

REAL LIFE REAL WORLD Activity: Architecture Similar Figures and Dilations

Topic: Similar Figures, Scale Drawings & Dilations

Grade Level: 7 - 12

Objective: To use geometry software to create a scale drawing

Time: 30-60 minutes

Introduction

Architects and interior designers create scale drawings that represent the house or room they are designing. A typical scale used for construction plans and blueprints is 1 foot = $\frac{1}{4}$ inch.

Discuss with Students

A scale drawing is an example of a similar figure, in which corresponding sides are proportional. If the scale is 1 foot = $\frac{1}{4}$ inch, set up and solve a proportion to find the needed measurements.

1. How long will a 15 foot path be on the scale drawing?
2. A room is 10 feet by 12.5 feet. How big will it be on the scale drawing?
3. A doorway on the scale drawing is .875 inches wide. How big will it be when built?
4. A new garage to be added on to a house is 4.75 inches by 6 inches on the blueprint. What will its actual dimensions be?

Discuss With Student Answers

1. $\frac{1ft}{.25in} = \frac{15}{x}$ $x = 3.75$ inches
2. $\frac{1ft}{.25in} = \frac{10}{w}$ $w = 2.5$ inches $\frac{1ft}{.25in} = \frac{12.5}{L}$ $L = 3.125$ inches
3. $\frac{1ft}{.25in} = \frac{x}{.875}$ $x = 3.5$ feet (42 in)
4. $\frac{1ft}{.25in} = \frac{w}{4.75}$ $w = 19$ feet $\frac{1ft}{.25in} = \frac{L}{6}$ $L = 24$ feet.

Student Page Answers

5. Answers will vary
6. The ratio of the original figure segment to the dilation image segment will be 4 to 1.
7. The ratio of corresponding angles will be 1 to 1.
8. The ratio of the original figure area to the dilation image area will be 16 to 1. An area ratio will be equal to the square of the length ratio in a set of similar figures.

Technology Reference

This activity uses the following Cabri Jr. functions:

F2	Point	F4	Dilation	F5	Alph-Num
	Segment				Measure: D. & Length
	Quad				Measure: Angle
					Calculate

Refer to "Getting Started with Cabri Jr." for more details.

Name _____ Date _____

REAL LIFE REAL WORLD Activity: Architecture

Architects and Interior Designers need to plan the buildings and rooms they are designing and create scale drawings and blueprints for construction. A typical scale used is 1 foot = $\frac{1}{4}$ inch.

Activity

1. Create a figure to represent a room or floorplan on one side of the screen. Use the Quadrilateral and Segment tools. See Figure 1.
2. Place a point in the opposite side of the screen to be the center of dilation. Label it X.
3. Place the numerical value 0.25 on the screen. See Figure 2.
 - Select the Alph-Num tool.
 - Press **ENTER** to begin the text in a desired location.
 - Press **ALPHA** to use numerical characters.
 - Press **ENTER** to finish the text.
4. Perform a dilation of the figure with scale factor .25 and center X. If the figure has several parts, each part will have to be dilated individually. See Figure 3.
5. Measure corresponding parts of the original figure and its dilation image.
 - Measure a segment length.
 - Measure an angle.
6. What is the ratio of the original segment length and the dilation image segment length? Use the Calculate tool to divide the measurements.
7. What is the ratio of the original angle measure and the dilation image angle measure?
8. If the original figure (or part of it) was created with the Quadrilateral tool, find its area. Find the area of the dilation image figure. What is the ratio of the areas? Explain.

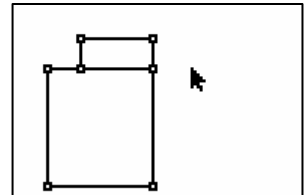


Figure 1

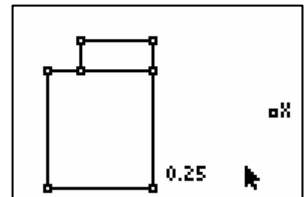


Figure 2

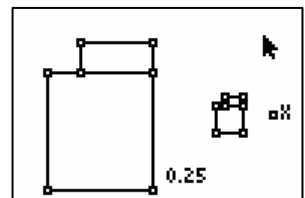


Figure 3

Extensions & Resources

Extension

Measure a room or level of your home and make scale drawing of the floorplan using scale factor 1 foot = .25 inch.

Websites To Explore

<http://www.math-kitecture.com>

See how to use architecture to do math and math to do architecture.

<http://schools.nyc.gov/offices/teachlearn/documents/standards/math/es/67dream.html>

Design a plan for your own dream house.

<http://42explore.com/arch.htm>

Definitions, activities, and resources for students to explore the topic of architecture.