

LESSON 22: Scale Drawings

Warm-Up

Directions: Circle the two ratios that will make a proportion.

1. $\frac{2}{3}$ $\frac{10}{11}$ $\frac{8}{12}$

2. $\frac{5}{8}$ $\frac{35}{63}$ $\frac{5}{9}$

Directions: Find the missing number in each proportion.

3. $\frac{7}{11} = \frac{x}{132}$ $x =$ _____

4. $\frac{4}{15} = \frac{32}{x}$ $x =$ _____

Directions: Identify the unit rate.

5. The table shows the number of hours Shelby worked and her pay.

Hours	1	2	3	5
Pay (\$)	8	16	24	40

LESSON 22: Scale Drawings

Directions: Complete the following SOLVE problem with your teacher. You will only complete the S step.

Nigel is making a drawing of a couch for a new advertisement. The actual measurements of the couch are 8 feet long by 3.5 feet tall. He is using a scale of 3 centimeters equals 2 feet. What should the dimensions of the couch be in the advertisement?

S Underline the question.

This problem is asking me to find _____.

Directions: Complete this page with your teacher and partner.

Scale Drawings:

- Mr. Taley is working on a geometry project with his class. He wants students to create a drawing of the classroom.
- Take a look around your classroom. If someone were to ask you to make a drawing of the classroom, what kind of things would you have to consider?
- Mr. Taley has his students measure the four sides of the room. The measurements are shown in the table below.

Room Sides	Measurement	Scaled Picture
Side 1	16 feet	
Side 2	22 feet	
Side 3	16 feet	
Side 4	22 feet	

- If you were one of Mr. Taley's students, would you want to try and create a drawing that has the measurements in the table above?
- Discuss with your partner strategies that you could possibly use to create a drawing of Mr. Taley's room.
- Have you ever seen a drawing of a real object that is proportionally smaller or larger than the real object? In other words, the dimensions of the drawing are in _____ to the dimensions of the real object.

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Directions: Complete this page with your teacher and partner.

Let’s look at another example, distances on a map.
Start with a rectangle that could represent a park on a map.



If the park is actually 500 feet wide by 1,000 feet long, we would not be able to represent that on a map. However, we can use smaller, proportional numbers. We can use a _____.

How do we know if a relationship is proportional?

- The two ratios have equal _____.
- The two ratios have equivalent _____.

Let’s use the proportion of 1 cm = 100 feet for our park drawing.

1. Width

Length

$$\begin{array}{l} \text{Map} \rightarrow \\ \text{Actual} \rightarrow \end{array} \frac{x}{500} \propto \frac{1}{100}$$

$$\begin{array}{l} \text{Map} \rightarrow \\ \text{Actual} \rightarrow \end{array} \frac{x}{1000} \propto \frac{1}{100}$$

Find the cross products: _____ = _____ _____ = _____

Divide both sides by 100: _____ = _____ _____ = _____

The width on the map should be _____. The length on the map should be _____.

Round your answers to the nearest tenth.

Scale	Width of park on map	Length of park on map
2. 200 ft = 1 cm		
3. 20 ft = 0.2 cm		
4. 300 ft = 2 cm		
5. 200 ft = 3 cm		

Conclusion: When we use this strategy to scale down each dimension of an object or drawing, we create a representation that is called a _____.

LESSON 22: Scale Drawings

Directions: Complete this page with your teacher and partner.

Scale Factor

When we create scale drawings, we _____ by a _____ that will create the shape or distance in a size that we are able to use in a _____.

Jarrold is making a scale drawing of his room. He wants to use the representation of 1 inch = 2ft.

1. How can we write that relationship as a ratio?

Jarrold wants to explain the relationship between the actual size of his room and the size of the representation of the room. What are some examples of ways that we compare the size of two objects? _____

_____ In order for him to compare the two, he needs to have a _____.

2. How can we use the ratio we have to find an equivalent ratio that has only numbers and no units?

3. Why did we choose that conversion factor?

4. How can we multiply by that conversion factor and not change the value of the answer?

Scale:

5. A scale written as a ratio in simplest form with the same units is called a _____.

What is the scale factor of Jarrold's drawing compared to the dimensions of his actual room?

6. What does this mean?

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Directions: Complete this page with your teacher and partner.

7. How can we use the scale factor to find the measurements on the drawing?
8. If Jarrod's room is 12 feet long, what would the length of the room be on the drawing?

If Jarrod's room is 16 feet wide, what would the width of the room be on the drawing?

9. A door is 96 inches tall and 48 inches wide. Use the scale factor of $\frac{1}{24}$ to find the dimensions of the door in a scale drawing.

Height:

Length:

10. Some things have to be drawn larger than they are, such as a cell. In this case, five centimeters on the drawing might represent 1 millimeter of the actual cell. Use the scale you have been given to find the scale factor.

Scale: $\frac{5 \text{ cm}}{1 \text{ mm}}$ Scale Factor:

Find the dimensions of the cell drawing if the actual cell is 2 mm long and 0.5 mm wide.

Length:

Width:

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Directions: Complete this page with your teacher and partner.

Perimeter of a Scale Drawing

1. Let's use the dimensions of the door from page S284.

A door is 96 inches tall and 48 inches wide. The scale factor of $\frac{1}{24}$ is used to find the dimensions of the door in a scale drawing.

The height is _____, and the width is _____. What is the perimeter of the actual door?

2. How do you think we can find the perimeter of the scale drawing of the door?

3. What is the height of the door on the scale drawing?

4. What is the width of the door on the scale drawing?

- What is the perimeter of the door on the scale drawing?

- What is the scale factor of the drawing?

- How can we use the scale factor to find the perimeter of the drawing of the door if we know the actual perimeter of the door?

- What do you notice?

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Directions: Complete this page with your teacher and partner.

1. Let's look at the example of Jarrod's room from S284. Jarrod's room is 12 feet long and 16 feet wide.

What is the perimeter of the room?

2. Let's create a drawing with a scale factor of $\frac{1}{16}$.
 Length: _____ Width: _____

3. What is the perimeter of the room on the drawing?

4. Use the drawing dimensions and the scale factor to find the perimeter.

What is the total perimeter of the room?

Find the perimeter using the scale factor:

Actual Dimensions	Actual Perimeter	Scale Factor	Drawing Dimensions	Drawing Perimeter Using Dimensions	Drawing Perimeter Using Scale Factor
Pool Length: 40 ft Width: 15 ft		$\frac{1}{10}$			
Ladybug Length: 3 cm Width: 1.5 cm		12			
Building Length: 1,100 ft Width: 200 ft		$\frac{1}{400}$			

Conclusion: List the two ways to find the perimeter of a scale drawing:

- _____.
- _____.

LESSON 22: Scale Drawings

Directions: Complete this page with your teacher and partner.

Area of a Scale Drawing

1. Let's use the dimensions of the door from page S284 to find the area of a scale drawing.

A door is 96 inches tall and 48 inches wide. The scale factor of $\frac{1}{24}$ is used to find the dimensions of the door in a scale drawing.

What is the area of the front of the actual door?

2. What is the height of the door on the scale drawing?
3. What is the width of the door on the scale drawing?
4. How do you think we can find the area of the scale drawing of the door?
5. What is the scale factor of the drawing?
6. How did we find the perimeter of the drawing?
7. Will this same strategy work to find the area of the drawing? Why?
8. What is the scale factor squared?
9. Multiply the actual area by the scale factor squared.
10. What is the area of the drawing?
11. Is this the same area that we found in Problem 4?

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Directions: Complete this page with your teacher and partner.

12. Let's look at the example of Jarrod's room from S284. Jarrod's room is 12 feet long and 16 feet wide.

What is the area of the room?

13. Let's create a drawing with a scale factor of $\frac{1}{16}$.

Length:

Width:

14. What is the area of the room on the drawing?

15. Use the drawing dimensions and the scale factor to find the area.

What is the total area of the room?

Find the area using the scale factor:

Actual Dimensions	Actual Area	Scale Factor Squared	Drawing Dimensions	Drawing Area Using Dimensions	Drawing Area Using Scale Factor
Pool Length: 40 ft Width: 15 ft		$(\frac{1}{10})^2 = \frac{1}{100}$			
Ladybug Length: 3 cm Width: 1.5 cm		$12^2 = 144$			
Building Length: 1,100 ft Width: 200 ft		$(\frac{1}{400})^2 = \frac{1}{160,000}$			

List the two ways to find the area of a scale drawing:

- _____.
- _____.

LESSON 22: Scale Drawings

Directions: Complete the following SOLVE problem with your teacher.

Nigel is making a drawing of a couch for a new advertisement. The actual measurements of the couch are 8 feet long by 3.5 feet tall. He is using a scale of 3 centimeters equals 2 feet. What should the dimensions of the couch be in the advertisement?

S Underline the question.

This problem is asking me to find _____
_____.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

L Write in words what your plan of action will be.

Choose an operation or operations.

V Estimate your answer.

Carry out your plan.

E Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

LESSON 22: Scale Drawings

Directions: Complete the following SOLVE problem with your partner.

Maria is making a scale drawing of her bedroom for her math class. She is drawing it on centimeter grid paper. Her bedroom is 12 feet long by 9 feet wide. She is using a scale of 3 cm = 1 foot. How many centimeters should she make the length and the width of her bedroom?

S Underline the question.

This problem is asking me to find _____
_____.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

L Write in words what your plan of action will be.

Choose an operation or operations.

V Estimate your answer.

Carry out your plan.

E Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

LESSON 22: Scale Drawings

Directions: Complete the following SOLVE problem with your partner.

Treyvon is making a scale drawing of his backyard. There is a rectangular-shaped sandbox with a length of 6 feet and a width of 8 feet. He is using the scale 1 inch = 2 feet. Find the area of the sandbox in his drawing.

S Underline the question.

This problem is asking me to find _____.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

L Write in words what your plan of action will be.

Choose an operation or operations.

V Estimate your answer.

Carry out your plan.

E Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

LESSON 22: Scale Drawings

Directions: Complete the following SOLVE problem with your partner.

Stacy is making a scale drawing of her backyard. There is a triangular-shaped flower garden with dimensions of 6 feet, 8 feet, and 10 feet. She is using the scale 1 inch = 2 feet. Find the perimeter of the flower garden in her drawing.

S Underline the question.

This problem is asking me to find _____
_____.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

L Write in words what your plan of action will be.

Choose an operation or operations.

V Estimate your answer.

Carry out your plan.

E Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

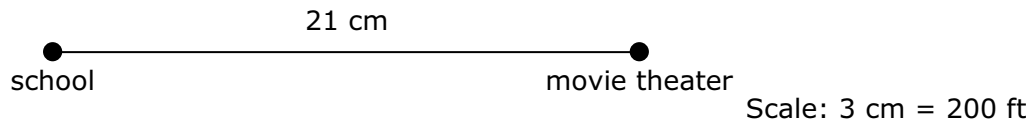
Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

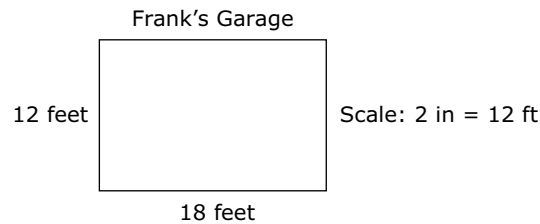
LESSON 22: Scale Drawings

Directions: Solve the following problems using what you have learned about scale drawings.

1. What is the distance from the school to the movie theater? _____



Directions: Use the drawing to answer Questions 2 – 5.



2. Frank is making a scale drawing of his garage. What are the dimensions of the garage in his drawing?

Length: _____ Width: _____

3. What is the scale factor?

4. Using the scale factor, what is the perimeter of the garage in his drawing?

Actual perimeter:

5. Using the scale factor, what is the area of the garage in his drawing?

Actual area:

LESSON 22: Scale Drawings

Homework

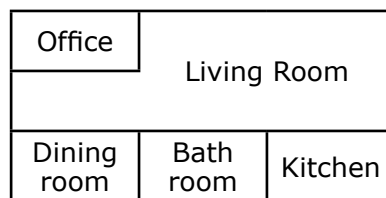
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Name _____ **Date** _____

Directions: Solve the following problems using what you have learned about scale drawings.

- The distance between two cities on a map is 6 cm. If the scale on the map is 2 cm = 50 miles, how many miles apart are the two cities?

Directions: Use the scale drawing below to answer Questions 2 - 6.



Scale: 2 in. = 1 ft

- Jenna's father is going to use the blueprint above to make a playhouse for her. In the drawing, the length of the entire first floor is 12 in. What is the actual length?
- The width of the entire first floor in the drawing is 8 in. What is the actual width?
- What scale factor did Jenna's father use to go from the drawing to the actual house?
- What is the perimeter of the first that floor Jenna's that father built?
- What is the area of the first floor that Jenna's that father built?