

SCALE CITY

KET

# The Road to Proportional Reasoning: Murals Handouts

## TABLE OF CONTENTS

*Click on a title to go directly to the handout.*

### **Handout 1: Rectangle Review**

Practice calculating area

### **Handout 2: Proportions and Rectangles #1**

Teacher-led exercise in how changing the size of a rectangle changes the amount of paint needed to cover an area

### **Handout 3: Proportions and Rectangles #2**

Guided practice for students on proportional relationships

### **Handout 4: On Your Own: Step-by-Step**

Step-by-step problems involving proportional reasoning

### **Handout 5: On Your Own**

The same problems in Handout 4 without the steps

### **Handout 6: Mural Math Game**

Twenty multiple choice questions to use with the Mural Math Game

# MURALS: HANDOUT 1

## Rectangle Review

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

1. Use a ruler to create grids with the following dimensions in a corner of your paper. Fill in the blanks.

<b>Length</b>	<b>Width</b>	<b>Area (Total Square Inches)</b>
4 inches	2 inches	_____
5 inches	3 inches	_____
6 inches	4 inches	_____
7 inches	5 inches	_____
8 inches	6 inches	_____

2. What is the formula for the area of a rectangle?

3. Use the formula for the area of a rectangle to calculate the following:

<b>Length</b>	<b>Width</b>	<b>Area (Total Square Inches)</b>
152 inches	20 inches	_____
30 inches	25.2 inches	_____
11 inches	8.5 inches	_____
241 inches	30 inches	_____
14 inches	7 inches	_____
49 inches	2 inches	_____

# Rectangle Review

4. Which two rectangles in problem 3 have the same area?

5. How could you use the length and width to show these rectangles are proportional?

Length	Width	Area (Total Square Inches)
4 inches	2 inches	_____
8 inches	4 inches	_____
12 inches	6 inches	_____

**Bonus thinking:** A two-by-two inch grid has four square inches of area. A four-by-four inch grid has 16 square inches of area. The size of the height and width are doubled. Why isn't the area of the larger grid double the area of the smaller grid?

# KEY: MURALS: HANDOUT 1

## Rectangle Review

1. Use a ruler to create grids with the following dimensions in a corner of your paper. Fill in the blanks.

Length	Width	Area (Total Square Inches)
4 inches	2 inches	$8 \text{ in}^2$
5 inches	3 inches	$15 \text{ in}^2$
6 inches	4 inches	$24 \text{ in}^2$
7 inches	5 inches	$35 \text{ in}^2$
8 inches	6 inches	$48 \text{ in}^2$

2. What is the formula for the area of a rectangle?

$$\text{Length} \cdot \text{Width} = \text{Area}$$

3. Use the formula for the area of a rectangle to calculate the following:

Length	Width	Area (Total Square Inches)
152 inches	20 inches	$3040 \text{ in}^2$
30 inches	25.2 inches	$756 \text{ in}^2$
11 inches	8.5 inches	$93.5 \text{ in}^2$
241 inches	30 inches	$7230 \text{ in}^2$
14 inches	7 inches	$98 \text{ in}^2$
49 inches	2 inches	$98 \text{ in}^2$

4. Which two rectangles in problem 3 have the same area?

$$14 \times 7 \text{ and } 49 \times 2$$

5. How could you use the length and width to show these rectangles are proportional?

Length	Width	Area (Total Square Inches)
4 inches	2 inches	$8 \text{ in}^2$
8 inches	4 inches	$32 \text{ in}^2$
12 inches	6 inches	$72 \text{ in}^2$

*The length and width form equivalent fractions:  $2/4 = 4/8 = 6/12$ . (Note to teacher: The area calculation is here to help students realize that both dimensions are necessary to determine area.)*

**Bonus Thinking:** A two-by-two inch grid has four square inches of area. A four-by-four inch grid has 16 square inches of area. The size of the height and width are doubled. Why isn't the area of the larger grid double the area of the smaller grid?

*Both the length and the width are doubled, so the area is four times greater. Students might mention that if just one dimension is doubled, the area will be doubled, or you might ask them what happens if you double just one side.*

# MURALS: HANDOUT 2

## Proportions and Rectangles #1

**Name:**

**Date:**

The art teacher is so impressed with Enrique's painting of the school, she asked him to create a larger version for the fall open house. Enrique's original painting was  $8\frac{1}{2}$  inches by 11 inches. The paper she would like him to use is twice the length and twice the width of his first painting.

- A.** What is the length and width of the larger paper? (Multiply each dimension by two.)
- B.** What is the area of the 8.5-inch by 11-inch paper? (Multiply the length by the width. The answer will be in square inches.)
- C.** What is the area of the larger paper?
- D.** If Enrique used 0.4 ounces of gray for his original drawing, how much gray will he need for the larger drawing?
- E.** The area of the 8.5-inch by 11-inch paper is what percent of the area of the larger paper?
- F.** Why is the area of the larger paper more than twice the area of the smaller paper?

**Bonus Thinking:** How could you have used your answer from part E to calculate the amount of paint needed?

# KEY: MURALS: HANDOUT 2

## Proportions and Rectangles #1

The art teacher is so impressed with Enrique's painting of the school, she asked him to create a larger version for the fall open house. Enrique's original painting was  $8\frac{1}{2}$  by 11 inches. The paper she would like him to use is twice the length and twice the width of his first painting.

**A.** What is the size of the larger paper? (Multiply each dimension by two.)

$$17 \text{ inches} \times 22 \text{ inches} \quad (8.5 \times 2 = 17, 11 \times 2 = 22)$$

**B.** What is the area of the 8.5-inch by 11-inch paper? (Multiply the length by the width. The answer will be in square inches.)

$$8.5 \text{ inches} \times 11 \text{ inches} = 93.5 \text{ square inches}$$

**C.** What is the area of the larger paper?

$$17 \text{ inches} \times 22 \text{ inches} = 374 \text{ square inches}$$

**D.** If Enrique used 0.4 ounces of gray for his original painting, how much gray will he need for the larger drawing? *Ask the students what they would assume about the larger painting relative to the original. (Enrique would create a larger version with the same proportions as the smaller one.) Ask, how does the amount of paint he uses relate to the areas of the two drawings? (They are proportional) Have students help set up proportions involving the areas and the known amount of paint and ask them to offer alternative ways of solving the problem.*

$$0.4/93.5 = x/374 \quad \text{or} \quad 93.5/0.4 = 374/x \quad \text{or} \quad 93.5/374 = 0.4/x \quad \text{or} \quad 374/93.5 = x/0.4$$

$$0.4 \times 374 = 93.5 x$$

$$149.6 = 93.5 x$$

$$149.6/93.5 = x$$

$$1.6 = x \quad \text{The answer is 1.6 ounces of paint.}$$

**E.** The area of the 8.5-inch by 11-inch paper is what percent of the area of the larger paper?

$$93.5 \text{ square inches} / 374 \text{ square inches} = 0.25$$

$$0.25 \times 100 = 25\%$$

**F.** Why is the area of the larger paper more than twice the area of the smaller paper?

*Both the length and width have doubled, so the area of the 11-inch by 22-inch paper is four times the area of the smaller paper. If just one dimension doubled, the area would double, but this would not allow Enrique to create a proportional replica of his original painting. A word processing or Photo Shop-type program can be used to demonstrate what happens to proportionality when only one dimension of a two-dimensional representation is increased.*

**Bonus Thinking:** How could you have used your answer from part E to calculate the amount of paint needed?

$$25 \text{ percent of what} = 0.4 \text{ ounces}$$

$$0.25 x = 0.4$$

$$x = 0.4 / .25$$

$$x = 1.6$$

# MURALS: HANDOUT 3

## Proportions and Rectangles #2

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Sara is designing a poster for the writing club with a composition book in proportion to an actual composition book. An actual composition book is  $9\frac{3}{4}$  inches by  $7\frac{1}{2}$  inches. If she were multiplying the length and the width by two, what would be the dimensions of the composition book on the poster?

2. To launch her catering business, Sally is decorating a cake with an image of a large business card. The business card is 2 inches by 3.5 inches. The business card on the cake will be 3.5 times the length and 3.5 times the width of the actual card. What will the dimensions of the card on the cake be so they are proportional to an actual business card?

3. A barn quilt is a painting of a quilt square mounted on a barn. A four-foot square barn quilt used  $\frac{1}{4}$  pint of blue paint. If the same quilt design were used on an eight-foot square barn quilt, how much paint would be needed?

A. Specify the measurements.

Smaller quilt: side = \_\_\_\_\_

Larger quilt: side = \_\_\_\_\_

B. Calculate the area in square units.

Smaller quilt: \_\_\_\_\_

Larger quilt: \_\_\_\_\_

C. Explain the proportional relationship in words.

D. Solve using proportional relationships.

E. Answer in the units specified in the problem.

# KEY: MURALS: HANDOUT 3

## Proportions and Rectangles #2

**1.** Sara is designing a poster for the writing club with a composition book in proportion to an actual composition book. An actual composition book is  $9\frac{3}{4}$  inches by  $7\frac{1}{2}$  inches. If she were multiplying the length and the width by two, what would be the dimensions of the composition book on the poster?

$$7\frac{1}{2} \times 2 = 15 \text{ inches}$$

$$9\frac{3}{4} \times 2 = 19\frac{1}{2} \text{ inches}$$

**2.** To launch her catering business, Sally is decorating a cake with an image of a large business card. The business card is 2 inches by 3.5 inches. The business card on the cake will be 3.5 times the length and 3.5 times the width of the actual card. What will the dimensions of the card on the cake be so they are proportional to an actual business card?

$$2 \times 3.5 = 7 \text{ inches (width)}$$

$$3.5 \times 3.5 = 12.25 \text{ inches (length)}$$

**3.** A barn quilt is a painting of a quilt square mounted on a barn. A four-foot square barn quilt used one-fourth pint of blue paint. If the same quilt design were used on an eight-foot square barn quilt, how much paint would be needed?

A. Specify the measurements.

Smaller quilt: side = 4

Larger quilt: side = 8

B. Calculate the area in square units

Smaller quilt: side x side =  $4 \times 4 = 16$  square feet

Larger quilt: side x side =  $8 \times 8 = 64$  square feet

C. Describe the proportional relationship in words.

*The amount of blue paint on a four-foot square barn quilt is proportional to the amount of blue paint needed for an eight-foot square version of the same design.*

D. Solve using proportional relationships.

$\frac{1}{4}$  pint of blue / 16 square feet =  $\frac{x}{64}$  square feet

$$\frac{1}{4} \times 64 = 16x$$

$$16 = 16x$$

$$x = 1$$

E. Answer in the units specified in the problem.

*The eight-foot square quilt would require one pint of blue paint.*

# MURALS: HANDOUT 4

## On Your Own: Step-by-Step

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**1.** One gallon of paint covers 380 square feet. If the ceiling you want to paint measures 8 feet by 12 feet, how much paint is needed? (Round your answer to the hundredths place.)

A. Describe the proportional relationship in words.

B. Specify the length and width.

Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

C. Calculate the area in square units.

D. Solve using proportional relationships.

E. Write in units specified in the problem.

**2.** Kaylee wanted to enlarge the size of a painting. Her original painting was on 8 1/2-inch by 11-inch paper. Her new painting will be on 22-inch by 28-inch poster board. She used 0.5 ounces of black paint on her smaller piece. How much black will she need for the poster board painting? (Round your answer to the hundredths place.)

A. Describe the proportional relationship in words.

B. Specify the length and width of both paintings.

Original  
Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

Replica  
Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

C. Calculate the area in square units.

Smaller painting: \_\_\_\_\_ Larger painting: \_\_\_\_\_

D. Solve using proportional relationships.

E. Write in units specified in problem.

**3.** The kitchen measures 8 feet by 12 feet. The tile that will be used to cover the floor measures 6 inches by 6 inches. How many tiles are needed?

A. Describe the proportional relationship in words.

B. Specify the length and width of the tile and the kitchen.

Tile: \_\_\_\_\_

Kitchen

Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

C. Calculate the area of the kitchen and the individual tiles in square units.

Area of kitchen = \_\_\_\_\_

Convert the tile's 6-inch by 6-inch measurements to feet. (Hint: How many inches are in a foot? What fraction of a foot are the length and width of the tile? How would you express this fraction as a decimal?)

Area of tile (in square feet) = \_\_\_\_\_

D. Solve using proportional relationships.

E. Write in units specified in problem.

**4.** A football field is 360 feet by 160 feet. If four pounds of fertilizer are recommended for every 1,000 square feet, how many pounds of fertilizer will be used for one field application? The fertilizer comes in 20-pound bags. How many bags will be used?

A. Describe the proportional relationship in words.

B. Specify the length and width.

Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

C. Calculate the area in square units.

D. Solve using proportional relationships.

E. Write in units specified in problem.

**5.** The art club is making rectangular tile wall hangings. The individual squares will be painted on tiles that are 4 centimeters by 4 centimeters. The tiles will be placed on a 24-centimeter by 16-centimeter rectangle to resemble a quilt. How many tiles are needed for each “quilt”?

A. Describe the proportional relationship in words.

B. Specify the length and width.

Tile: \_\_\_\_\_

Rectangle

Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

C. Calculate the area in square units.

Area of Rectangle = \_\_\_\_\_ Area of Tile = \_\_\_\_\_

D. Solve using proportional relationships.

E. Write in units specified in problem.

**Note to student:** You can check your answer by measuring the specified rectangle on paper and marking a grid for the 4-cm by 4-cm tiles.

**6.** A commercial wood floor finish used for the high school gymnasium coats at least 600 square feet per gallon. The gym is 74 feet by 50 feet. How much floor finish will the school need? (Round your answer to the hundredths place.)

A. Describe the proportional relationship in words.

B. Specify the length and width.

Length (longest side) = \_\_\_\_\_ Width (shortest side) = \_\_\_\_\_

C. Calculate the area in square units.

D. Solve using proportional relationships.

E. Write in units specified in problem.

**7.** Cam is making a sign for the school dunking booth. She made a cartoon painting of a duck on a 4-inch by 5-inch paper. She used 0.2 ounces of yellow for the small painting. The large painting will be on a 20-inch by 25-inch board. How much yellow paint will she need?

A. Describe the proportional relationship in words.

B. Specify the length and width of each painting.

Small painting  
Length (longest side) = \_\_\_\_\_      Width (shortest side) = \_\_\_\_\_

Large painting  
Length (longest side) = \_\_\_\_\_      Width (shortest side) = \_\_\_\_\_

C. Calculate the area in square units.

Area of small painting = \_\_\_\_\_      Area of a large painting = \_\_\_\_\_

D. Solve using proportional relationships.

E. Write in units specified in problem.

# KEY: MURALS: HANDOUT 4

## On Your Own: Step-by-Step

1. One gallon of paint covers 380 square feet. If the ceiling you want to paint measures 8 feet by 12 feet, how much paint is needed? (Round your answer to the hundredths place.)

A. Describe the proportional relationship in words.

*One gallon of paint is to 380 square feet as the amount of paint needed for the ceiling is to the ceiling's area in square feet.  
one gallon of paint/380 square feet = amount of paint needed/area in square feet*

B. Specify the length and width.

Length (longest side) = 12 feet    Width (shortest side) = 8 feet

C. Calculate the area in square units.

*Length · Width*

$$12 \cdot 8 = 96 \text{ square feet}$$

D. Solve using proportional relationships.

$$1/380 \text{ square feet} = x/96 \text{ square feet}$$

$$380x = 96$$

$$x = 96/380$$

$$x = 0.2526$$

*Students also might divide 96 by 380 to determine what percent of 380 ninety-six represents. Or they might divide 380 by 96 and discover that 96 is approximately 1/4 of 380.*

E. Write in units specified in the problem.

*0.25 gallons will be needed (also accept .25 or 1/4 gallon or one quart)*

2. Kaylee wanted to enlarge the size of a painting. Her original painting was on 8 1/2-inch by 11-inch paper. Her new painting will be on 22-inch by 28-inch poster board. She used 0.5 ounces of black paint on her smaller piece. How much black will she need for the poster board painting? (Round your answer to the hundredths place.)

A. Describe the proportional relationship in words.

*The black paint for the small painting is to the small painting's area as the black paint for the large painting is to the large painting's area.*

*Black for small painting /small area in square inches = Black for large painting /large area in square inches*

B. Specify the length and width of both paintings.

Original

Length (longest side) = 11 inches    Width (shortest side) = 8 1/2 inches

Replica

Length (longest side) = 28 inches    Width (shortest side) = 22 inches

C. Calculate the area in square units.

Smaller painting:

$Length \times Width$

$$11 \times 8.5 = 93.5 \text{ square inches}$$

Larger painting:

$Length \times Width$

$$28 \times 22 = 616 \text{ square inches}$$

D. Solve using proportional relationships.

$$0.5/93.5 = x/616$$

$$93.5 x = 0.5 \cdot 616$$

$$x = 0.5 \cdot 616/93.5$$

$$x = 3.294163$$

Students also might calculate the value of the ratio of the larger painting's area to the smaller painting's area ( $616/93.5 = 6.588325$ ) and multiply 0.5 ounces by this value ( $0.5 \times 6.588325 = 3.294163$ ).

E. Write in units specified in problem.

*She will need 3.29 ounces of black paint.*

**3.** The kitchen measures 8 feet by 12 feet. The tile that will be used to cover the floor measures 6 inches by 6 inches. How many tiles are needed?

A. Describe the proportional relationship in words.

*One tile is to its square area as the number of tiles needed is to the square area of the kitchen.*

*1 tile /square area of tile = number of tile needed/square area of kitchen*

B. Specify the length and width of the tile and the kitchen.

Tile: *6 inches x 6 inches*

Kitchen: Length (longest side) = *12 feet*    Width (shortest side) = *8 feet*

C. Calculate the area of the kitchen and the individual tiles in square units.

Area of kitchen = *96 square feet*

Convert the tile's 6-inch by 6-inch measurements to feet. (Hint: How many inches are in a foot? What fraction of a foot are the length and width of the tile? How would you express this fraction as a decimal?)

Area of tile (in square feet) =  $0.5 \times 0.5 = 0.25 \text{ square feet}$

D. Solve using proportional relationships.

$$1/0.25 = x/96$$

$$0.25 x = 96$$

$$x = 96/0.25$$

$$x = 384$$

Students also might take the area of the kitchen (96 square feet) and divide it by 0.25 to arrive at the answer of 384. Or they might realize that there are four tiles in a square foot, so they might multiply 96 by 4.

E. Write in units specified in problem.

*384 tiles*

**4.** A football field is 360 feet by 160 feet. If four pounds of fertilizer are recommended for every 1,000 square feet, how many pounds of fertilizer will be used for one field application? The fertilizer comes in 20-pound bags. How many bags will be used?

A. Describe the proportional relationship in words.

*Four pounds of fertilizer is to 1,000 square feet as the needed pounds of fertilizer are to the area of the field.*

*4 pounds of fertilizer / 1,000 square feet = needed pounds of fertilizer / area of football field*

B. Specify the length and width.

Length (longest side) = 360 feet    Width (shortest side) = 160 feet

C. Calculate the area in square units.

*Area of field = Length  $\times$  Width =  $360 \times 160 = 57,600$  square feet*

D. Solve using proportional relationships.

$$4/1000 = x/57600$$

$$1000x = 4 \cdot 57600$$

$$x = 4 \cdot 57600/1000$$

$$x = 230.4$$

*Students also might divide 57,600 by 1000 and multiply the result (57.6) times four to get 230.4 pounds*

E. Write in units specified in problem.

*11.52 bags of fertilizer.*

*230.4 divided by 20 (number of pounds in a bag) = 11.52*

*You might want to discuss with your students how this information would translate into practical terms—you would actually buy 12 bags of fertilizer for the project.*

**5.** The art club is making rectangular tile wall hangings. The individual squares will be painted on tiles that are 4 centimeters by 4 centimeters. The tiles will be placed on a 24-centimeter by 16-centimeter rectangle to resemble a quilt. How many tiles are needed for each “quilt”?

A. Describe the proportional relationship in words.

*One tile is to its area in square centimeters as the number of tiles needed is to the area of the rectangle.*

*1 tile/square foot area = number of tiles needed/area of rectangle*

B. Specify the length and width.

Tile: 4 cm  $\times$  4 cm

Rectangle

Length (longest side) = 24 cm    Width (shortest side) = 16 cm

C. Calculate the area in square units.

*Area of Rectangle =  $24 \times 16 = 384$  square centimeters      Area of Tile =  $4 \times 4 = 16$  square centimeters*

D. Solve using proportional relationships.

$$1/16 = x/384$$

$$16x = 384$$

$$x = 384/16$$

$$x = 24$$

*Students also might divide 384 by 16 to arrive at their answer.*

E. Write in units specified in problem.

*24 tiles*

**6.** A commercial wood floor finish used for the high school gymnasium coats at least 600 square feet per gallon. The gym is 74 feet by 50 feet. How much floor finish will the school need? (Round your answer to the hundredths place.)

A. Describe the proportional relationship in words.

*One gallon of paint is to 600 square feet as the number of gallons needed is to area of the gym.*

*1 gallon/600 square feet = gallons needed/area of gym*

B. Specify the length and width.

Length (longest side) = 74 feet      Width (shortest side) = 50 feet

C. Calculate the area in square units.

*Area of floor = 74 • 50 = 3700 square feet*

D. Solve using proportional relationships.

$$1/600 = x/3700$$

$$600x = 3700$$

$$x = 3700/600$$

$$x = 6.16666667$$

*Students might divide the area of the gym (3700) by 600 to arrive at their answer.*

E. Write in units specified in problem.

*6.17 gallons are needed*

**7.** Cam is making a sign for the school dunking booth. She made a cartoon painting of a duck on a 4-inch by 5-inch paper. She used 0.2 ounces of yellow for the small painting. The large painting will be on a 20-inch by 25-inch board. How much yellow paint will she need?

A. Describe the proportional relationship in words.

*The amount of paint Cam used is to the area of the small painting as the amount of paint needed for the larger version is to the larger version's area.*

*0.2 oz of paint/area of small painting = paint needed/area of large painting*

B. Specify the length and width of the small and large paintings.

*Small painting*

Length (longest side) = 5 inches      Width (shortest side) = 4 inches

*Large painting*

Length (longest side) = 25 inches      Width (shortest side) = 20 inches

C. Calculate the area in square units

*Area of small painting = Length x Width = 5 x 4 = 20 square inches*

*Area of large painting = Length x Width = 25 x 20 = 500 square inches*

D. Solve using proportional relationships.

$$0.2/20 = x/500$$

$$20x = 100$$

$$x = 100/20$$

$$x = 5$$

*Students might find the value of the ratio of the large painting's area to the small painting's area (500/20 = 25) and then multiple 0.2 by 25 to arrive at the answer.*

E. Write in units specified in problem.

*5 ounces of yellow paint will be needed.*

# MURALS: HANDOUT 5

## On Your Own

**Name:**

**Date:**

1. One gallon of paint covers 380 square feet. If the ceiling you want to paint measures 8 feet by 12 feet, how much paint is needed? (Round your answer to the hundredths place.)
2. Kaylee wanted to enlarge the size of a painting. Her original painting was on 8 1/2-inch by 11-inch paper. Her new painting will be on 22-inch by 28-inch poster board. She used 0.5 ounces of black paint on her smaller piece. How much black will she need for the poster board painting? (Round your answer to the hundredths place.)
3. The kitchen measures 8 feet by 12 feet. The tile that will be used to cover the floor measures 6 inches by 6 inches. How many tiles are needed?
4. A football field is 360 feet by 160 feet. If four pounds of fertilizer are recommended for every 1,000 square feet, how many pounds of fertilizer will be used for one field application? The fertilizer comes in 20-pound bags. How many bags will be used?
5. The art club is making rectangular tile wall hangings. The individual squares will be painted on tiles that are 4 centimeters by 4 centimeters. The tiles will be placed on a 24-centimeter by 16-centimeter rectangle to resemble a quilt. How many tiles are needed for each "quilt"?
6. A commercial wood floor finish used for the high school gymnasium coats at least 600 square feet per gallon. The gym is 74 feet by 50 feet. How much floor finish will the school need? (Round your answer to the hundredths place.)
7. Cam is making a sign for the school dunking booth. She made a cartoon painting of a duck on a 4-inch by 5-inch paper. She used 0.2 ounces of yellow for the small painting. The large painting will be on a 20-inch by 25-inch board. How much yellow paint will she need?

# KEY: MURALS: HANDOUT 5

## On Your Own

### Teacher Tip:

When you go over these problems, encourage students to share and discuss the methods they used to solve them.

1. One gallon of paint covers 380 square feet. If the ceiling you want to paint measures 8 feet by 12 feet, how much paint is needed? (Round your answer to the hundredths place.)  
*0.25 gallons will be needed. Accept 0.25 gallons or 1/4 gallon or 1 quart.*
2. Kaylee wanted to enlarge the size of a painting. Her original painting was on 8 1/2-inch by 11-inch paper. Her new painting will be on 22-inch by 28-inch poster board. She used 0.5 ounces of black paint on her smaller piece. How much black will she need for the poster board painting? (Round your answer to the hundredths place.)  
*She will need 3.29 ounces of black paint.*
3. The kitchen measures 8 feet by 12 feet. The tile that will be used to cover the floor measures 6 inches by 6 inches. How many tiles are needed?  
*384 tiles*
4. A football field is 360 feet by 160 feet. If four pounds of fertilizer are recommended for every 1,000 square feet, how many pounds of fertilizer will be used for one field application? The fertilizer comes in 20-pound bags. How many bags will be used?  
*11.52 bags of fertilizer will be used. You might want to discuss with your students how this information would translate into practical terms—you would actually buy 12 bags of fertilizer for the project.*
5. The art club is making rectangular tile wall hangings. The individual squares will be painted on tiles that are 4 centimeters by 4 centimeters. The tiles will be placed on a 24-centimeter by 16-centimeter rectangle to resemble a quilt. How many tiles are needed for each “quilt”?  
*24 tiles will be used.*
6. A commercial wood floor finish used for the high school gymnasium coats at least 600 square feet per gallon. The gym is 74 feet by 50 feet. How much floor finish will the school need? (Round your answer to the hundredths place.)  
*6.17 gallons are needed. See comment for question 4.*
7. Cam is making a sign for the school dunking booth. She made a cartoon painting of a duck on a 4-inch by 5-inch paper. She used 0.2 ounces of yellow for the small painting. The large painting will be on a 20-inch by 25-inch board. How much yellow paint will she need?  
*5 ounces of yellow paint will be needed.*

# MURALS: HANDOUT 6

## Mural Math Game

**Name:**

**Date:**

**Directions:** Your challenge is to earn grid pieces that will allow you to reconstruct an entire picture. The first group to complete its picture wins the game. You earn pieces from your grid by answering multiple choice questions correctly. This is not a race—all teams will answer all the questions. Display your team’s answer when the teacher says, “Show your answer.” Teams that show more than one answer won’t receive a point. Every team that provides the correct answer will receive a piece of their picture.

1. One gallon of paint is needed to cover 380 square feet. If the ceiling measures 30 feet by 45 feet, the amount of paint needed would be
  - A. less than 2 gallons
  - B. less than 3 gallons
  - C. more than 3 gallons
  - D. more than 4 gallons
2. Tori made a painting of her favorite vacation spot on an 8 1/2-inch by 11-inch paper. She wants to expand the painting to a wall painting for the art room measuring 25.5 inches by 33 inches. She used 0.3 ounces of gray paint on her smaller drawing. The amount of gray paint she will need for her larger drawing is
  - A. 0.6 ounces
  - B. 0.9 ounces
  - C. 2.7 ounces
  - D. 3.4 ounces
3. The 4-H club is making plaques for area businesses and leaders who have supported the club. The plaques are 4 inches by 4 inches. There are 40 plaques to make. One spray can of shellac covers at least 3600 square inches. All the plaques will be sprayed with shellac. The number of spray cans to buy is
  - A. 1 can
  - B. 2 cans
  - C. 3 cans
  - D. 4 cans
4. In preparing a mural for the community center, a group will cover the mural with paint sealant. A can of sealant will cover 100 square feet per quart. For an 8-foot by 12-foot area, the amount of sealant needed is
  - A. 1 quart
  - B. 1 1/2 quarts
  - C. 2 quarts
  - D. 3 quarts
5. Every Saturday, Shonique’s mom says that there is not enough parking at the mall. The suggested amount of parking is five spaces for every 1000 square feet of retail space. The mall has 2500 parking spaces. If the mall is 562,298 square feet, it
  - A. has 300 more parking spaces than recommended
  - B. has 20 more parking spaces than recommended
  - C. needs 132 more parking spaces
  - D. needs more than 300 additional parking spaces

- 6.** The grass seed company recommends one bag of seed per 1000 square feet. The new baseball field will have 26,000 square feet of grass area in the outfield. The amount of grass seed needed is
- A. 14 bags
  - B. 22 bags
  - C. 26 bags
  - D. 32 bags
- 7.** A commercial wood floor finish used for the middle school gymnasium coats at least 600 square feet per gallon. The gym is 74 feet by 50 square feet. The school will need at least
- A. 4.5 gallons of finish
  - B. 6.2 gallons of finish
  - C. 7.8 gallons of finish
  - D. 12.4 gallons of finish
- 8.** The industrial arts enrichment class is creating tile trivets for sale at the school's annual craft fair. The tile will cover an area that is 12 centimeters by 15 centimeters. The size of the tile is 3 cm by 3 cm. To make one craft trivet, you would need
- A. 9 tiles
  - B. 20 tiles
  - C. 36 tiles
  - D. 45 tiles
- 9.** During a class homework check, you read the following on another student's paper:  
 $15\text{ cm} \times 10\text{ cm} = 150\text{ square centimeters}$ ,  $30\text{ cm} \times 20\text{ cm} = 300\text{ square cm}$ . This student made an error in
- A. calculating the area of a 15 cm by 10 cm rectangle
  - B. writing the units in square centimeters instead of meters
  - C. writing cm as an abbreviation for centimeters
  - D. calculating the area of a 30 cm by 20 cm rectangle
- 10.** Alex is going to paint a mural on the wall of his room this weekend. He used 1 ounce of orange paint for an 8 1/2-inch by 11-inch drawing. He will increase the size of his painting to 34 inches by 44 inches. He will likely use
- A. 4 ounces of orange paint
  - B. 8 ounces of orange paint
  - C. 16 ounces of orange paint
  - D. 20 ounces of orange paint
- 11.** You know the amount of paint needed to paint the ceiling, a rectangle. You know the area of the ceiling. You could calculate the paint needed to paint another surface by finding the unknown value in the equivalent fractions. The amount of paint you need to paint the ceiling/the ceiling's area equals
- A. length of other surface/unknown area of other surface
  - B. amount of paint needed for the other surface/the area of other surface in square feet
  - C. width of other surface/ unknown area of other surface
  - D. amount of paint needed for other surface/length of other surface
- 12.** If you are solving a problem using proportions, you will definitely have
- A. the formula for area in square feet
  - B. two equivalent relationships
  - C. two unequal fractions
  - D. two unknown values

- 13.** A cleaning product will clean 500 square feet of flooring with 32 ounces. You have 1400 square feet to clean. One way to calculate the amount of cleaning product needed is to use proportional reasoning and the equivalent fractions
- $500/1400 = x/32$
  - $500/32 = x/1400$
  - $500/1400 = 32/x$
  - $32/500 = x/1400$
- 14.** A cleaning product will clean 500 square feet of flooring with 32 ounces. You have 1400 square feet to clean. The amount of cleaning product you need is
- 64.5 ounces
  - 76.3 ounces
  - 89.6 ounces
  - 128.4 ounces
- 15.** If two fractions are equal, it means
- the numerators are the same number
  - the denominators are the same number
  - the ratio of the numerator to the denominator is the same in both fractions
  - the decimal value of each fraction is less than 0.6
- 16.** A store should have one parking space per 225 square feet in the store. You could use this relationship to determine the number of parking spaces needed by setting up equivalent fractions as follows
- 2 spaces/575 square feet = needed spaces/calculated square feet of store
  - 2 spaces/450 square feet = needed spaces/calculated square feet of store
  - 3 spaces/ 700 square feet = needed spaces/calculated square feet of store
  - 4 spaces/1000 square feet = needed spaces/calculated square feet of store
- 17.** The following rectangles have sides that are proportional to each other:
- 8.5 x 11 and 24 x 33
  - 19 x 38 and 8 x 16
  - 2 x 4.5 and 8 x 18
  - 15 x 2 and 5 x 6
- 18.** Lauren is comparing the size of a piece of 8 1/2-inch by 11-inch paper with a piece of 17-inch by 22-inch paper. She correctly concludes that
- one paper is half the area of the other
  - one paper is one-third the area of the other
  - one paper is one-tenth the area of the other
  - one paper is one-fourth the area of the other
- 19.** A label explained the amount of mural sealer needed per 50 square feet. A proportional relationship exists between the amount of paint sealer and the area. One container of paint sealer/50 square feet is equal to
- the amount of paint sealer you need/the area you need to cover in square feet
  - the amount of paint sealer you need/the length of your project in feet
  - the amount of paint sealer you need/the width of your project in feet
  - the amount of paint sealer you need/the perimeter of your project in feet
- 20.** A four-foot square barn quilt used 1/2 pint of indigo blue paint. If the same quilt design were used on an eight-foot square barn quilt, how much paint would be needed?
- one pint
  - two pints
  - three pints
  - four pints

# KEY: MURALS: HANDOUT 6

## Mural Math Game

**1. C, 2. C, 3. A, 4. A, 5. D, 6. C, 7. B, 8. B, 9. D, 10. C, 11. B, 12. B, 13. C and D (award a point for either answer), 14. C, 15. C, 16. B, 17. C, 18. D, 19. A, 20. B**