

WAMC Lab Template

Math Concept(s) :

- 1): Analyze Proportional Relationships and use them to solve real-world and mathematical problems.
- 2): Understand ratio concepts and use ratio reasoning to solve problems.

Source / Text: CORD and misc.

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Attach the following documents:

Lab Instructions

Student Handout(s)

Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

Lab Plan

Lab Title: Similarity- "Wonder Walls"

Prerequisite skills:

- Ability to use tape measure and record measurements
- Ability to measure distances in feet and inches
- Ability to convert feet into inches and vice versa

Lab objective:

- SWBAT construct (draw) a two-dimensional model using proportional relationships and unit conversions correctly.
- SWBAT explain how the scale factor affects the size of the drawing.

Standards:

CCSS-M:

Domain:

- 1): 7RP: Ratios and Proportional Relationships
- 2): 6RP: Ratios and Proportional Relationships

Big Idea (Cluster):

- 1): 7RP: Analyze Proportional Relationships and use them to solve real-world and mathematical problems.
- 2): 6RP: Understand ratio concepts and use ratio reasoning to solve problems.

Common Core State Standards:

- 1): 7RP:1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
- 2): 6RP:3d: Use ratio reasoning to convert measurement units: manipulate and transform units appropriately when multiplying or dividing quantities.

Standards for Mathematical Practice:

- CCSS-MP 1-8 (all)
-

State Standards addressed (2008 Washington State Mathematics Standards):

- PE7.2.B: Solve single- and multi-step problems involving proportional relationships and verify the solutions.
- PE7.2.D: Make scale drawings and solve problems related to scale.
- PE7.2.I: Solve single- and multi-step problems involving conversions with or between measurement systems and verify the solutions.

Writing:

-

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)			
<input type="checkbox"/> Global Awareness	<input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy	<input type="checkbox"/> Civic Literacy	
<input type="checkbox"/> Health/Safety Literacy	<input type="checkbox"/> Environmental Literacy		
21st Century Skills (Check those that students will demonstrate in the above activity.)			
LEARNING AND INNOVATION <u>Creativity and Innovation</u>	INFORMATION, MEDIA & TECHNOLOGY SKILLS <u>Information Literacy</u>	LIFE & CAREER SKILLS <u>Flexibility and Adaptability</u>	Productivity and Accountability
<input checked="" type="checkbox"/> Think Creatively	<input type="checkbox"/> Access and Evaluate Information	<input checked="" type="checkbox"/> Adapt to Change	<input checked="" type="checkbox"/> Manage Projects
<input checked="" type="checkbox"/> Work Creatively with Others	<input type="checkbox"/> Use and manage Information	<input checked="" type="checkbox"/> Be Flexible	<input checked="" type="checkbox"/> Produce Results
<input checked="" type="checkbox"/> Implement Innovations	<u>Media Literacy</u>	<u>Initiative and Self-Direction</u>	<u>Leadership and Responsibility</u>
<u>Critical Thinking and Problem Solving</u>	<input type="checkbox"/> Analyze Media	<input checked="" type="checkbox"/> Manage Goals and Time	<input type="checkbox"/> Guide and Lead Others
<input checked="" type="checkbox"/> Reason Effectively	<input type="checkbox"/> Create Media Products	<input type="checkbox"/> Work Independently	<input type="checkbox"/> Be Responsible to Others
<input checked="" type="checkbox"/> Use Systems Thinking	<u>Information, Communications and Technology (ICT Literacy)</u>	<u>Social and Cross-Cultural</u>	
<input checked="" type="checkbox"/> Make Judgments and Decisions	<input checked="" type="checkbox"/> Apply Technology Effectively	<input checked="" type="checkbox"/> Interact Effectively with Others	
<input checked="" type="checkbox"/> Solve Problems		<input type="checkbox"/> Work Effectively in Diverse Teams	
<u>Communication and Collaboration</u>			
<input checked="" type="checkbox"/> Communicate Clearly			
<input checked="" type="checkbox"/> Collaborate with Others			

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Tape measures,
- paper (including graph paper),
- pencils,
- rulers,
- walls

Set-Up Required:

- assemble materials above
- have instructions prepared for distribution (or overhead display)
- have warmup exercise prepared for distribution (or overhead display)

Lab Organization Strategies:

<https://wa-appliedmath.org/>

Grouping/Leadership/Presentation Opportunities:

- students will be in groups of two for this lab: one will do measurement, and one will record data

Cooperative Learning:

Cooperative learning roles will be combined to accommodate student pairs:

- recorder/timekeeper will act as the data recoder
- leader/

Expectations:

- Students will create a scale drawing of the wall(s)- included in the drawing will be all wall features
- Each drawing will have a scale factor listed

Timeline:

- 3 days

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- Using a scale drawing to create a larger model
- Converting distances on a map
- Adjusting a recipe to either double or half the end result
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Career Applications

- Interior Designer
- Engineer
- Construction
- Architect
- Home owner

Optional or Extension Activities

- Extension 1- Have the students create a scale drawing of the front of their home. A picture must accompany the drawing.
- Extension 2- Have the students create a scale drawing of their bedroom floor. All the furnishings need to be included in the drawing.
- Extension 3- Have the students create a scale drawing of their dream home. The scale drawing must include the actual dimensions.

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Warm Up Exercise for “Wonder Walls” Exercise

Using your ruler, measure the figure below. Write its dimensions on the lines next to each side.

_____ inches

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_____ inches

Using those measurements, draw a scale model on a piece of graph paper such that one inch of this square equals $\frac{1}{2}$ inch on the graph paper. (This is considered a 2:1 scale factor.)

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Students' Instructions for "Wonder Walls" Lab

You should be in a group of two! One person will be acting as the measurement person and one person will be recording those measurements. Please trade roles at least once so that each of you has the opportunity to do both jobs.

You should have the following materials:

- Tape measures,
- paper (including graph paper),
- pencils,
- rulers

Your assignment is to examine the wall that is assigned to you and accurately measure every feature on the wall, including:

- the dimensions of the wall itself,
- The windows,
- Light switches,
- White boards
- And anything else that might be on the wall.

Then you must use those measurements to draw a scale drawing on a piece of graph paper. Decide what your scale factor must be in order to correctly transfer all the features of the wall to your graph paper. You might wish to draw a rough sketch first, and then recreate the drawing onto another sheet of paper. Use the suggestions and ideas from our class discussion to help you get started! Ask questions! Have fun!

You will be presenting your final drawing at the end of the project. The rubric for your drawing is attached.

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Instructions for Wonder Walls Lab

Students will be placed in groups of two. Each group will be responsible for accurately creating a scale drawing of the wall(s) in the classroom. Each drawing must include all additional wall features (clock, whiteboard(s), door, window(s), etc.) correctly placed. Each drawing will contain the scale factor the students are using.

All work for conversions must be shown.

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Rubric for “Wonder Walls” Lab

Objectives:

CCSS-M

1): 7RP: Analyze Proportional Relationships and use them to solve real-world and mathematical problems.

2): 6RP: Understand ratio concepts and use ratio reasoning to solve problems.

Advanced (4)	Proficient (3)	Basic (2)	Below Standard (0)
<p>Student consistently demonstrates clear and in-depth understanding of the concepts outlined previously in these ways:</p> <ul style="list-style-type: none"> Answers more than 95% of the questions correctly, uses correct notation in 95% of answers, gives all final answers in simplest form (by reducing fractions and combining like terms), and in Standard Form (when appropriate) 	<p>Student demonstrates good understanding of using measurement techniques to create a two-dimensional model from a life-sized example of a classroom wall.</p> <p>Student can:</p> <ul style="list-style-type: none"> accurately make measurements and record that information to use in scale drawing, create a scale drawing using a scale factor consistently throughout the drawing, render an accurate model with regard to placement of fixtures, windows, etc. use knowledge of proportional relationships to calculate unit conversions <p>Student:</p> <ul style="list-style-type: none"> can create a model with 85% of features in the correct places and with the correct scale, uses correct units in at least 85% of answers, gives some final answers in simplest form (by reducing fractions and combining like terms), and in Standard Form (when appropriate), may make some errors in basic math skills, but otherwise meets all terms as described above. 	<p>Student demonstrates basic understanding of using measurement techniques to create a two-dimensional model from a life-sized example of a classroom wall.</p> <p>Student can:</p> <ul style="list-style-type: none"> accurately make measurements and record that information to use in scale drawing, create a scale drawing using a scale factor consistently throughout the drawing, render an accurate model with regard to placement of fixtures, windows, etc. use knowledge of proportional relationships to calculate unit conversions <p>Student:</p> <ul style="list-style-type: none"> can create a model with 75% of features in the correct places and with the correct scale, uses correct units in at least 75% of answers, may make some errors in basic math skills, but otherwise meets all terms as described above. 	<p>Student demonstrates little to no understanding of using measurement techniques to create a two-dimensional model from a life-sized example of a classroom wall.</p> <p>Student makes no use of knowledge and skills to analyze and solve problems.</p> <p>Student has not provided enough assessment evidence to make a determination.</p>

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