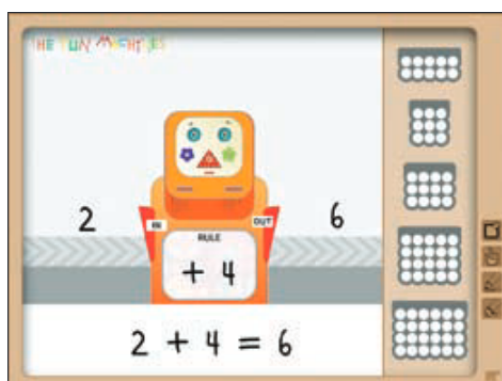


Resources

- *Teaching Tool*
- *The Fun Machines*

Activity

Make sure all the students can see the *Teaching Tool*. Referring to the storybook as needed, discuss the machines' jobs in *The Fun Machines*. Use the drawing tool to write the RULE on the machine in the work area as you say, **This machine adds four to everything. We can show this rule in the middle.** Write **2** on the IN side of the machine as you ask, **If we had two things going in the machine, how many would come out? (Six.)** We could also write another rule to get the same number coming out. Write **+ 5 - 1** in the RULE part of the machine. Ask, **If we had two things going into the machine, first we would add five. Two add five is seven. Then we subtract one. Seven take one is six, so the answer is the same.** How would we write this as a number sentence? What is another rule we could write to get the same number coming out? Discuss the students' ideas and have them demonstrate their thinking with the *Teaching Tool*.



10. Doubling and halving



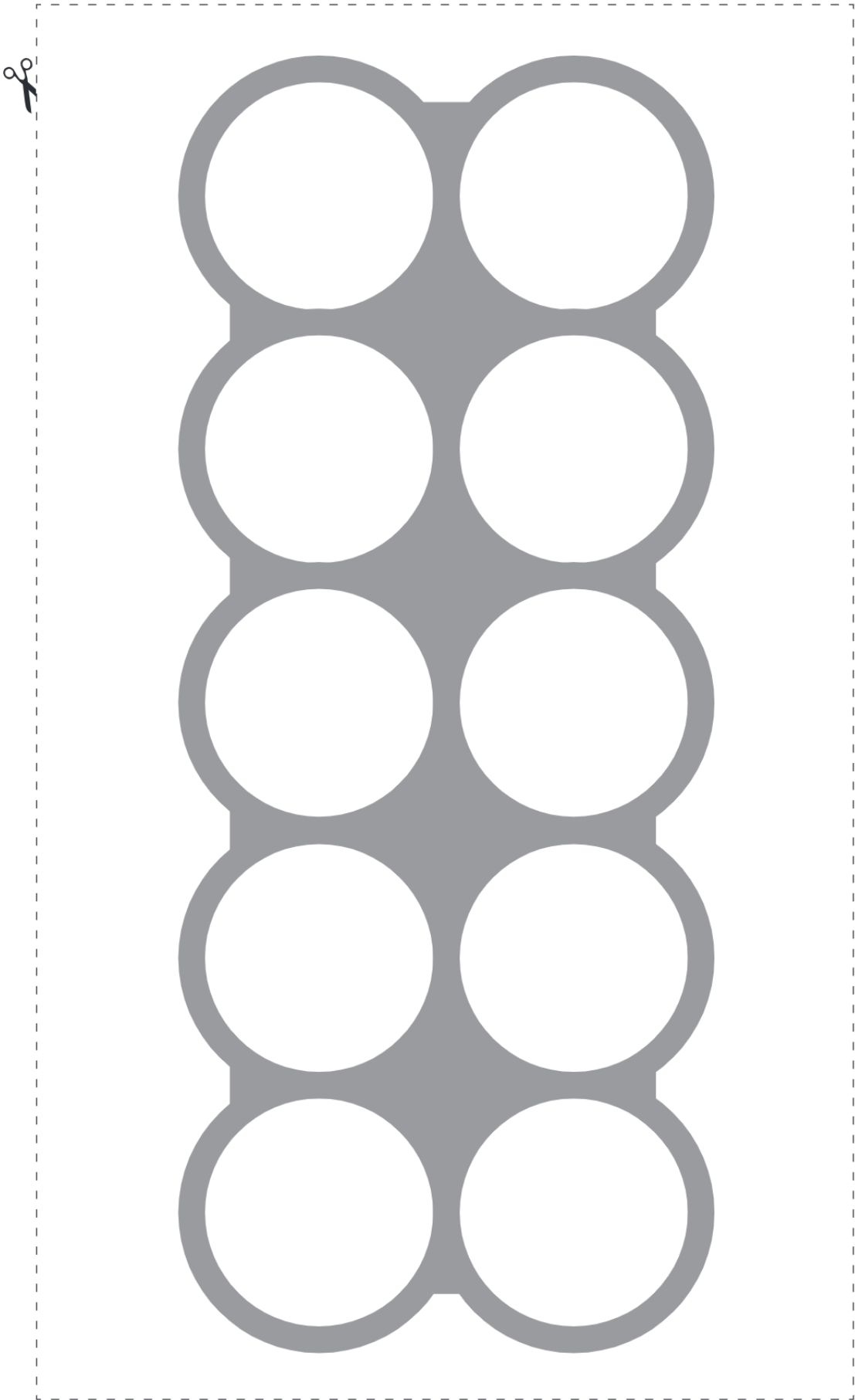
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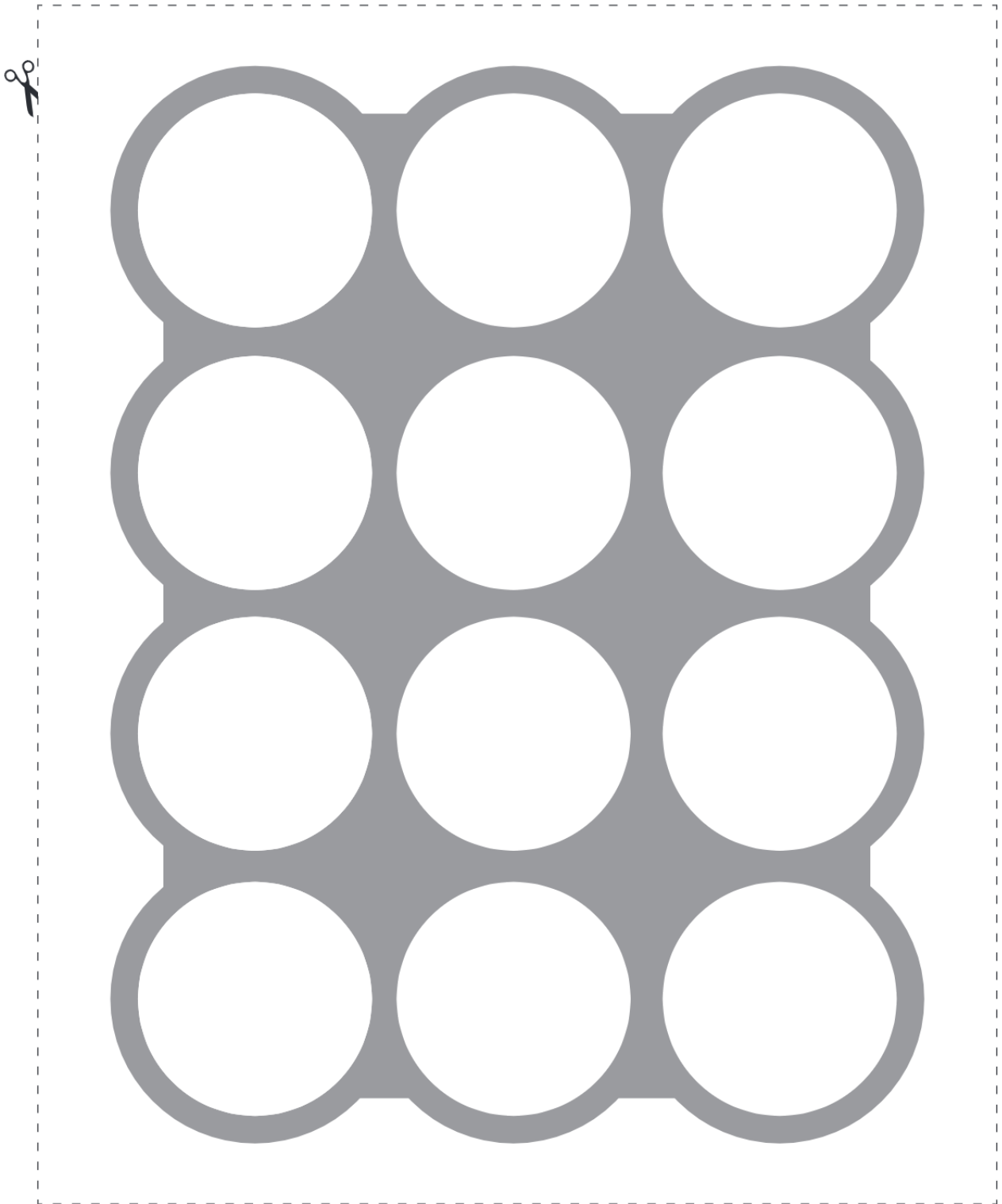
Activity

Make sure all the students can see the *Teaching Tool*. Referring to the storybook as needed, discuss the machines' jobs in *The Fun Machines* and point out that all the machines add things to the frames. Click and drag a 2-by-5 frame onto the IN side of the machine in the work area. Click in the circles of the frame to show four things. Discuss what the students know about doubling numbers and say, **Imagine this machine doubled the number of things in each frame. If four things went into the machine, how many would come out?** Listen to the students' predictions then drag the frame by its handle to sit above the head of the machine. Click in the frame to add another four things to the frame and compare the total to the students' predictions. Write **Double 4 is 8** in the white panel at the bottom of the screen. Repeat with other amounts. To extend the activity, point to the machine in the work area and say, **This machine halves everything that goes in. If twelve things go in the machine, how many will come out? How do you know?**

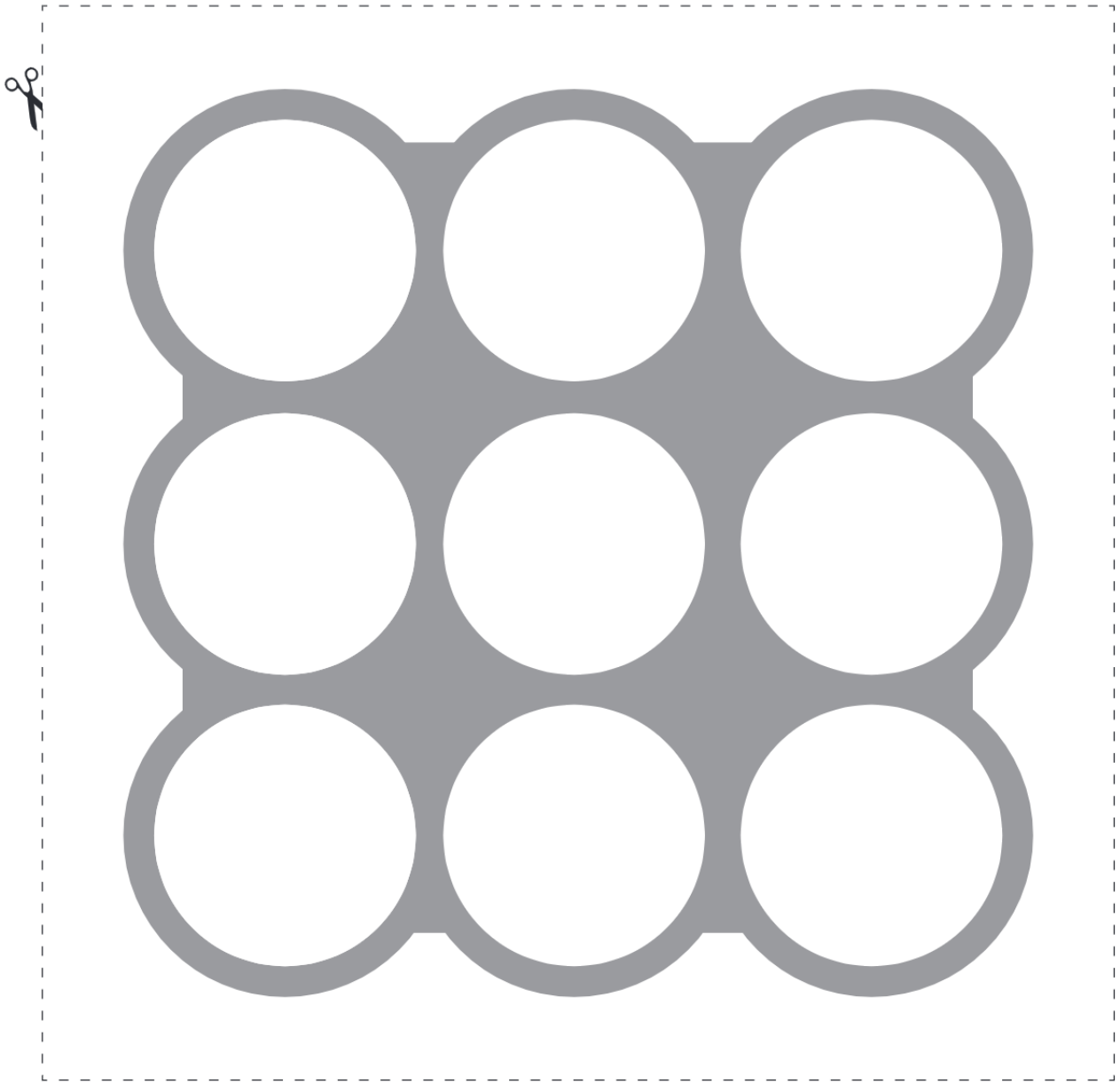




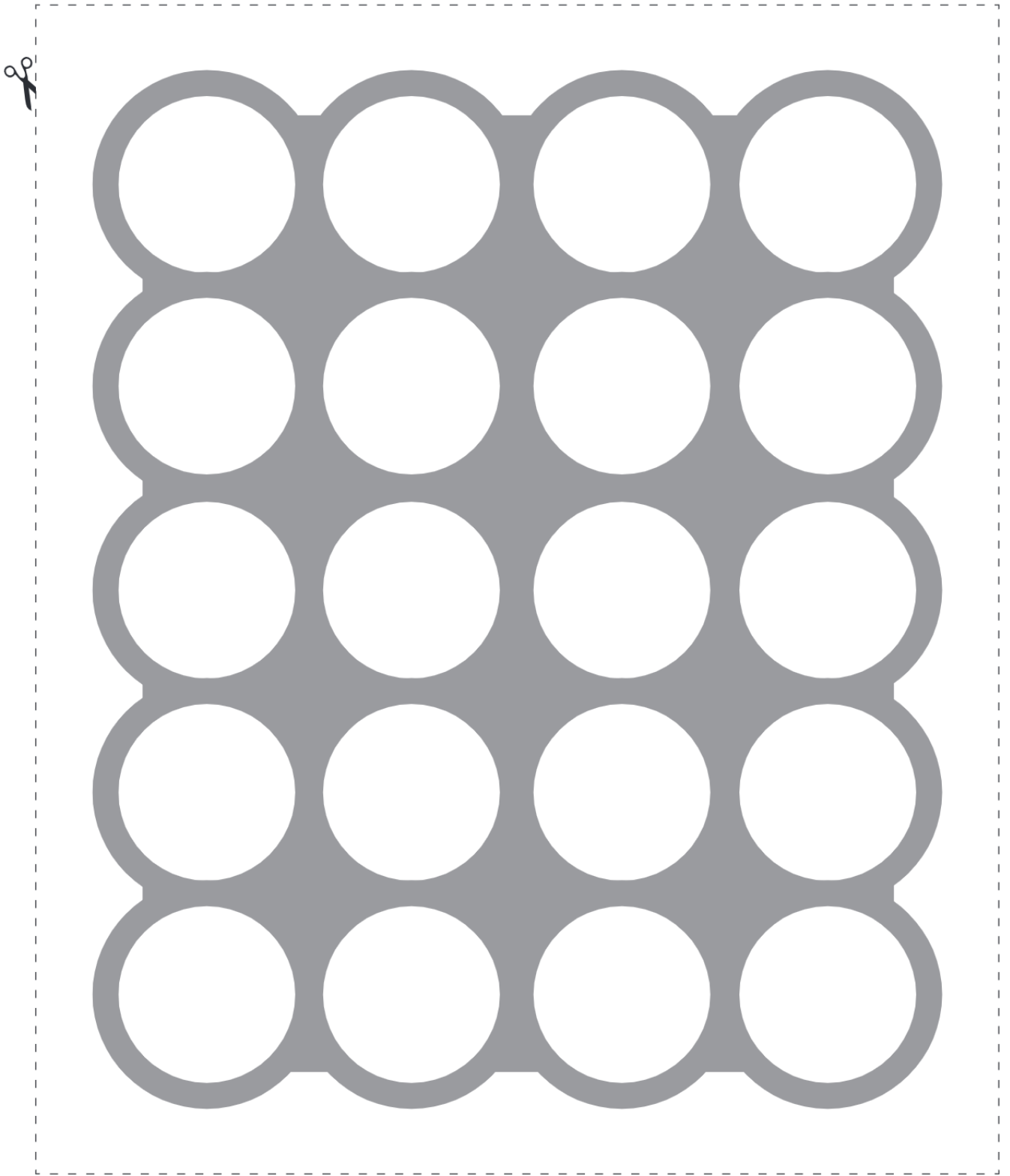
Frames (continued)



Frames (continued)



Frames (continued)



Frames (continued)

