

Picture This

3rd - 6th Grade

OBJECTIVE

To learn how to enlarge or reduce objects to scale.

MATERIALS

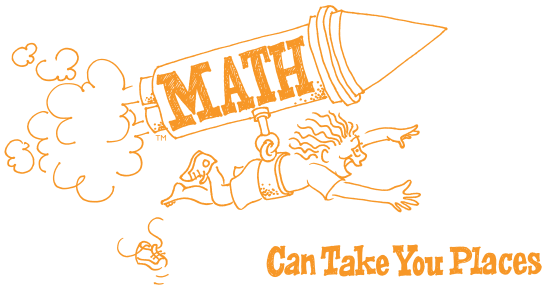
- Pencils - one per student
- Rulers - enough for all students to share
- One-inch grid paper - two sheets for each participant or pair
- Picture This Worksheet - one per student or pair
- *Math Can Take You Places* Rocket Kid Challenge Picture - one per student or pair

BEFORE YOU START

- You may want to draw the rectangles that will be enlarged/reduced in the demonstration ahead of time so you can use them as visuals during the lesson. (You can also use an overhead projector, if available and make a transparency.)
- Extra Background Information:
 $\text{Perimeter} = 2(\text{length}) + 2(\text{width})$ or the total of the lengths of all of the sides of a shape

HOW TO START

Say: Today, you will be starting a new job working at a photo shop. You will be responsible for enlarging and reducing customers' photographs. While you're learning the ropes, we'll start learning the process by using easy shapes, then move on to enlarging a picture.



FOCUS AREA

Patterns

ACTIVITY TYPE

Individual Activity

MATH GOAL

To enlarge or reduce shapes using division and multiplication (proportions)

RECOMMENDED NUMBER OF STUDENTS

Students can work alone or in pairs (older youths with younger ones)

TIME NEEDED

45 minutes

STEPS

Step 1

How to Enlarge

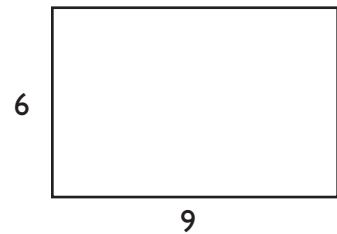
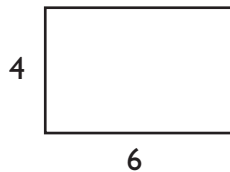
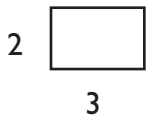
Instruct children to draw a rectangle on 1-inch grid paper. Use the grid to make the length 3 inches (3 boxes) and the width 2 inches (2 boxes). Be sure to use a straight edge so that the lines are neat. Explain that to enlarge means to make the rectangle larger. To double the perimeter of the rectangle, they should multiply the length and the width by two. To triple the perimeter of the rectangle they should multiply the length and the width by three. (and so on)

For example:

	Original size	Doubled its size	Triple its size
Length	3	6	9

	Original size	Doubled its size	Triple its size
Width	2	4	8

Have students draw the original rectangle but double and triple its size. Be sure they label the lengths and widths of their new rectangles (drawings below are not to scale).



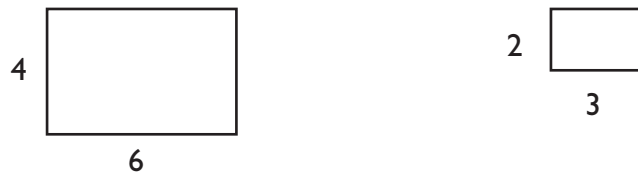
Step 2

How to Reduce

Instruct the children to draw a rectangle on 1-inch grid paper. Use the grid to make the length 6 inches (6 boxes) and the width 4 inches (4 boxes). Be sure to use a straight edge so that the lines are neat. Explain that to reduce the size of the rectangle and make it half its original perimeter, they should divide the length and the width by two.

For example:

	Original size	Half size
Length	6	3
Width	4	2



Step 3

Give each student a Picture This Worksheet and two sheets of 1-inch grid paper. They will work on their own to reduce and enlarge several geometric shapes. The facilitator should walk among the students, checking to make sure everyone understands what they are doing. Make sure students are labeling the lengths and widths of their shapes.

WRAP UP

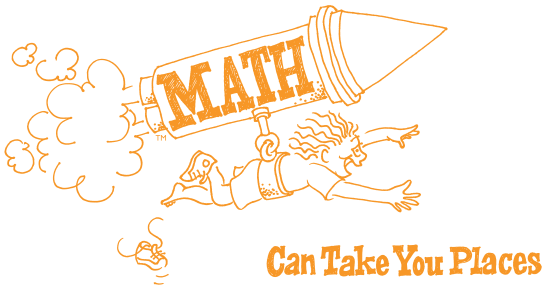
Give each student the *Math Can Take You Places* Rocket Kid Challenge Picture. Give them time to experiment with drawing the line art, reducing it and enlarging it. Allow the students to share their work with the class.

OPTIONAL ACTIVITIES

- Allow students to draw scale pictures of whatever they'd like inside of the shapes they create on the Picture This Worksheet.
- Let the students choose a simple picture from a magazine or newspaper and use the grid paper to attempt to enlarge or reduce the image.
- Discuss how students can use a similar process to distort a picture (similar to a fun-house mirror). For example, what would happen if you only increased the length but not the width? The figure would be stretched out of shape. Have students distort a couple of the shapes to see how different the final product would look. Here's a Web site that explains how to distort a picture by manipulating the grid:
<http://www.princetonol.com/groups/iad/lessons/middle/grid-drawings.htm>

WEB RESOURCES

- How to Enlarge a Picture Using a Grid: http://www.ehow.com/how_12732_enlarge-drawing-using.html
- Printable grid art activities: <http://www.billybear4kids.com/Learn2Draw/grid-art.html>
- Grid Drawing: http://drawsketch.about.com/od/drawinglessonsandtips/ss/griddrawing_2.htm



Activity Cue Card

- Facilitator will demonstrate, step-by-step, how to reduce and enlarge rectangular shapes.
- Then, students will work independently using the Picture This Worksheet and 1-inch grid paper to reduce and enlarge several geometric shapes.
- Pass out the *Math Can Take You Places* Rocket Kid Challenge Picture. Allow students to practice drawing, enlarging and reducing the picture on grid paper.
- Ask for volunteers to share their art with the class.

Picture This Worksheet

1. Draw a rectangle with the following measurements:

length = 2 inch

width = 1 inches

Now make this rectangle 3 times **larger**.

2. Draw a square with the following measurements:

all sides = 6 inches

Now make this square 2 times **smaller**.

3. Draw a square with the following measurements:

all sides = 12 inches

Now make this square 4 times **smaller**.

4. Draw draw a hexagon(six sides) with the following measurements:

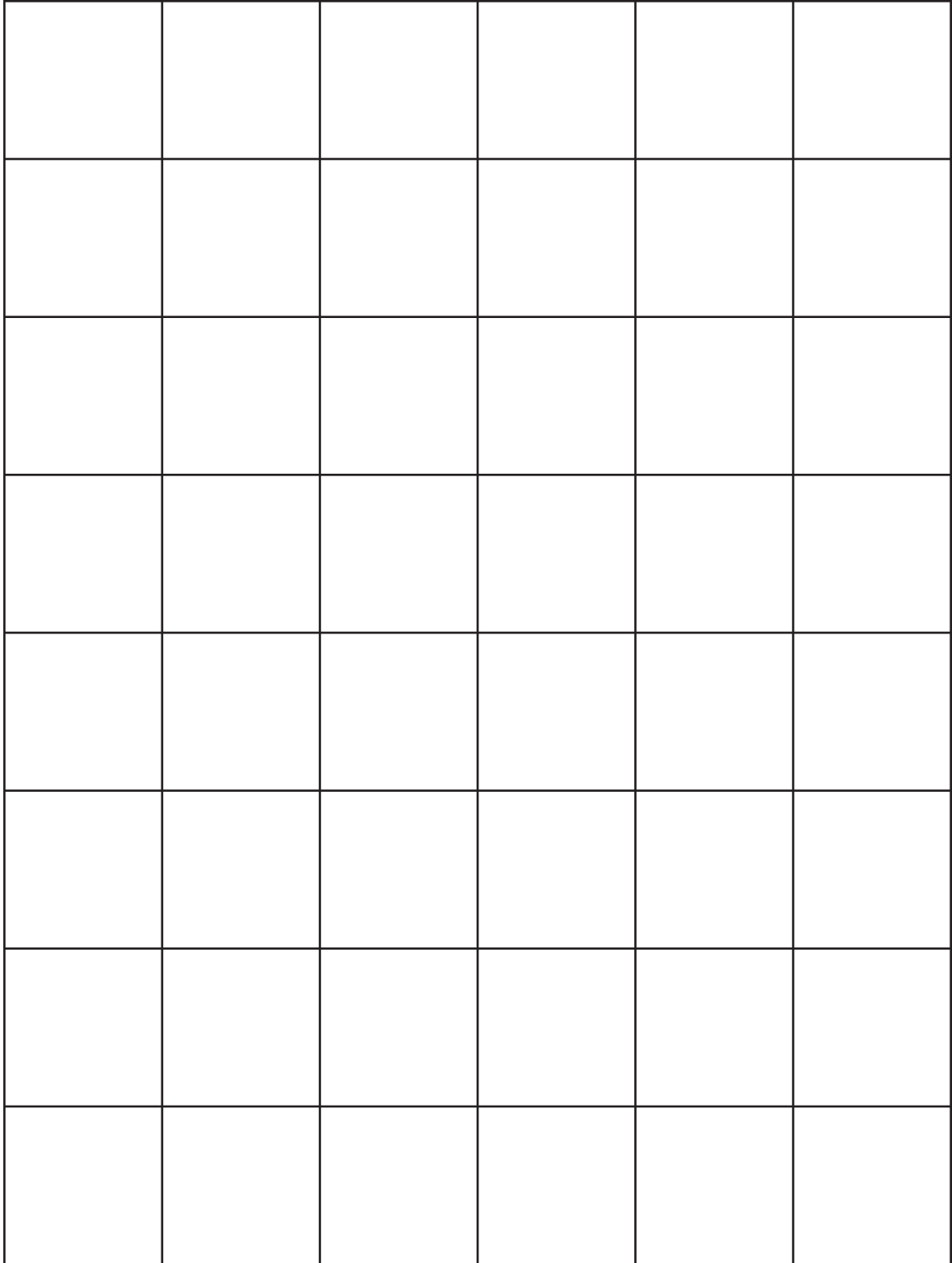
all sides = 2 inches

Now make this hexagon 2 times **larger**.

5. Draw a pentagon (five sides) with the following measurements:

all sides = 4 inches

Now make this pentagon 2 times **smaller**.



**Math Can Take You Places
Rocket Kid Challenge Picture**

