CITYTUTOR DC

Seventh Grade Math Lesson Materials

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Effective Date: January 1, 2023

Updated: August 16, 2023

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A physical or electronic signature of a person authorized to act on behalf of the copyright owner of the work that allegedly has been infringed;

Identification of the copyrighted work claimed to have been infringed, or, if multiple copyrighted works allegedly have been infringed, then a representative list of such copyrighted works;

Identification of the material that is claimed to be infringing and that is to be removed or access to which is to be disabled, and information reasonably sufficient to permit us to locate the allegedly infringing material, e.g., the specific web page address on the Platform;

Information reasonably sufficient to permit us to contact the party alleging infringement, including an email address;

A statement that the party alleging infringement has a good-faith belief that use of the copyrighted work in the manner complained of is not authorized by the copyright owner or its agent, or is not otherwise permitted under the law; and

A statement that the information in the notification is accurate, and under penalty of perjury, that the party alleging infringement is authorized to act on behalf of the copyright owner of the work that allegedly has been infringed.

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CITYTUTOR DC

G7 Unit 1:

Scale Drawings

G7 U1 Lesson 1

Differentiate between scaled and non-scaled copies of a figure

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G7 U1 Lesson 1 - Students will differentiate between scaled and non-scaled copies of a figure

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today is our first lesson in our unit that's all about scale drawings. A scale drawing is a two-dimensional representation of an actual object or place. Scale drawings and scale models are all around us. We see them when we look at maps or at blueprints of buildings. Model-builders, video game designers, and artists often use scale drawings to help recreate figures in different sizes. The applications for scale drawings are seemingly limitless, so I'm excited to start exploring this concept with you. Let's jump in!

Let's Talk (Slide 3): Take a look at the original image of the kitten. Now, look at the other images. What do you notice about the images? Possible Student Answers, Key Points:

- I notice the first one is a smaller version of the original and the second one is a larger version of the original.
- I notice the third one is kind of slanted and skinny. I notice the fourth one is kind of flattened.

Each image is a different version of the original, but only two are what we would call *scaled copies.* A scaled copy is when an image is changed in a way where each part of the images is a certain number of times bigger or smaller than the original. A scaled copy is never stretched or distorted. Based on what I shared, which of these images could we consider scaled copies of the original? How do you know? Possible Student Answers, Key Points:

- I think the first two could be considered scaled copies. They look like the same kitten in the original, just a little bigger or a little smaller.
- The other two images distort the kitten so it doesn't look similar. It's stretched or pulled or squished in a way that doesn't match the original.

The first two images are scaled copies of the original. A scaled copy can be larger or smaller than an original, but never stretched out or distorted like the other two images appear.

Let's Think (Slide 4): Take a second to look at the original rectangle here. What do you notice about the original rectangle? Possible Student Answers, Key Points:

- I notice it's small and narrow.
- I notice it has a length of 3 units and a width of 1 unit. I notice the area is 3 square units.

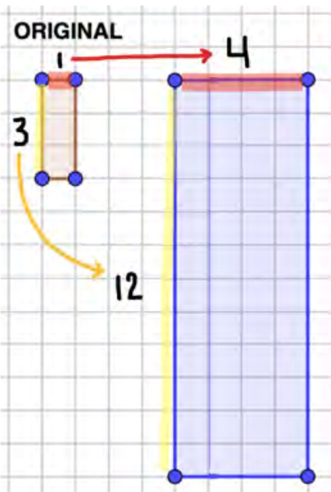
One of the two other rectangles can be considered a scaled copy of the original rectangle. We're going to try to see if we can determine which rectangle is a scaled copy just by looking at the original. I'll also show you a way to mathematically prove whether something is a scaled copy of an original.

Let's just think visually for a second. You already told me some attributes you noticed for the original rectangle. Based on those attributes do you think it's more likely that the purple rectangle or the pink rectangle is a scaled copy of the original? Possible Student Answers, Key Points:

- I think the first/purple rectangle is a scaled copy. It's still narrow and tall like the original.
- I don't think the second/pink rectangle is a scaled copy. It's not narrow like the original. It's more square-shaped.

The purple rectangle is a scaled copy of the original. We can tell this visually because, even though the rectangle is bigger than the original, it still maintains the general shape of the original. The pink rectangle is a square, which isn't the same shape as the original.

If we want to take a more precise, mathematical approach to determining whether something is a scaled copy, we can draw our attention to the side lengths. The side lengths in a scaled copy are related to the corresponding side lengths in the original in a consistent way.



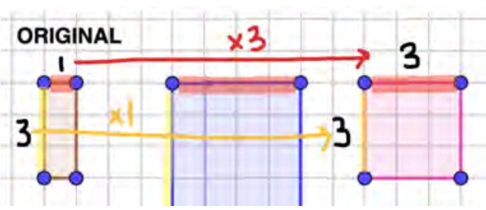
Let's start by looking at each shorter side length. What is the short side length of the original rectangle? (1 unit) What is the short side length of the scaled copy? (4 units) *(highlight the corresponding lengths and label them with the measurements, drawing an arrow from the original to the scaled copy)* The original side length is 1 and the corresponding side length in the scaled copy is 4.

Let's look at the longer side length. What is the long side length of the original rectangle? (3 units) What is the long side length of the scaled copy? (12 units) *(highlight the corresponding lengths and label them with the measurements, drawing an arrow from the original to the scaled copy)* The original side length is 3 and the corresponding side length in the scaled copy is 12.

What do you notice about the measurements of each pair of corresponding side lengths? Possible Student Answers, Key Points:

- I know 1 x 4 = 4 and I know 3 x 4 = 12. Each one can be multiplied by 4 to find the scaled copy.
- I know each side length of the scaled copy is 4 times as long as the corresponding side of the original.

The side lengths of the original and the scaled copy are related in a consistent way. Each side length in the scaled copy is 4 times as long as the corresponding side length in the original.

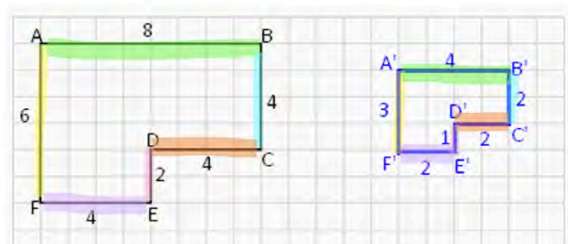


We already said the pink rectangle did not look like a scaled copy, because the shape was different. We can prove that by looking at the corresponding side lengths. *(label and highlight corresponding side lengths as shown)* The top side length of the scaled copy is three times as long as the corresponding side length of the original figure. The left side length of the scaled copy is one times as long as the corresponding side length of the original. Since the side lengths are not related in a consistent way, we know for certain that the pink rectangle cannot be a scaled copy of the original.

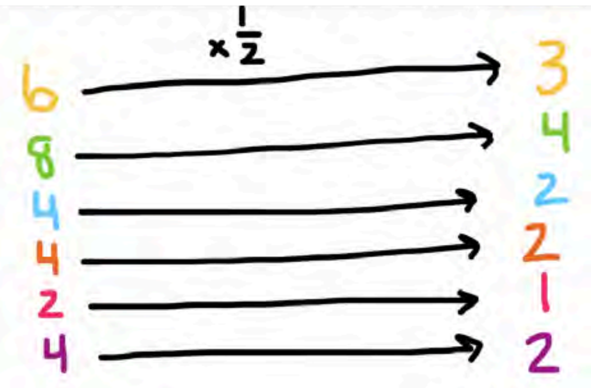
We can visually check to see if an image is a scaled copy of an original figure, and we also saw how we can look at how corresponding sides are related to determine if an image is a scaled copy of the original figure. Both strategies can work, but I'll caution you that just going off of visuals can sometimes be misleading. Let's look at one more.

Let's Think (Slide 5): This problem wants us to determine whether the second polygon is a scaled copy of the original polygon. Visually, does the second figure appear to be a scaled copy? Possible Student Answers, Key Points:

- It looks like it's the same shape, but just a little smaller. I think it could be a scaled copy.
- It's hard to tell for sure. This polygon has more sides than the last example we saw, so I'm not sure.



The second image appears to be similar in shape to the original image, but it can be hard to tell just by looking. Let's look at corresponding sides to see. I'll highlight each corresponding side. *(highlight each corresponding side systematically)*



Let's look at the length of each corresponding side in the original compared to the potential scaled copy. *(list sides as shown, color-coding as possible to match the visual, then draw an arrow between corresponding sides)* Are the side lengths related in a consistent way? What do you notice? Possible Student Answers, Key Points:

- I think they are related in a consistent way. Each measurement on the scaled copy is half of the original measurement.
- I can divide the original side length by 2 each time, and the result will be the length of the other polygon.

(write x ½ between the corresponding sides) Excellent! By looking at how the corresponding sides are related, we can see that the second polygon is a scaled copy of the first polygon. Each side length of the scaled copy is half the length of the original. We can multiply each original length by ½, and the result will be the corresponding length in the other polygon.

Let's Try it (Slides 6 - 7): Now let's work on a few more examples together before you get a chance to practice on your own. Sometimes we can visually tell if an image is a scaled copy, because the copy is the same shape; the copy isn't distorted or stretched or squished in any way. We also saw how we can look more precisely at corresponding sides. If all corresponding sides are related in a similar way, then we can be certain that an image is a scaled copy. Let's keep these ideas in mind as we look at our next few examples. Let's go for it!

WARM WELCOME

Today we will differentiate between scaled and non-scaled copies of a figure.

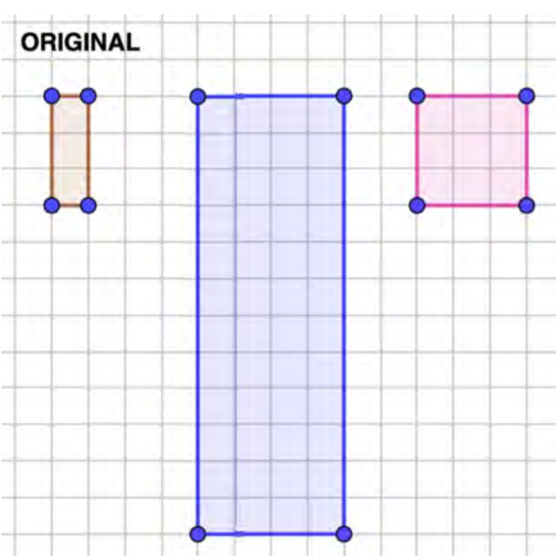
Let's Talk:

What do you notice about the images shown here?

Let's Think:

Which rectangle is a scaled copy of the original?

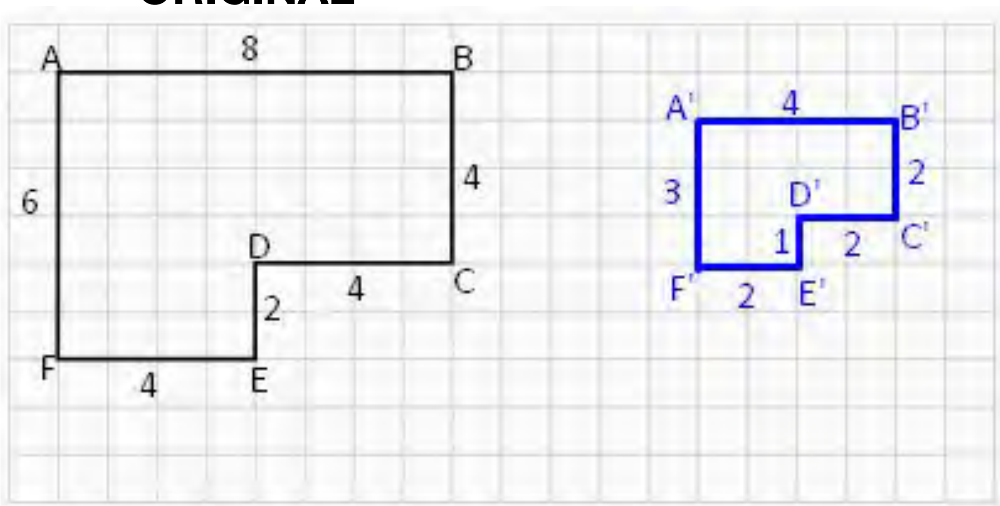
Explain how you know visually.



Explain how you know using numbers.

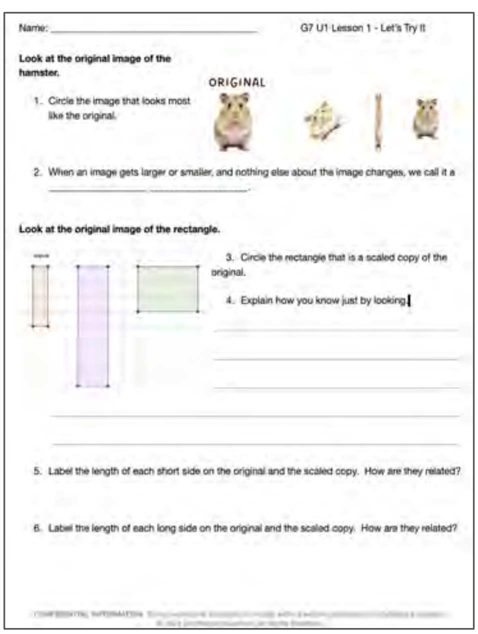
Let's Think:

Is the blue polygon a scaled image of the original?



Let's Try It:

Let's explore differentiating between scaled and non-scaled copies of a figure together.



Name: ______________________ G7 U1 Lesson 1 - Let's Try It

Look at the original image of the hamster.

1. Circle the image that looks most like the original.

ORIGINAL

2. When an image gets larger or smaller, and nothing else about the image changes, we call it a ____________ ____________.

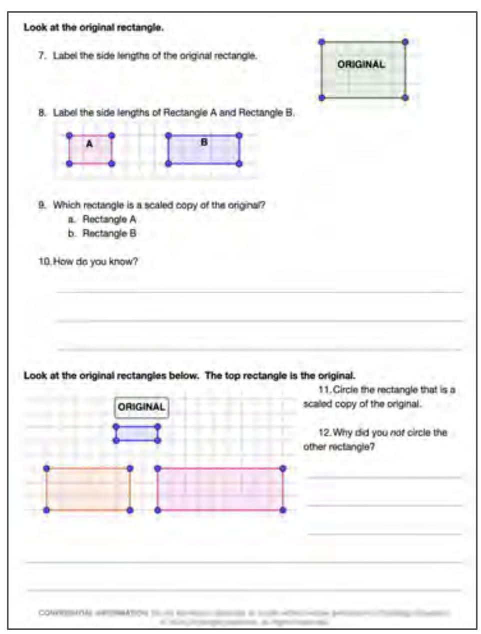
Look at the original image of the rectangle.

3. Circle the rectangle that is a scaled copy of the original.

4. Explain how you know just by looking.

5. Label the length of each short side on the original and the scaled copy. How are they related?

6. Label the length of each long side on the original and the scaled copy. How are they related?



Look at the original rectangle.

7. Label the side lengths of the original rectangle.

ORIGINAL

8. Label the side lengths of Rectangle A and Rectangle B.

A B

9. Which rectangle is a scaled copy of the original?
   a. Rectangle A
   b. Rectangle B

10. How do you know?

Look at the original rectangles below. The top rectangle is the original.

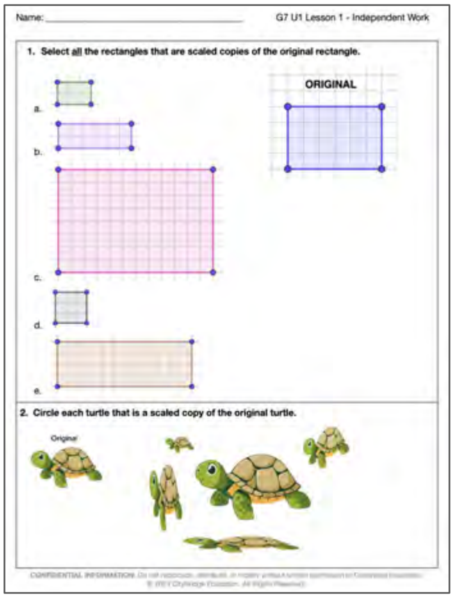
ORIGINAL

11. Circle the rectangle that is a scaled copy of the original.

12. Why did you *not* circle the other rectangle?

On your Own:

Now it's time to differentiate between scaled and non-scaled copies of a figure on your own.



Name: ______________________ G7 U1 Lesson 1 - Independent Work

1. Select all the rectangles that are scaled copies of the original rectangle.

ORIGINAL

a.

b.

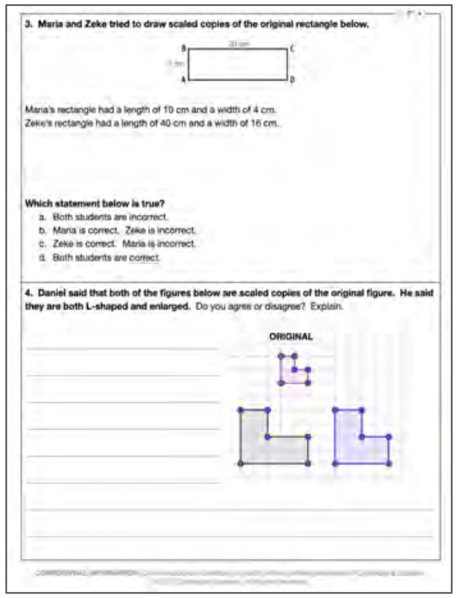
c.

d.

e.

2. Circle each turtle that is a scaled copy of the original turtle.

Original



3. Maria and Zeke tried to draw scaled copies of the original rectangle below.

Maria's rectangle had a length of 10 cm and a width of 4 cm.
Zeke's rectangle had a length of 40 cm and a width of 16 cm.

Which statement below is true?

a. Both students are incorrect.
b. Maria is correct. Zeke is incorrect.
c. Zeke is correct. Maria is incorrect.
d. Both students are correct.

4. Daniel said that both of the figures below are scaled copies of the original figure. He said they are both L-shaped and enlarged. Do you agree or disagree? Explain.

ORIGINAL

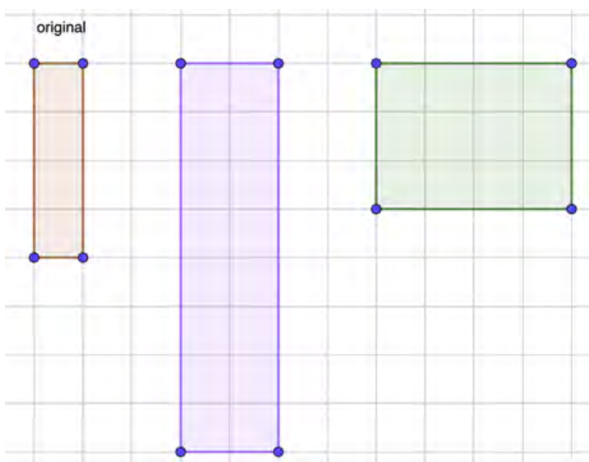
Name: ______________________________________

Look at the original image of the hamster.

1. Circle the image that looks most like the original.

2. When an image gets larger or smaller, and nothing else about the image changes, we call it a __________________ __________________.

Look at the original image of the rectangle.



3. Circle the rectangle that is a scaled copy of the original.

4. Explain how you know just by looking.

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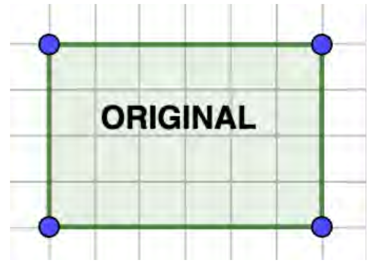
5. Label the length of each short side on the original and the scaled copy. How are they related?

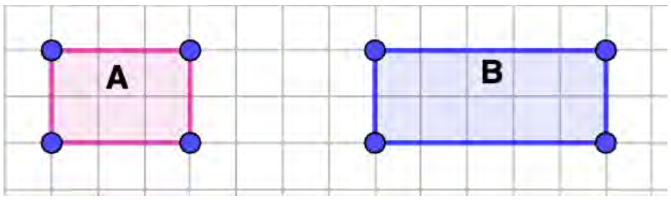
6. Label the length of each long side on the original and the scaled copy. How are they related?

Look at the original rectangle.



7. Label the side lengths of the original rectangle.

8. Label the side lengths of Rectangle A and Rectangle B.



9. Which rectangle is a scaled copy of the original?
   a. Rectangle A
   b. Rectangle B

10. How do you know?

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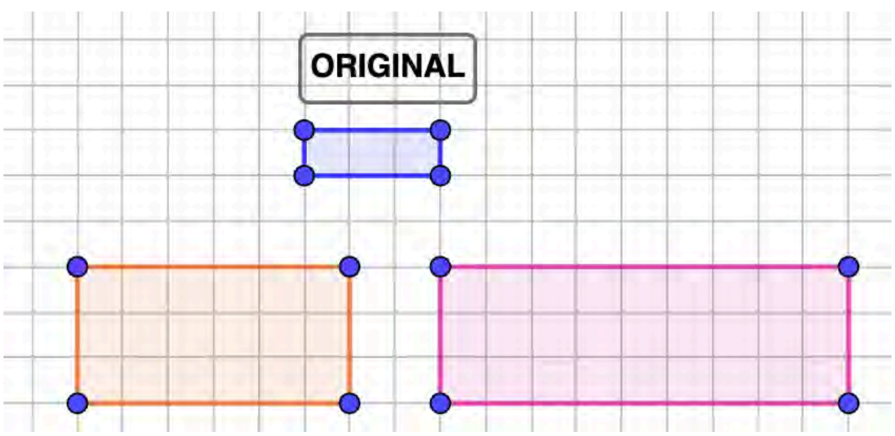
Look at the original rectangles below. The top rectangle is the original.



11. Circle the rectangle that is a scaled copy of the original.

12. Why did you *not* circle the other rectangle?

____

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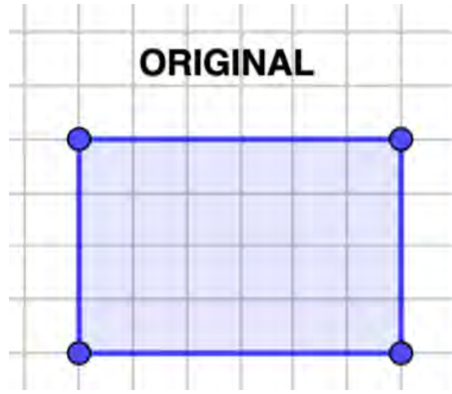
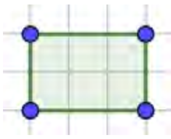
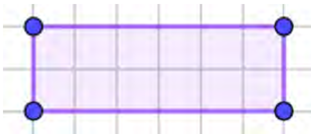
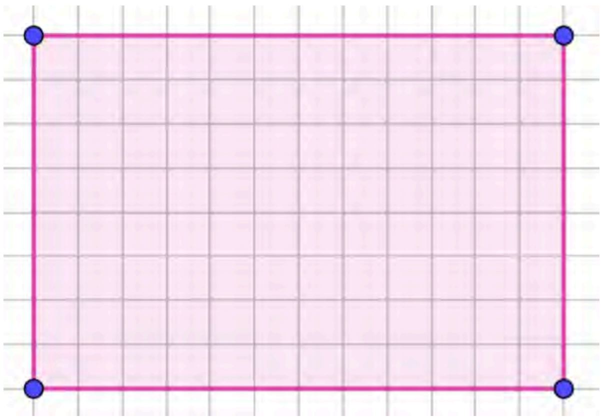
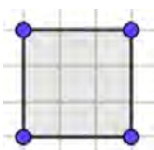
1. Select all the rectangles that are scaled copies of the original rectangle.

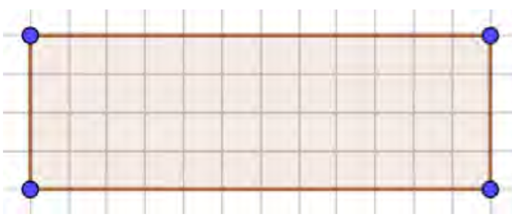


a. 

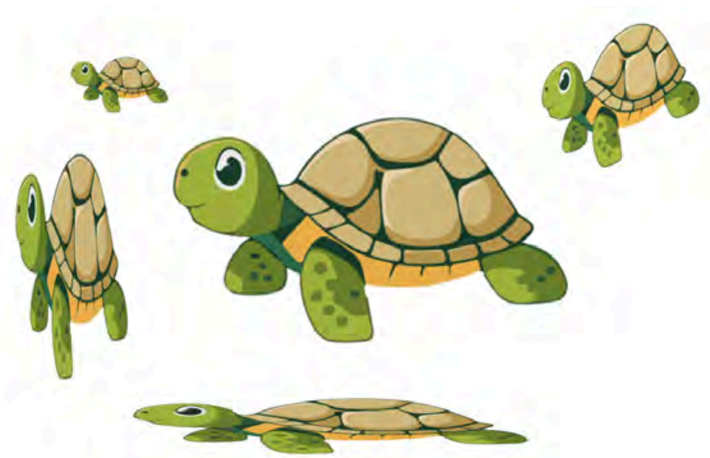
b. 

c. 

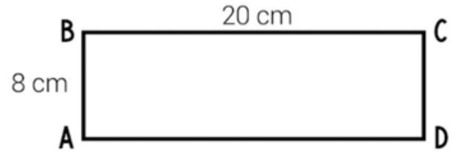
d. 

e. 

2. Circle each turtle that is a scaled copy of the original turtle.



3. Maria and Zeke tried to draw scaled copies of the original rectangle below.

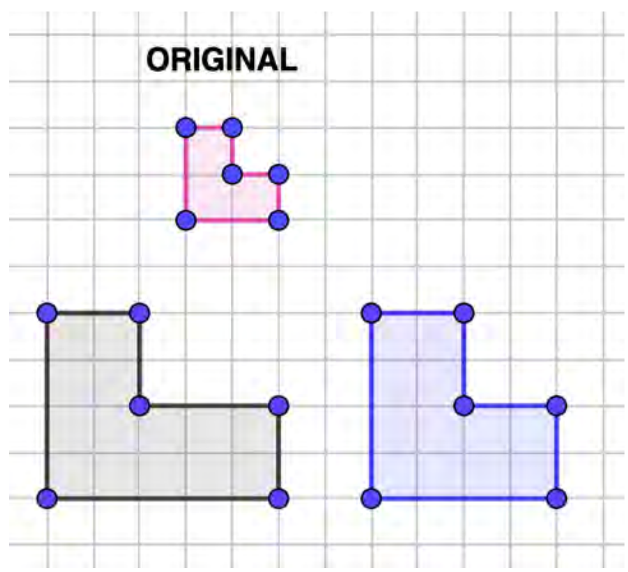


Maria's rectangle had a length of 10 cm and a width of 4 cm.
Zeke's rectangle had a length of 40 cm and a width of 16 cm.

Which statement below is true?

a. Both students are incorrect.
b. Maria is correct. Zeke is incorrect.
c. Zeke is correct. Maria is incorrect.
d. Both students are correct.

4. Daniel said that both of the figures below are scaled copies of the original figure. He said they are both L-shaped and enlarged. Do you agree or disagree? Explain.



Name: KEY

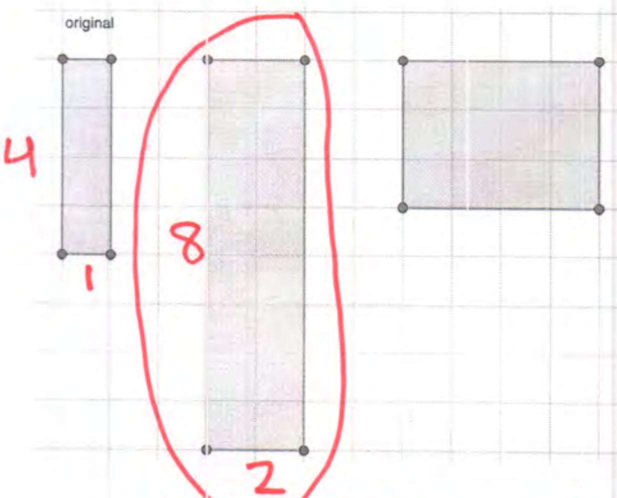
Look at the original image of the hamster.

1. Circle the image that looks most like the original.

ORIGINAL

2. When an image gets larger or smaller, and nothing else about the image changes, we call it a scaled copy.

Look at the original image of the rectangle.



3. Circle the rectangle that is a scaled copy of the original.

4. Explain how you know just by looking.

It is most similar in terms of shape. It's narrow and tall, while the other option is shorter and wider.

5. Label the length of each short side on the original and the scaled copy. How are they related?

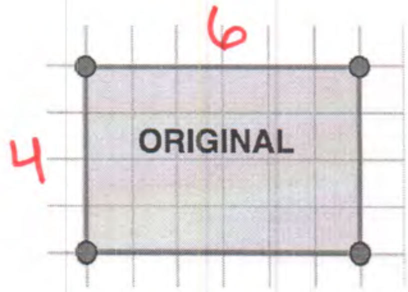
The copy is twice as long.

6. Label the length of each long side on the original and the scaled copy. How are they related?

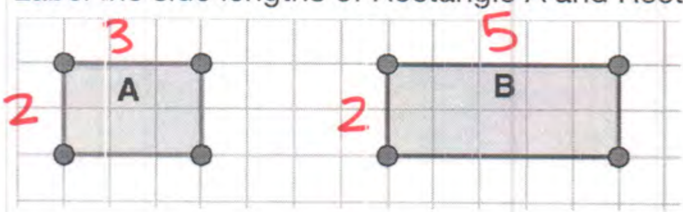
The copy is twice as long.

Look at the original rectangle.

7. Label the side lengths of the original rectangle.



8. Label the side lengths of Rectangle A and Rectangle B.

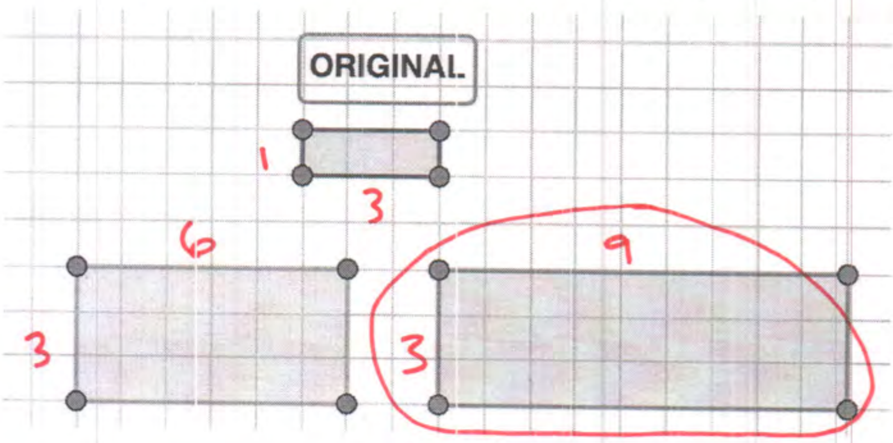


9. Which rectangle is a scaled copy of the original?
   a. Rectangle A
   b. Rectangle B

10. How do you know?

The sides of "A" are related in a consistent way to the original. Each side of "A" is half ~~the~~ as long as the original side.

Look at the original rectangles below. The top rectangle is the original.



11. Circle the rectangle that is a scaled copy of the original.

12. Why did you *not* circle the other rectangle?

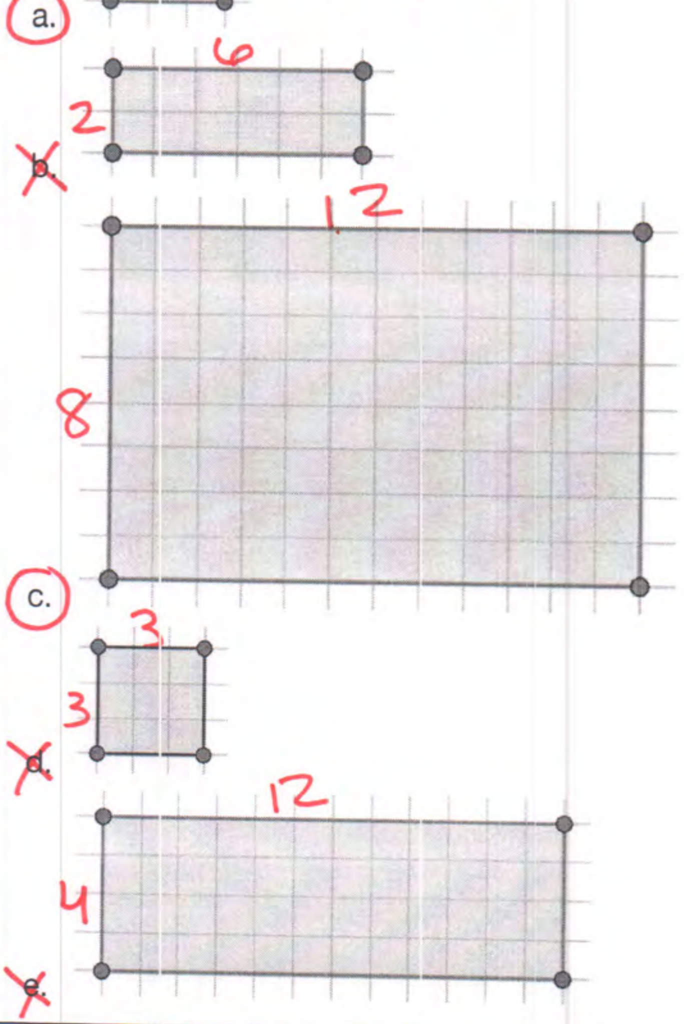
The width is 3 times longer while the length is 2 times longer. The relationship between sides is inconsistent.

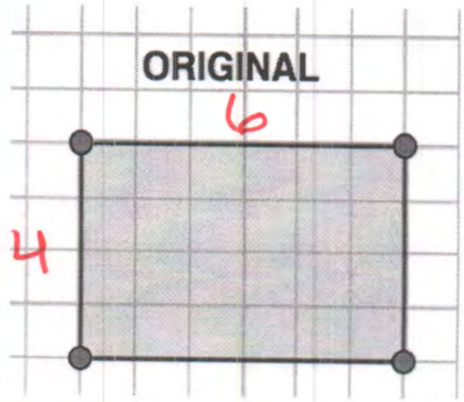
Name: KEY

1. **Select all the rectangles that are scaled copies of the original rectangle.**

$6 \times \frac{1}{2} = 3$

$4 \times \frac{1}{2} = 2$

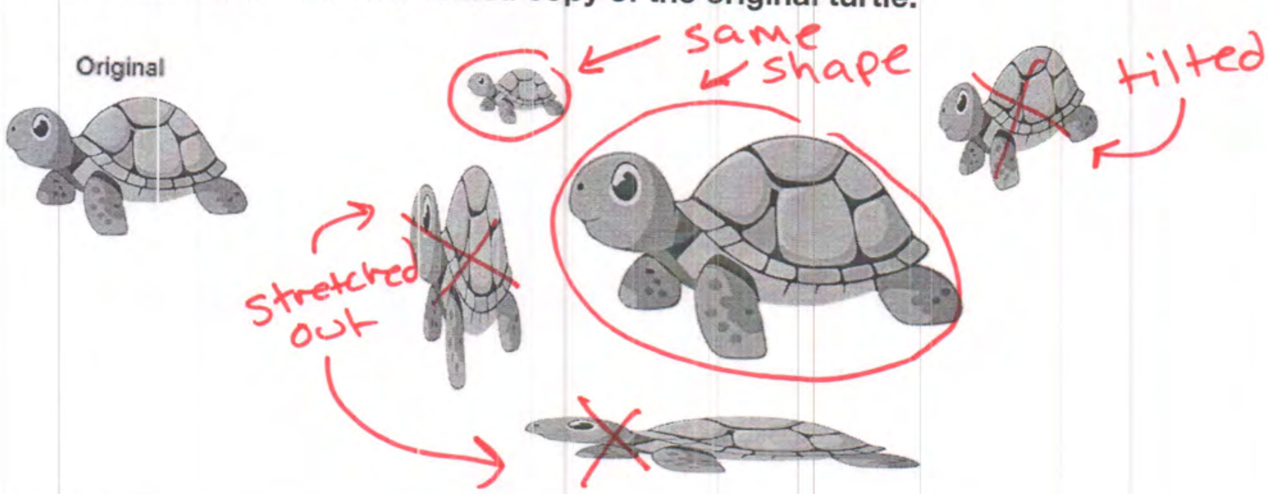




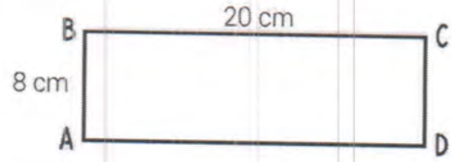
$6 \times 2 = 12$

$4 \times 2 = 8$

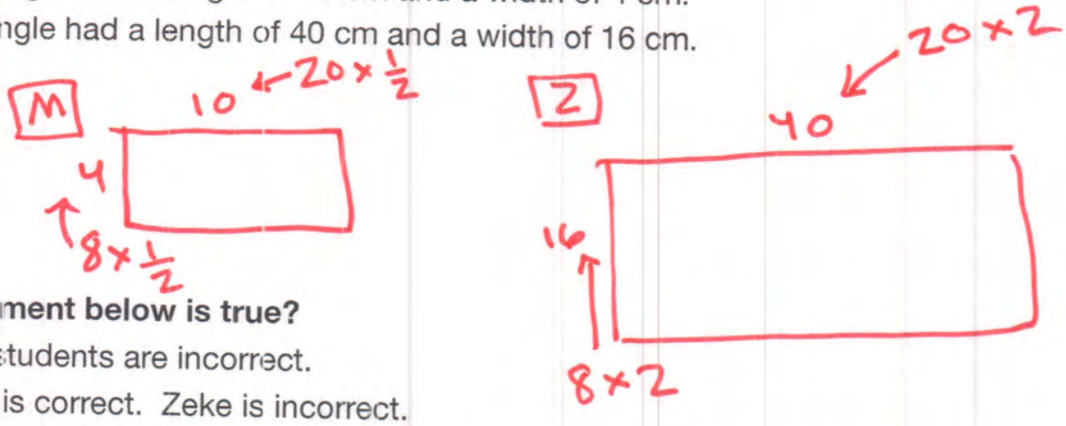
2. **Circle each turtle that is a scaled copy of the original turtle.**



3. Maria and Zeke tried to draw scaled copies of the original rectangle below.



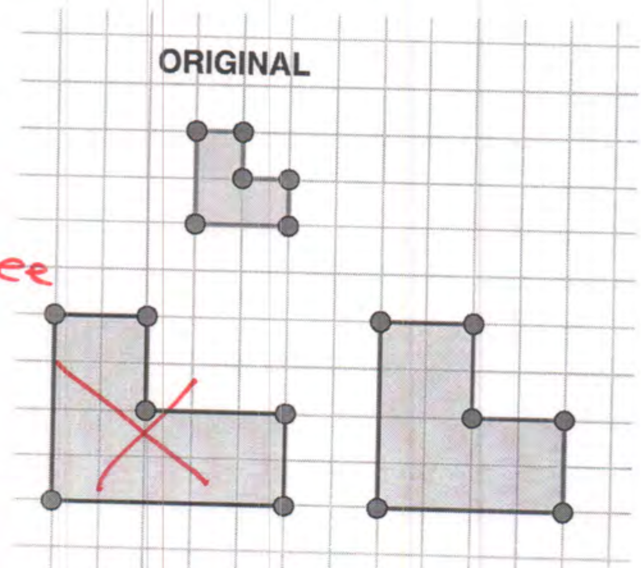
Maria's rectangle had a length of 10 cm and a width of 4 cm.
Zeke's rectangle had a length of 40 cm and a width of 16 cm.



Which statement below is true?

a. Both students are incorrect.
b. Maria is correct. Zeke is incorrect.
c. Zeke is correct. Maria is incorrect.
d. Both students are correct.

4. Daniel said that both of the figures below are scaled copies of the original figure. He said they are both L-shaped and enlarged. Do you agree or disagree? Explain.



I agree that they are both L-shaped and enlarged, but I disagree that they are both scaled copies. The first shape is stretched out so the bottom part is longer than it should be. The shape is distorted.

G7 U1 Lesson 2

Identify corresponding parts and determine the scale factor between two figures

G7 U1 Lesson 2 - Students will identify corresponding parts and determine the scale factor between two figures

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): In our previous lesson, we started to think about scaled copies. We saw images that were scaled copies of an original and some that were not. What makes an image of scaled copy of an original? What makes an image NOT a scaled copy of an original? Possible Student Answers, Key Points:

- An image is a scaled copy if it's the same shape, just bigger or smaller.
- An image is not a scaled copy if it is distorted in any way, like if it's widened or stretched out.

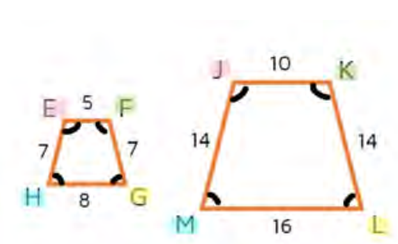
When we saw sets of images, we were able to tell if a figure was a scaled copy just by looking. In other cases, it helped to look at corresponding sides. Today, we'll continue thinking about scaled figures and how we can use the mathematical relationship between corresponding sides to help us think precisely about scaled copies.

Let's Talk (Slide 3): Take a look at the figures shown here. What do you notice about the figures? What do you wonder? Possible Student Answers, Key Points:

- I notice they are trapezoids. I notice the corresponding sides are color-coded. I notice there are different letters at each vertex. I notice the second one is smaller and rotated a little bit.
- I wonder what the side lengths are. I wonder if the second one is actually a scaled copy or not.

The second trapezoid appears to be a scaled copy of the original trapezoid, just a bit smaller and turned at an angle. It appears as though all corresponding sides are related to each other in a consistent way. It would be helpful to have numbers labeling the side lengths so we can be sure that each side of the original can be multiplied by a consistent factor that results in the corresponding side length. This consistent factor relating corresponding sides is called the scale factor. Let's look at a few problems dealing with scale factor together.

Let's Think (Slide 4): The two trapezoids shown here are related. Trapezoid EFGH is the original. Trapezoid JKLM is the scaled copy. The problem wants us to list corresponding sides and angles, and then determine the scale factor.



Let's start by looking at corresponding angles. I see Angle E and Angle J are corresponding, because they both are at the same position within their corresponding figure. *(highlight each angle and mark the angles with an arc se you name them)* Angle K and F are also corresponding. What other corresponding angles do you see? (Angles H and M as well as angles G and L) I notice that each pair of corresponding angles are the same size. For example, Angle E is an obtuse angle that appears to be a little more than 90 degrees. It's corresponding angle, Angle J, is also an obtuse angle that appears to be a little more than 90 degrees. Angles in scaled copies should have the same measurement as their corresponding angles.

EFGH	JKLM
5	10
7	14
8	16
7	14

Now, let's look at corresponding sides. *(make a t-chart with corresponding sides, highlighting the sides on the figure if that is helpful)* Which sides are corresponding, and how do you know? Possible Student Answers, Key Points:

- 5 and 10 are corresponding measurements, since they're both the tops of the trapezoids. 8 and 16 are corresponding, since they're both the bottoms of the figures. Each 7 corresponds with a side length of 14 in the scaled copy.

EFGH	JKLM
5	10
7	14
8	16
7	14

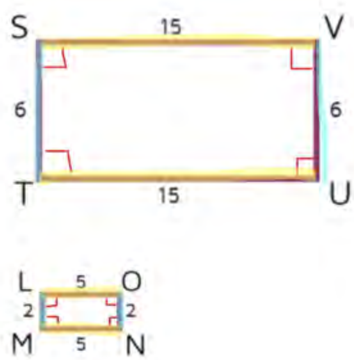
x2

What do you notice about each pair of corresponding sides? Possible Student Answers, Key Points:

- Each side of JKLM is two times the length of the corresponding side in EFGH.
- I notice a pattern. 5 x 2 = 10, 7 x 2 = 14, 8 x 2 = 16, and 7 x 2 = 14.

(draw arrows between each corresponding side and write x2 next to the table) We can multiply each side length on the original trapezoid to get the corresponding side length on the scaled copy. Since we can multiply each side by 2, we can say that the scale factor used to make the scaled copy is 2. The scale factor is 2. I think you're ready for another example.

Let's Think (Slide 5): This problem shows two rectangles. It says the rectangle STUV is the original, which means that LMNO is a scaled copy. Let's work to determine the scale factor used to create rectangle LMNO.



Let's start by thinking about the angles for a moment. We know the corresponding angles in scaled copies should be equivalent to the angles in the original figure. Do we see that in these figures? How do you know? Possible Student Answers, Key Points:

- Yes, all of the angles are 90 degrees.
- Yes, since both shapes are rectangles, I know every angle is a right angle. All the corresponding angles are equivalent.

(mark each angle with a box signifying a right angle) Since each angle in a rectangle is 90 degrees, we know all the corresponding angles are congruent.

Let's move on to thinking about corresponding sides. Which sides are corresponding? *(highlight and color-code as student shares)* (SV and TU correspond with LO and MN while ST and VU correspond with LM and ON)

STUV	LMNO	scale factor
15	5	1/3
15	5	1/3
6	2	1/3
6	2	1/3

I'll make a t-chart so we can think about how the corresponding sides are related. I'll add a column to the right, so we can think about the scale factor that this question asks about. *(sketch a chart as shown and fill in the corresponding sides)* What do you notice about the corresponding sides in our chart? Possible Student Answers, Key Points:

- There are two pairs of corresponding sides that measure 15 and 5, and two pairs of corresponding sides that measure 6 and 2.
- I notice the sides in LMNO are shorter than their corresponding side in STUV.
- I notice that each length in STUV is three times as long as the corresponding length in LMNO.

Each side of STUV is 3 times larger than its corresponding side in LMNO. The factor we can multiply lengths from STUV by to get their corresponding lengths in LMNO is ⅓. *(fill in ⅓ in the last column as you narrate)* 15 times ⅓ is 5. 15 times ⅓ is 5. 6 times ⅓ is 2. 6 times ⅓ is 2. The scale factor used to create LMNO was ⅓.

Let's Try it (Slides 6 - 7): We'll try a few more together before you practice independently. We saw today that corresponding angles in scale copies are identical or congruent. We also noticed that we can find the scale factor by identifying corresponding sides, often using a table, and thinking about how they are mathematically related. The number we can multiply a given length in an original figure to produce the corresponding length in the scaled copy is called the scale factor. Let's work together to identify corresponding parts and determine the scale factor between two figures.

WARM WELCOME

Today we will identify corresponding parts and determine the scale factor between two figures.

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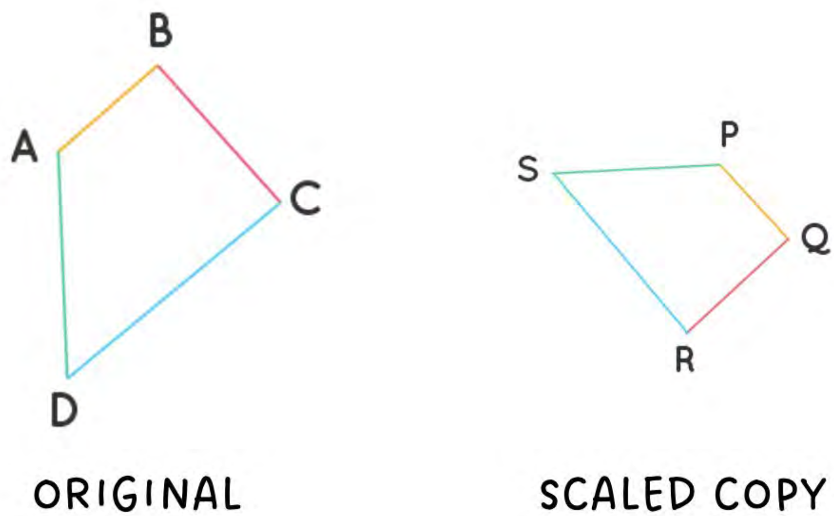
Let's Talk:

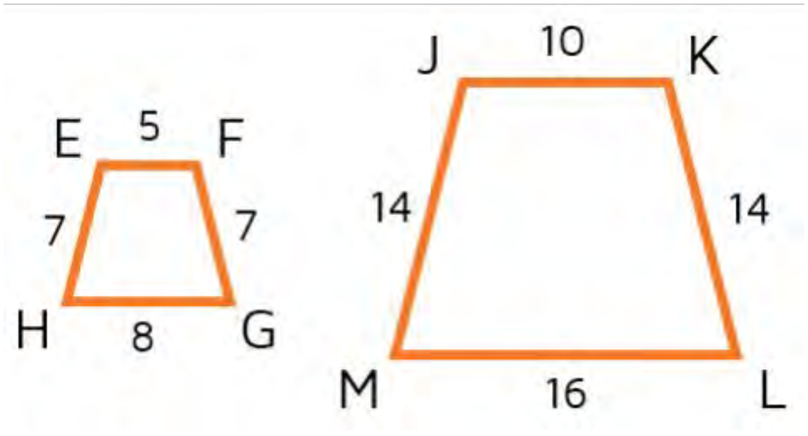
What do you notice?

What do you wonder?



Let's Think:

Trapezoid EFGH is the original. List the corresponding sides and angles. What is the scale factor?



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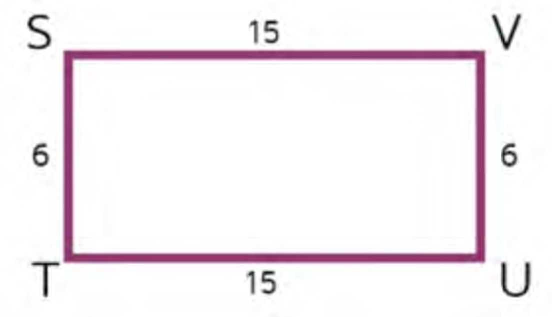
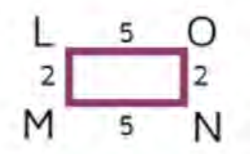
Let's Think:

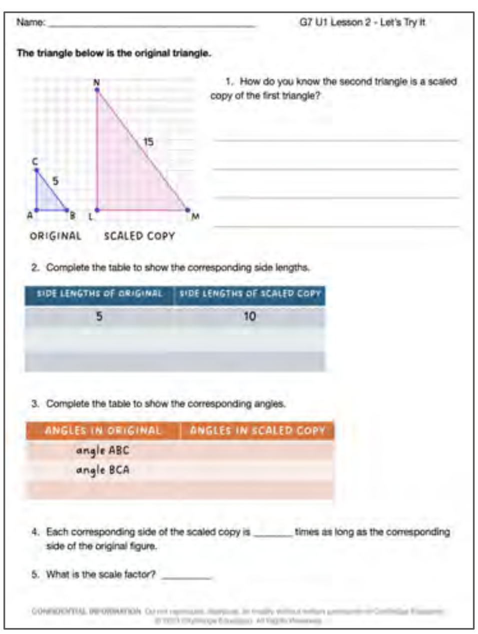
Rectangle STUV is the original. What is the scale factor?





Let's Try It:

Let's explore identifying corresponding parts and determining the scale factor between two figures together.



Name: ______________________ G7 U1 Lesson 2 - Let's Try It

The triangle below is the original triangle.

N 15 C 5 A B L M

ORIGINAL SCALED COPY

1. How do you know the second triangle is a scaled copy of the first triangle?

2. Complete the table to show the corresponding side lengths.

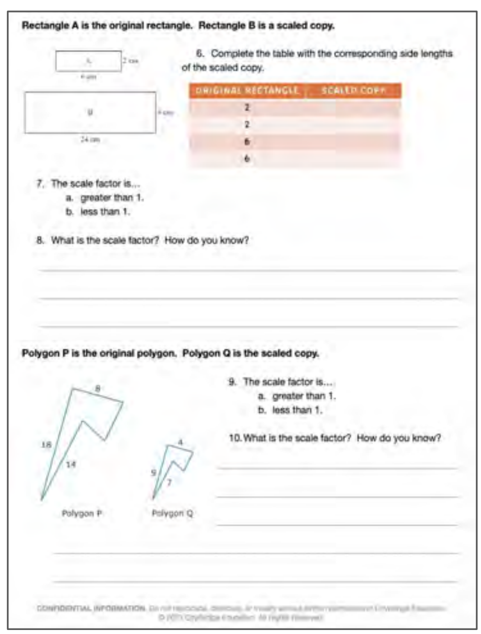
SIDE LENGTHS OF ORIGINAL	SIDE LENGTHS OF SCALED COPY
5	10

3. Complete the table to show the corresponding angles.

ANGLES IN ORIGINAL	ANGLES IN SCALED COPY
angle ABC	
angle BCA	

4. Each corresponding side of the scaled copy is ______ times as long as the corresponding side of the original figure.

5. What is the scale factor? ________



Rectangle A is the original rectangle. Rectangle B is a scaled copy.

6. Complete the table with the corresponding side lengths of the scaled copy.

ORIGINAL RECTANGLE	SCALED COPY
2	
2	
6	
6	

7. The scale factor is...
   a. greater than 1.
   b. less than 1.

8. What is the scale factor? How do you know?

Polygon P is the original polygon. Polygon Q is the scaled copy.

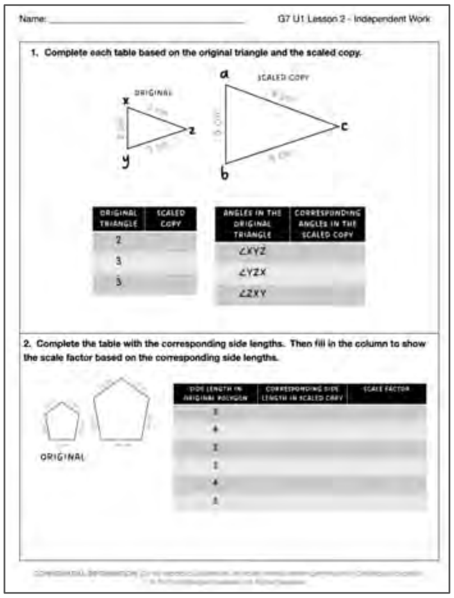
8 18 14 Polygon P 4 9 7 Polygon Q

9. The scale factor is...
   a. greater than 1.
   b. less than 1.

10. What is the scale factor? How do you know?

On your Own:

Now it’s time to identify corresponding parts and determine the scale factor between two figures on your own.



Name: ______________________ G7 U1 Lesson 2 - Independent Work

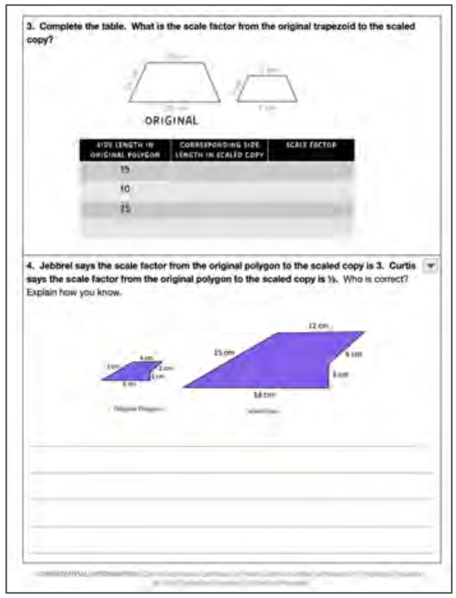
1. Complete each table based on the original triangle and the scaled copy.

ORIGINAL TRIANGLE	SCALED COPY
2	
3	
5	

ANGLES IN THE ORIGINAL TRIANGLE	CORRESPONDING ANGLES IN THE SCALED COPY
∠XYZ	
∠YZX	
∠ZXY	

2. Complete the table with the corresponding side lengths. Then fill in the column to show the scale factor based on the corresponding side lengths.

SIDE LENGTH IN ORIGINAL POLYGON	CORRESPONDING SIDE LENGTH IN SCALED COPY	SCALE FACTOR
[illegible]		
[illegible]		
[illegible]		
[illegible]		
[illegible]		
[illegible]		

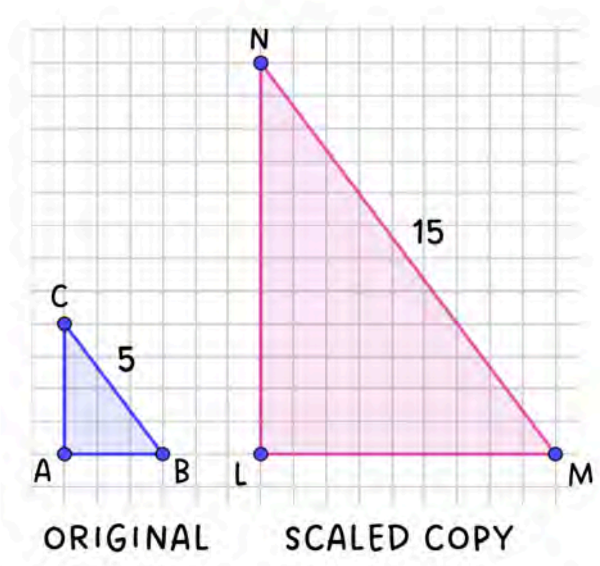


3. Complete the table. What is the scale factor from the original trapezoid to the scaled copy?

SIDE LENGTH IN ORIGINAL POLYGON	CORRESPONDING SIDE LENGTH IN SCALED COPY	SCALE FACTOR
15		
10		
25		

4. Jebbrel says the scale factor from the original polygon to the scaled copy is 3. Curtis says the scale factor from the original polygon to the scaled copy is ⅓. Who is correct? Explain how you know.

The first triangle below is the original triangle.



1. How do you know the second triangle is a scaled copy of the first triangle?

____

____

____

____

2. Complete the table to show the corresponding side lengths.

SIDE LENGTHS OF ORIGINAL	SIDE LENGTHS OF SCALED COPY
5	15

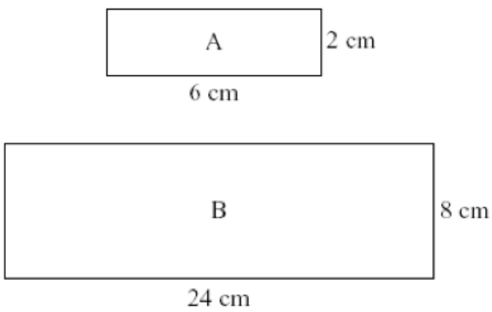
3. Complete the table to show the corresponding angles.

ANGLES IN ORIGINAL	ANGLES IN SCALED COPY
angle ABC	
angle BCA	

4. Each corresponding side of the scaled copy is ________ times as long as the corresponding side of the original figure.

5. What is the scale factor? __________

Rectangle A is the original rectangle. Rectangle B is a scaled copy.



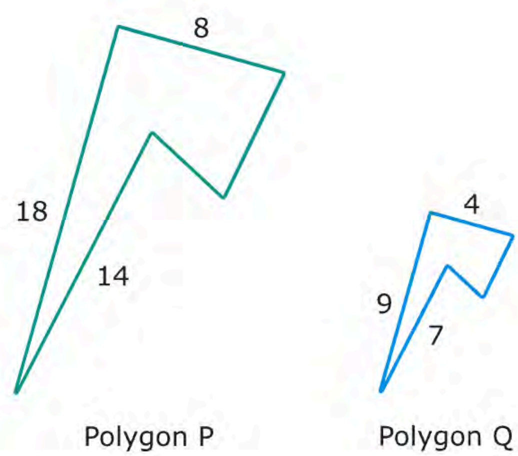
6. Complete the table with the corresponding side lengths of the scaled copy.

ORIGINAL RECTANGLE	SCALED COPY
2	
2	
6	
6	

7. The scale factor is…
    a. greater than 1.
    b. less than 1.

8. What is the scale factor? How do you know?

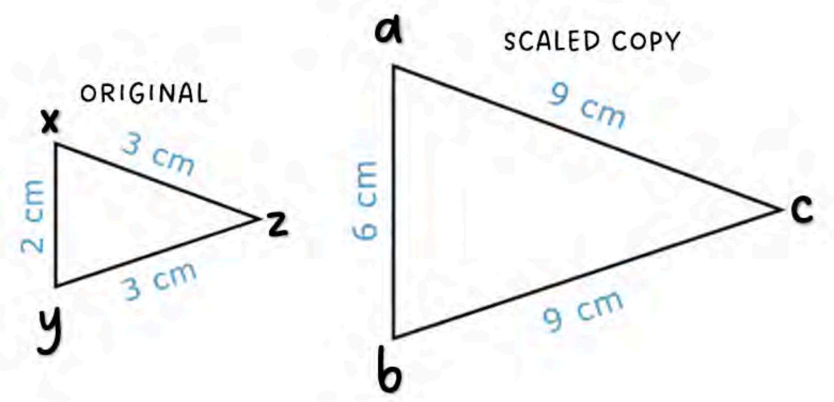
Polygon P is the original polygon. Polygon Q is the scaled copy.



9. The scale factor is…
    a. greater than 1.
    b. less than 1.

10. What is the scale factor? How do you know?

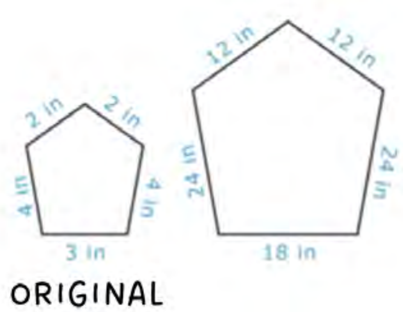
1. Complete each table based on the original triangle and the scaled copy.



ORIGINAL TRIANGLE	SCALED COPY
2	
3	
3	

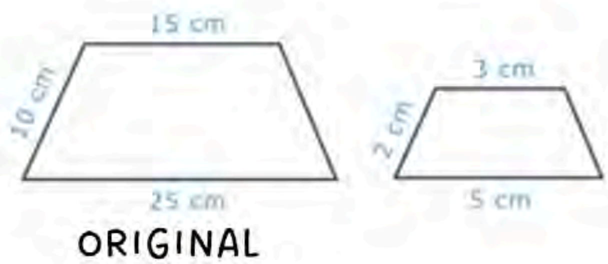
ANGLES IN THE ORIGINAL TRIANGLE	CORRESPONDING ANGLES IN THE SCALED COPY
∠XYZ	
∠YZX	
∠ZXY	

2. Complete the table with the corresponding side lengths. Then fill in the column to show the scale factor based on the corresponding side lengths.



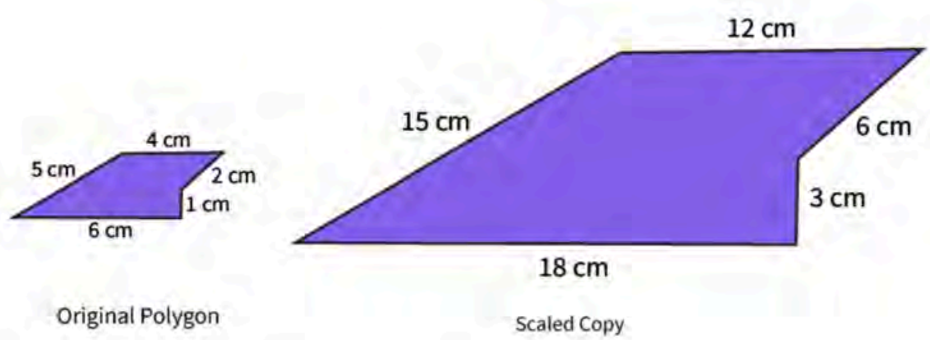
SIDE LENGTH IN ORIGINAL POLYGON	CORRESPONDING SIDE LENGTH IN SCALED COPY	SCALE FACTOR
3		
4		
2		
2		
4		
3		

3. Complete the table. What is the scale factor from the original trapezoid to the scaled copy?



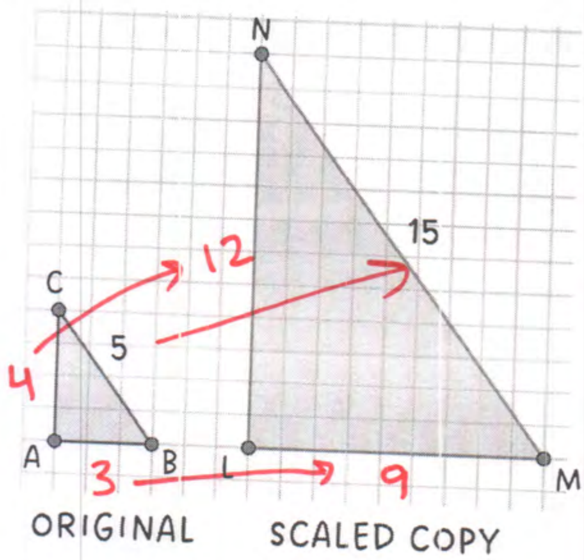
SIDE LENGTH IN ORIGINAL POLYGON	CORRESPONDING SIDE LENGTH IN SCALED COPY	SCALE FACTOR
15		
10		
25		

4. Jebbrel says the scale factor from the original polygon to the scaled copy is 3. Curtis says the scale factor from the original polygon to the scaled copy is ⅓. Who is correct? Explain how you know.



Name: KEY

The first triangle below is the original triangle.



1. How do you know the second triangle is a scaled copy of the first triangle?

Each corresponding side is 3 times as long as the original. It's the same shape, just a different size.

2. Complete the table to show the corresponding side lengths.

SIDE LENGTHS OF ORIGINAL	SIDE LENGTHS OF SCALED COPY
5	~~10~~ 15
4	12
3	9

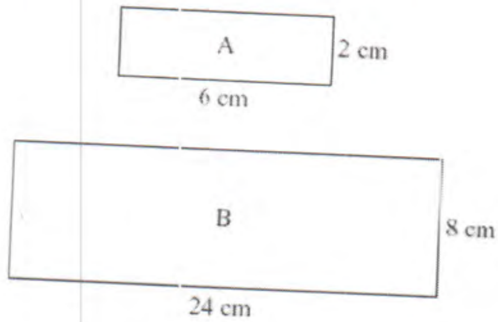
3. Complete the table to show the corresponding angles.

ANGLES IN ORIGINAL	ANGLES IN SCALED COPY
angle ABC	∠LMN
angle BCA	∠MNL
angle CAB	∠NLM

4. Each corresponding side of the scaled copy is 3 times as long as the corresponding side of the original figure.

5. What is the scale factor? 3

Rectangle A is the original rectangle. Rectangle B is a scaled copy.



6. Complete the table with the corresponding side lengths of the scaled copy.

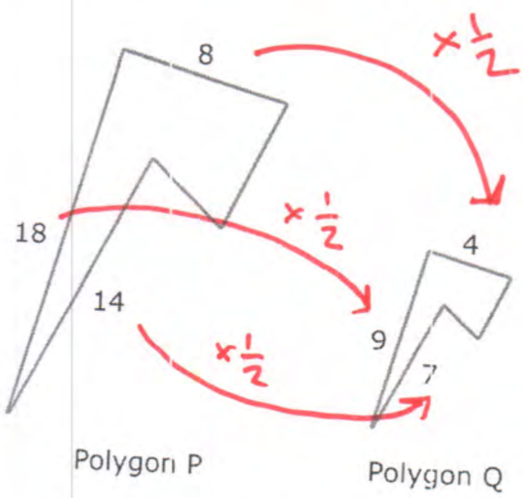
ORIGINAL RECTANGLE	SCALED COPY
2	8
2	8
6	24
6	24

7. The scale factor is…
   a. greater than 1.
   b. less than 1.

8. What is the scale factor? How do you know?

The scale factor is 4. Each side of the original can be multiplied by 4 to get the corresponding side.

Polygon P is the original polygon. Polygon Q is the scaled copy.



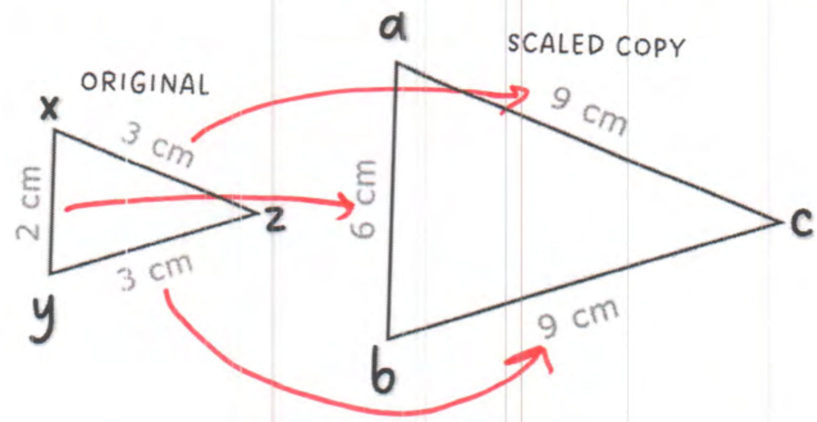
9. The scale factor is…
   a. greater than 1.
   b. less than 1.

10. What is the scale factor? How do you know?

The scale factor is 1/2, because each side can be multiplied by a factor of $\frac{1}{2}$ to make the corresponding length in the scaled copy.

Name: KEY

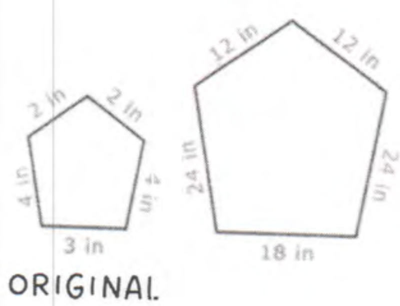
1. Complete each table based on the original triangle and the scaled copy.



ORIGINAL TRIANGLE	SCALED COPY
2	6
3	9
3	9

ANGLES IN THE ORIGINAL TRIANGLE	CORRESPONDING ANGLES IN THE SCALED COPY
∠XYZ	<abc
∠YZX	<bca
∠ZXY	<cab

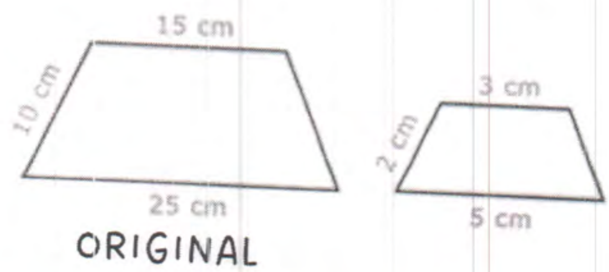
2. Complete the table with the corresponding side lengths. Then fill in the column to show the scale factor based on the corresponding side lengths.



SIDE LENGTH IN ORIGINAL POLYGON	CORRESPONDING SIDE LENGTH IN SCALED COPY	SCALE FACTOR
3	18	6
4	24	6
2	12	6
2	12	6
4	24	6
3	18	6

×6

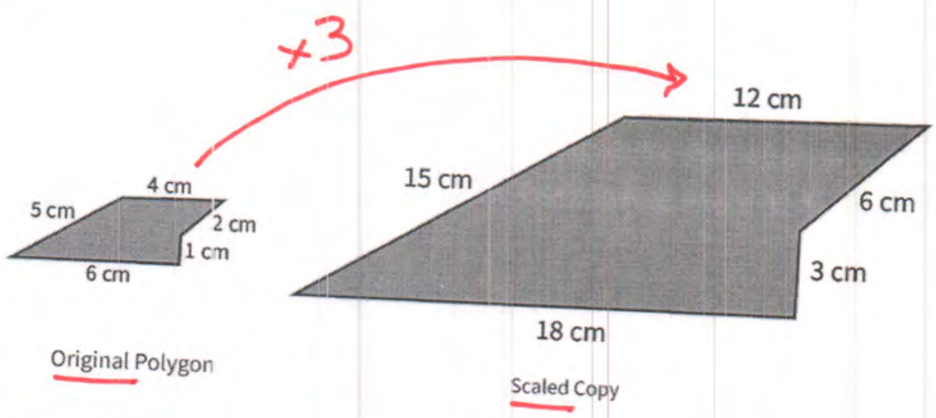
3. **Complete the table. What is the scale factor from the original trapezoid to the scaled copy?**



SIDE LENGTH IN ORIGINAL POLYGON	CORRESPONDING SIDE LENGTH IN SCALED COPY	SCALE FACTOR
15 →	3	1/5
10 →	2	1/5
25 →	5	1/5
10 →	2	1/5

$\times \frac{1}{5}$

4. **Jebbrel says the scale factor from the original polygon to the scaled copy is 3. Curtis says the scale factor from the original polygon to the scaled copy is ⅓.** Who is correct? Explain how you know.



Jebbrel is correct. Each side of the scaled copy is 3 times the length of the corresponding side in the original.

G7 U1 Lesson 3

Draw a scaled copy of a given figure using a given scale factor

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G7 U1 Lesson 3 - Students will draw a scaled copy of a given figure using a given scale factor

Warm Welcome (Slide 1): Tutor choice

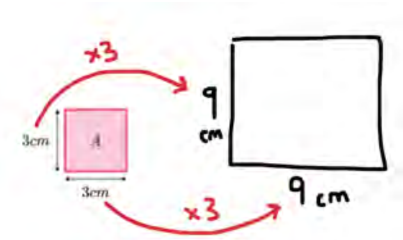
Frame the Learning/Connect to Prior Learning (Slide 2): Today we'll continue working with scale drawings. Our goal today will be to identify or draw scaled copies of a figure based on a given scale factor. As we saw previously, a scale factor is a number that we can multiply the dimensions of an original figure by that results in a scaled copy of the original figure. Let's dive in!

Let's Talk (Slide 3): Here we have a square. The side lengths of the square are all 3 units, or 3 centimeters in this case. What do you notice or wonder about the thought bubbles? Possible Student Answers, Key Points:

- I notice one is thinking about a scale factor of 3 which is a whole number. I notice the other is thinking of a scale factor of ⅓ which is a fraction. I notice 3 and ⅓ are multiplicative inverses.
- I wonder what the scaled copies will look like.

What would happen if we took this pink square and made a scale copy using a scale factor of 3? Possible Student Answers, Key Points:

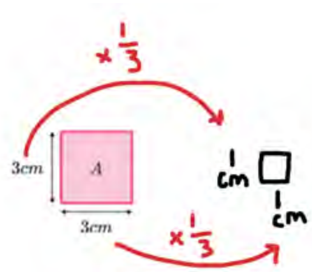
- The scale copy of the square would be bigger than the original.
- The side lengths would be 9cm.



If we used a scale factor of 3, each side length of the original would be multiplied by a factor of 3. The resulting scaled copy would be a square that measures 9 centimeters on each side. *(sketch and label square representing the scaled copy)* The length would be 9, since 3 times 3 equals 9. The width would also be 9, since 3 times 3 equals 9. *(draw arrows and "x 3" to connect each corresponding side)*

What about a scale factor of ⅓? What would be the same? What would be different? Possible Student Answers, Key Points:

- We would still end up with a scaled copy of the square, it would just be smaller.
- The side lengths would be 1 centimeter.

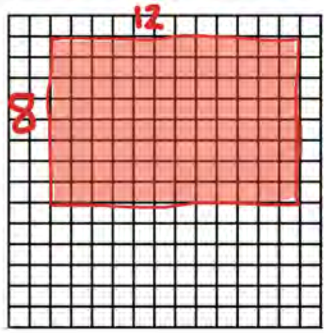


If we used a scale factor of ⅓ to make a scale copy, we would need to multiply each side by ⅓. I know 3 times ⅓ is equal to 1, so each side length of the new square would be 1 centimeter long. *(sketch new square, including arrows showing the scale factor)*

The size of the resulting scaled copy depends on the scale factor being used. We can see here that multiplying the dimensions of the square by a factor of 3 resulted in a larger scaled copy. Multiplying the dimensions by ⅓ resulted in a smaller scaled copy. We'll explore this more in future lessons, but keep it in the back of your mind as we work through today's examples.

Let's Think (Slide 4): This problem wants us to create two different scaled drawings of the same original rectangle. What are the two scale factors the problem wants us to consider? How do you think each scale factor will impact the scaled copies we draw? Possible Student Answers, Key Points:

- They want us to think about a scale factor of 2 and ½.
- The scale factor of 2 will require us to make a bigger rectangle, multiplying each side of the original by 2. I think the scale of ½ will result in a smaller scaled copy, since we'll be multiplying by a fraction.

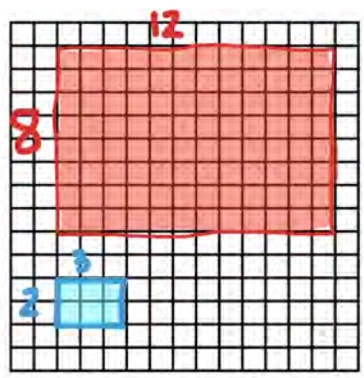


$4 \times 2 = 8$
$6 \times 2 = 12$

Let’s see if what you described is true. Let’s begin by thinking about a scale factor of 2. A scale factor of 2 means we must multiply each dimension of the original rectangle by 2. What will the dimensions of the scaled copy be? (8 units and 12 units) *(write 4 x 2 = 8 and 6 x 2 = 12 as student shares)*

When we multiply the length and width each by 2, we end up with a scaled copy with a length of 12 and a width of 8. Let’s sketch that on the grid here. *(sketch and label a rectangle measuring 12 units by 8 units leaving enough room along the bottom of the grid to draw the next scaled copy)*

We just drew a scaled copy of the original rectangle by multiplying each dimension by the scale factor, then using the grid to draw the new figure. Let’s do the same work with the second scale factor of ½.



$4 \times \frac{1}{2} = 2$
$6 \times \frac{1}{2} = 3$

How can I find the dimensions of a scaled copy using a scale factor of ½? Possible Student Answers, Key Points:

- You can multiply each dimension by the scale factor of ½.
- I know 4 times ½ is 4/2 or 2. I know 6 times ½ is 6/2 or 3.

(write 4 x ½ = 2 and 6 x ½ = 3 as student shares) I notice these dimensions are smaller than the original rectangle’s dimensions. That makes sense, since we multiplied each dimension by ½ This scaled copy will have a length of 3 and a width of 2. Let’s draw that on the grid. *(sketch a 2 x 3 rectangle underneath the previous scaled copy)* We have two different scaled copies of the same rectangle. As we can see, the scale factor being used impacts the size of the scaled copy. The shape, of course, stays the same.

Let’s consider one more example that asks us to think about scale factor in a slightly different way.

Let’s Think (Slide 5): Instead of having us draw a new scaled copy, this problem wants us to determine which of the three triangles shown here could be scaled copies of the original triangle at the top. We know a scaled copy is a figure whose corresponding sides have a consistent relationship with the original figure. Let’s see if we can find a consistent scale factor that could result in each scaled copy. If we can find a consistent scale factor, the figure is a scaled copy. If we can’t find a consistent scale factor, then the figure is not a scaled copy.

Look at the first potential scaled copy, then look at the original triangle. Which sides are corresponding sides? (12 and 6, 5 and 2 ½, and 13 and 6 ½) I want to think about what factor each original side can be multiplied by to result in the dimensions of the scaled copy.

$12 \times \frac{1}{2} = 6$ ✓
$5 \times \frac{1}{2} = 2\frac{1}{2}$ ✓
$13 \times \frac{1}{2} = 6\frac{1}{2}$ ✓

(write 12 x ___ = 6, 5 x ____ = 2 ½, and 13 x ____ = 6 ½) I can think about what number I multiply 12 by to end up with 6. I know 12 x ½ = 6, because half of 12 is 6. *(write ½ in blank)* 12 times a scale factor of ½ results in a scaled side equal to 6 units.

I know 5 times ½ results in 2 ½. 5 times ½ is 5/2, which is equal to 2 ½. *(fill in ½)* What about 13? 13 times what results in 6 ½? (½) *(fill in ½)* Since each side length can be multiplied by a scale factor of ½ and result in the side length of the scaled copy, I know the first triangle IS a scaled copy of the original.

$12 \times 2 = 24$ ✓

$5 \times 2 = 10$ ✓

$13 \times 2 = 26$ ✓

Let’s use similar thinking to consider the second triangle. *(point to sides as you name them)* I know 12 corresponds with 24. I know 5 corresponds with 10. I know 13 corresponds with 26. Is this a scaled copy of the original? How do you know? Possible Student Answers, Key Points:

- It is a scaled copy of the original. The scale factor is 2.
- 12 x 2 = 24, 5 x 2 = 10, and 13 x 2 = 26. I can multiply each side of the original figure by 2.

(write equations as shown) We can multiply each side of the original triangle by 2 and we will end up with the side lengths of this second triangle. This second triangle must be a scaled copy. The scale factor used to make it is 2.

$12 \times 2 = 24$ ✗

$5 \times 3 = 15$ ✓

$13 \times 3 = 39$ ✓

Let’s use the same thinking to see if this last triangle is a scaled copy. *(write each equation and point to the named sides as you narrate)*

I know 12 x 2 = 24. I know 5 x 3 = 15. I know 13 x 3 = 9. Is this triangle a scaled copy of the original? How do you know? Possible Student Answers, Key Points:

- It is not a scaled copy.
- We can use multiplication to find the corresponding side lengths, but one side needs to be multiplied by 2 and the other sides need to be multiplied by 3. It’s not a consistent relationship.

The relationship between the sides of the original triangle and the sides of the copy are not consistent. There is not one consistent scale factor we can use to find the resulting side lengths. Therefore, this third triangle cannot be a scaled copy of the original. The scale factor being used must be the same throughout the entire figure.

Let’s Try it (Slides 6 - 7): Let’s try out a few more problems before you show what you know independently. Today we’ll use a scale factor to multiply dimensions of an original figure and consider how to draw or identify the resulting scaled copy. Depending on the number we use as the scale factor, we can end up with different scaled copies. We also saw today that is important to multiply each dimension or side by the same scale factor, otherwise the resulting figure cannot be considered a true scaled copy. We’ll keep all this in mind as we try th next set of problems.

WARM WELCOME

Today we will draw a scaled copy of a given figure using a given scale factor.

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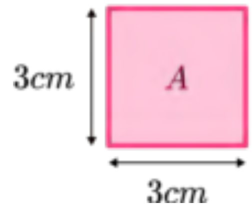
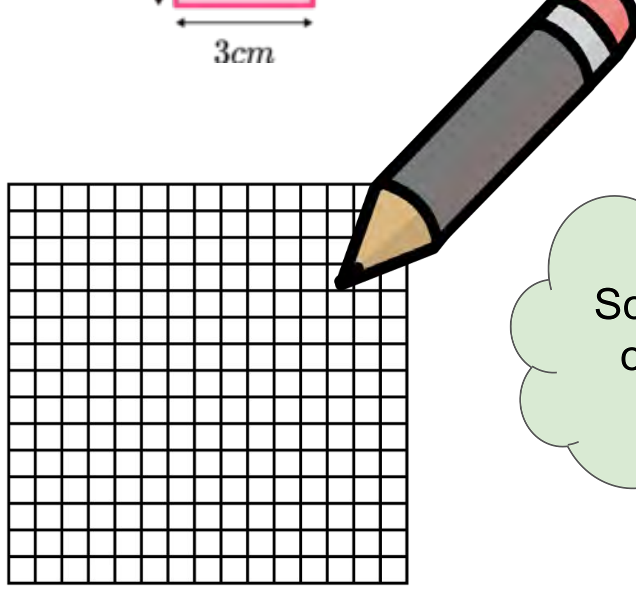
Let's Talk:



Scale factor of 3…?



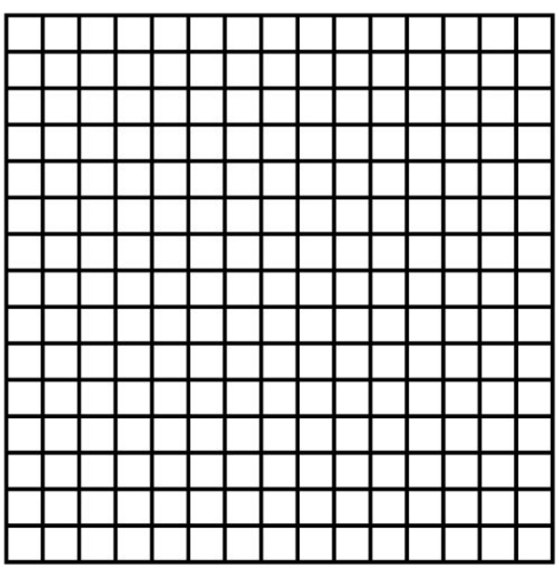
Scale factor of 1/3…?

Let's Think:

A rectangle is shown below.

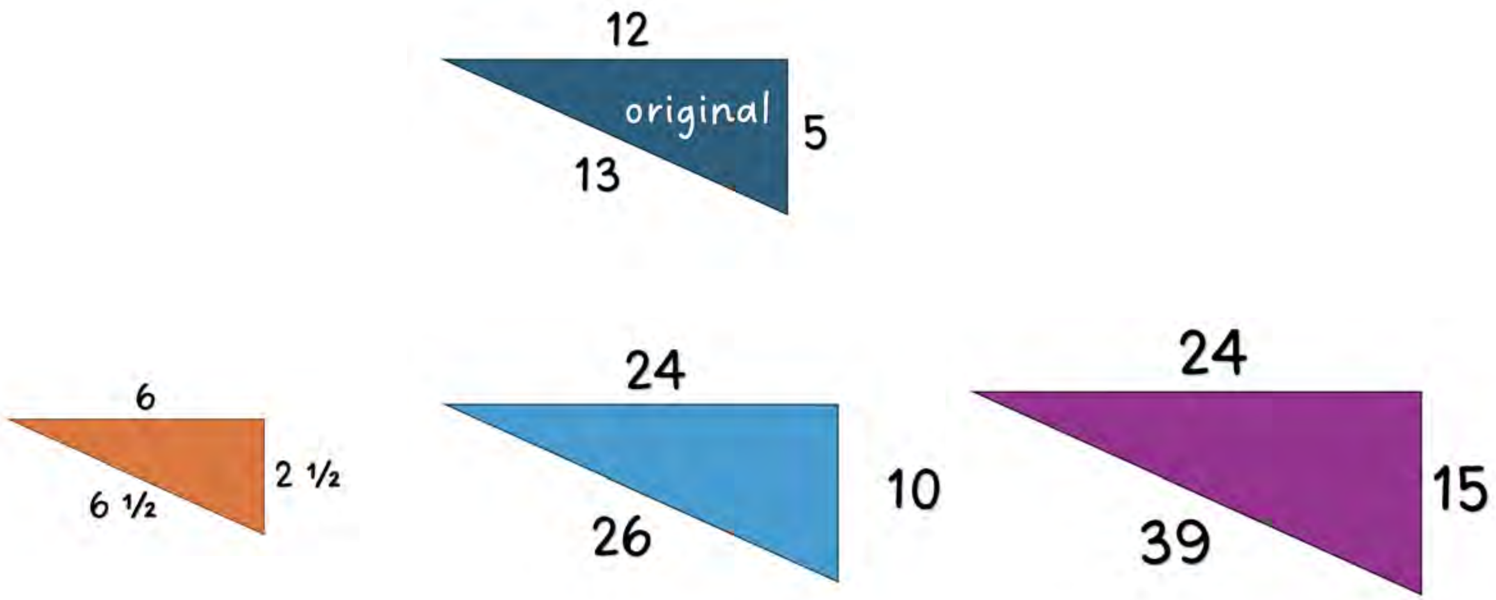
Sketch a scaled copy using a scale factor of 2.

Sketch another scaled copy using a scale factor of ½.



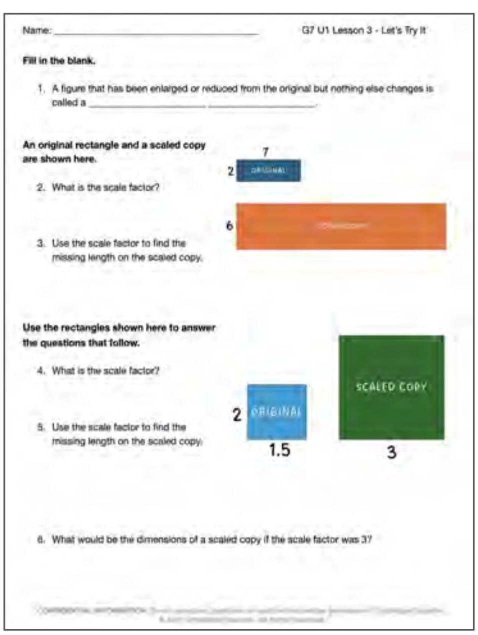
Let's Think:

Which of the triangles below could be scaled copies of the original triangle?



Let's Try It:

Let's explore drawing a scaled copy of a given figure using a given scale factor together.



Name: ______________________ G7 U1 Lesson 3 - Let's Try It

Fill in the blank.

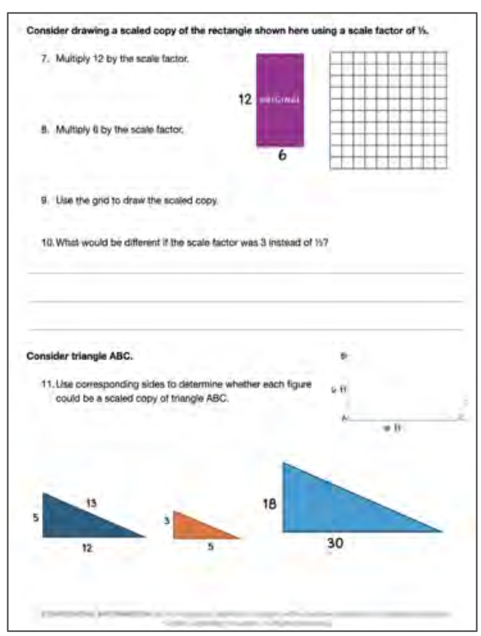
1. A figure that has been enlarged or reduced from the original but nothing else changes is called a ____________ ____________.

An original rectangle and a scaled copy are shown here.

2. What is the scale factor?
3. Use the scale factor to find the missing length on the scaled copy.

Use the rectangles shown here to answer the questions that follow.

4. What is the scale factor?
5. Use the scale factor to find the missing length on the scaled copy.
6. What would be the dimensions of a scaled copy if the scale factor was 3?



Consider drawing a scaled copy of the rectangle shown here using a scale factor of ½.

7. Multiply 12 by the scale factor.
8. Multiply 6 by the scale factor.
9. Use the grid to draw the scaled copy.
10. What would be different if the scale factor was 3 instead of ½?

Consider triangle ABC.

11. Use corresponding sides to determine whether each figure could be a scaled copy of triangle ABC.

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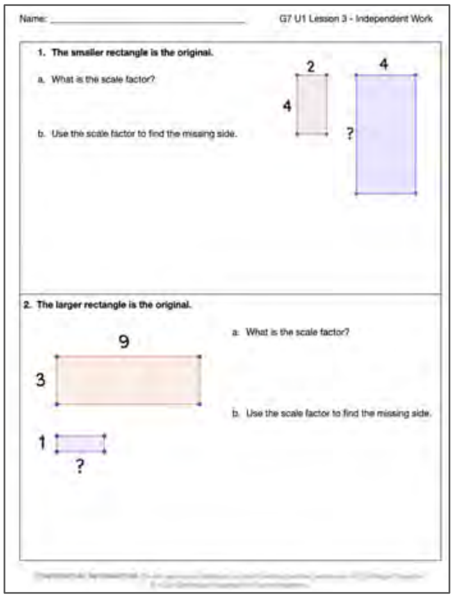
On your Own:

Now it's time to draw a scaled copy of a given figure using a given scale factor on your own.



Name: ______________________ G7 U1 Lesson 3 - Independent Work

1. The smaller rectangle is the original.

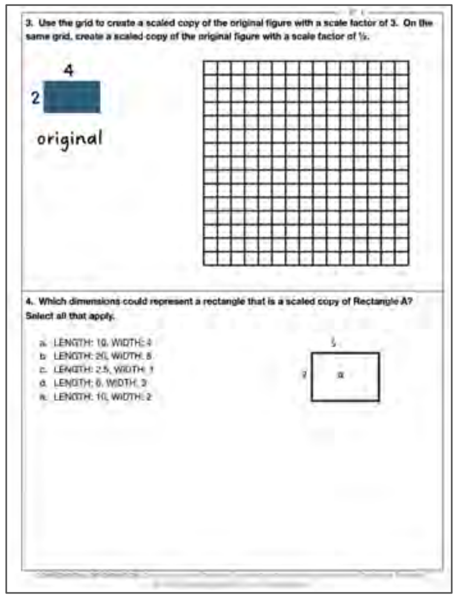
a. What is the scale factor?

b. Use the scale factor to find the missing side.

2. The larger rectangle is the original.

a. What is the scale factor?

b. Use the scale factor to find the missing side.



3. Use the grid to create a scaled copy of the original figure with a scale factor of 3. On the same grid, create a scaled copy of the original figure with a scale factor of ½.

4. Which dimensions could represent a rectangle that is a scaled copy of Rectangle A? Select all that apply.

a. LENGTH: 10, WIDTH: 4
b. LENGTH: 20, WIDTH: 8
c. LENGTH: 2.5, WIDTH: 1
d. LENGTH: 6, WIDTH: 3
e. LENGTH: 10, WIDTH: 2

Fill in the blank.

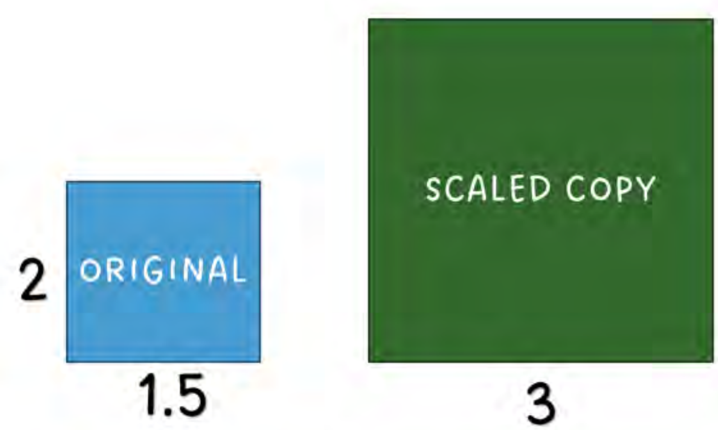
1. A figure that has been enlarged or reduced from the original but nothing else changes is called a ______________________ ____________________.

An original rectangle and a scaled copy are shown here.

2. What is the scale factor?

3. Use the scale factor to find the missing length on the scaled copy.

Use the rectangles shown here to answer the questions that follow.



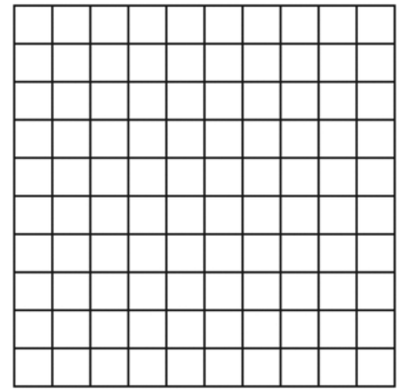
4. What is the scale factor?

5. Use the scale factor to find the missing length on the scaled copy.

6. What would be the dimensions of a scaled copy if the scale factor was 3?

Consider drawing a scaled copy of the rectangle shown here using a scale factor of ⅓.

7. Multiply 12 by the scale factor.



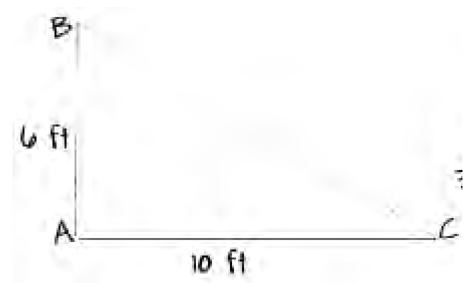
8. Multiply 6 by the scale factor.

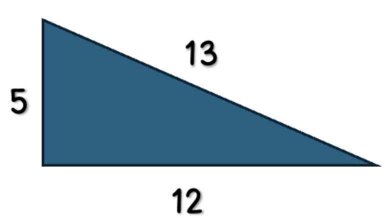
9. Use the grid to draw the scaled copy.

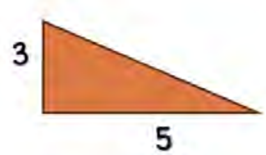
10. What would be different if the scale factor was 3 instead of ⅓?

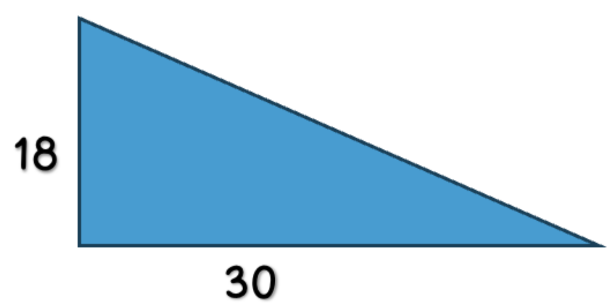
Consider triangle ABC.

11. Use corresponding sides to determine whether each figure could be a scaled copy of triangle ABC.





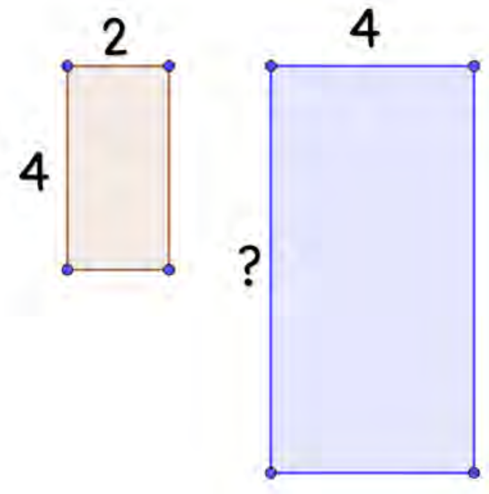




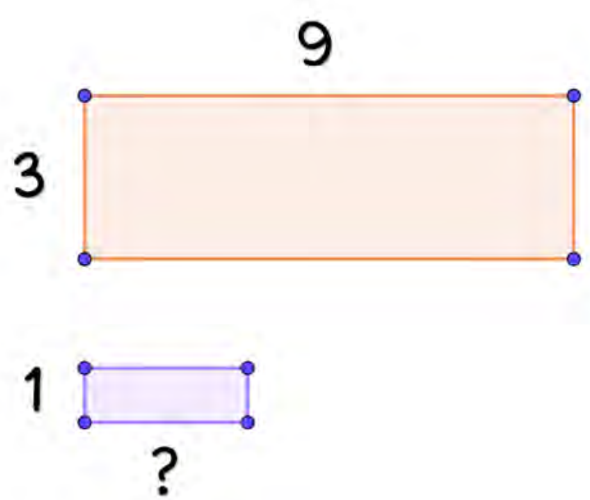
1. The smaller rectangle is the original.

a. What is the scale factor?

b. Use the scale factor to find the missing side.



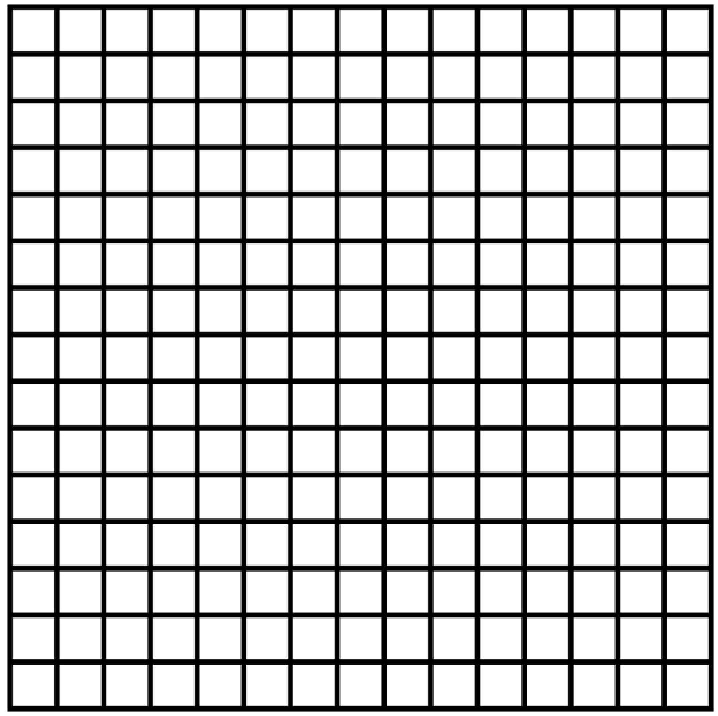
2. The larger rectangle is the original.



a. What is the scale factor?

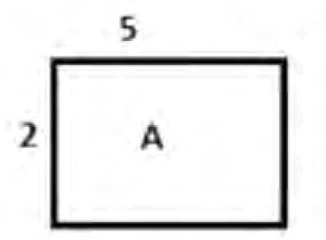
b. Use the scale factor to find the missing side.

3. Use the grid to create a scaled copy of the original figure with a scale factor of 3. On the same grid, create a scaled copy of the original figure with a scale factor of ½.



4. Which dimensions could represent a rectangle that is a scaled copy of Rectangle A? Select all that apply.

a. LENGTH: 10, WIDTH: 4
b. LENGTH: 20, WIDTH: 8
c. LENGTH: 2.5, WIDTH: 1
d. LENGTH: 6, WIDTH: 3
e. LENGTH: 10, WIDTH: 2

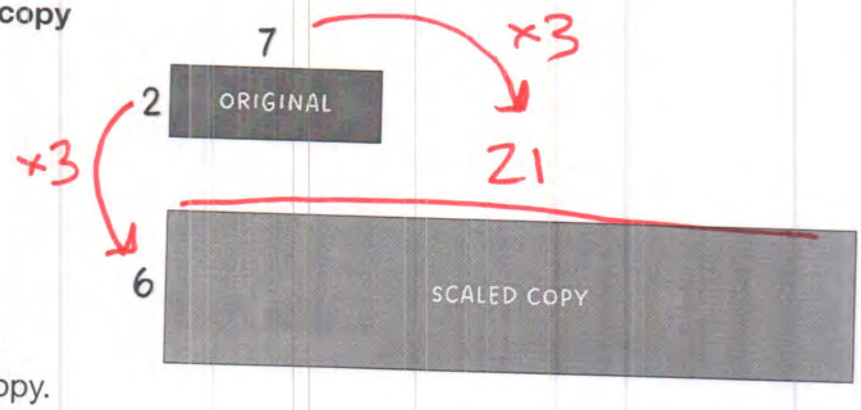


Name: KEY

Fill in the blank.

1. A figure that has been enlarged or reduced from the original but nothing else changes is called a scaled copy.

An original rectangle and a scaled copy are shown here.



2. What is the scale factor?

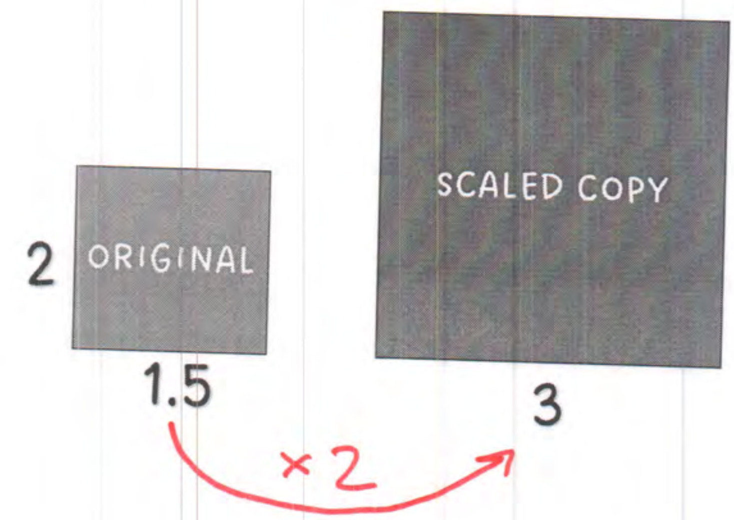
3

3. Use the scale factor to find the missing length on the scaled copy.

$7 \times 3 = 21$

21

Use the rectangles shown here to answer the questions that follow.



4. What is the scale factor?

$1.5 \times 2 = 3$

2

5. Use the scale factor to find the missing length on the scaled copy.

$2 \times 2 = 4$

4

6. What would be the dimensions of a scaled copy if the scale factor was 3?

$2 \times 3 = 6$

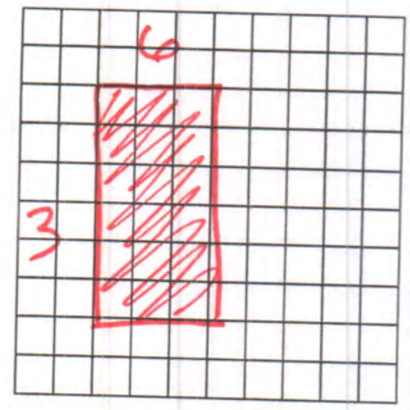
$1.5 \times 3 = 4.5$

6 and 4.5

Consider drawing a scaled copy of the rectangle shown here using a scale factor of ⅓.

7. Multiply 12 by the scale factor.

$12 \times \frac{1}{2} = 6$



8. Multiply 6 by the scale factor.

$6 \times \frac{1}{2} = 3$

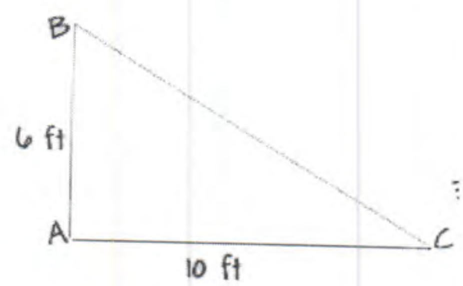
9. Use the grid to draw the scaled copy.

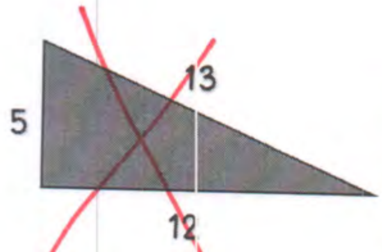
10. What would be different if the scale factor was 3 instead of ⅓?

The rectangle would be 3 times bigger than the original. I would multiply each side by 3.

Consider triangle ABC.

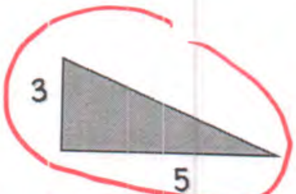
11. Use corresponding sides to determine whether each figure could be a scaled copy of triangle ABC.





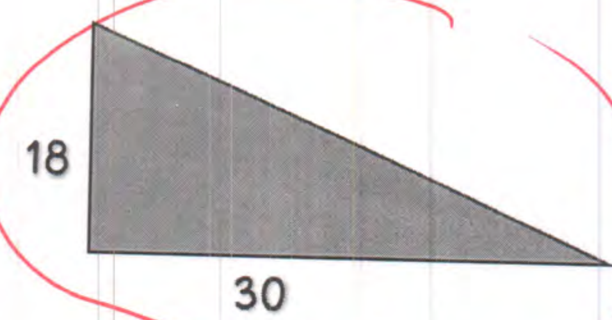
$6 \times ? = 5$

$10 \times ? = 12$



$6 \times \frac{1}{2} = 3$ ✓

$10 \times \frac{1}{2} = 5$ ✓

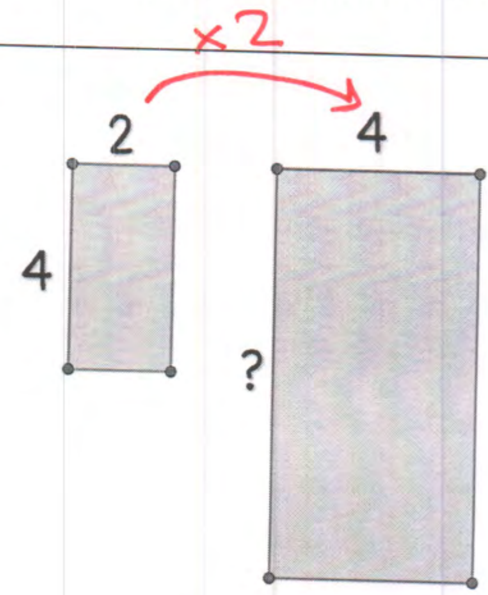


$6 \times 3 = 18$ ✓

$10 \times 3 = 30$ ✓

Name: KEY

1. The smaller rectangle is the original.



a. What is the scale factor?

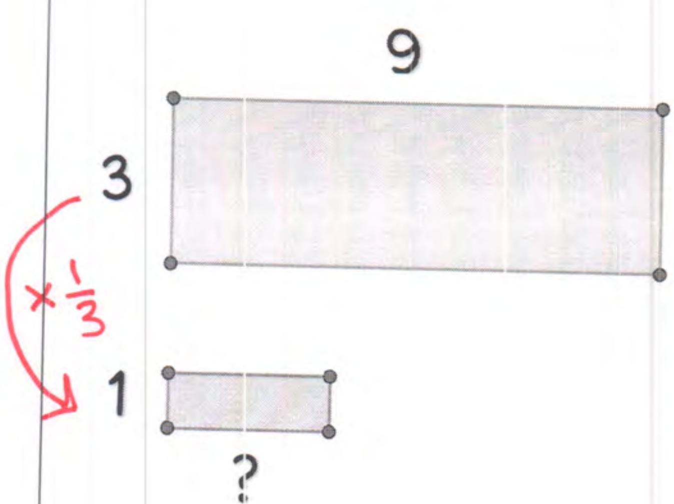
2

b. Use the scale factor to find the missing side.

$4 \times 2 = ?$

8

2. The larger rectangle is the original.



a. What is the scale factor?

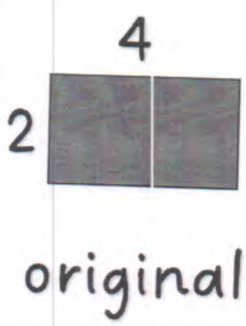
$\frac{1}{3}$

b. Use the scale factor to find the missing side.

$9 \times \frac{1}{3} = \frac{9}{3} = 3$

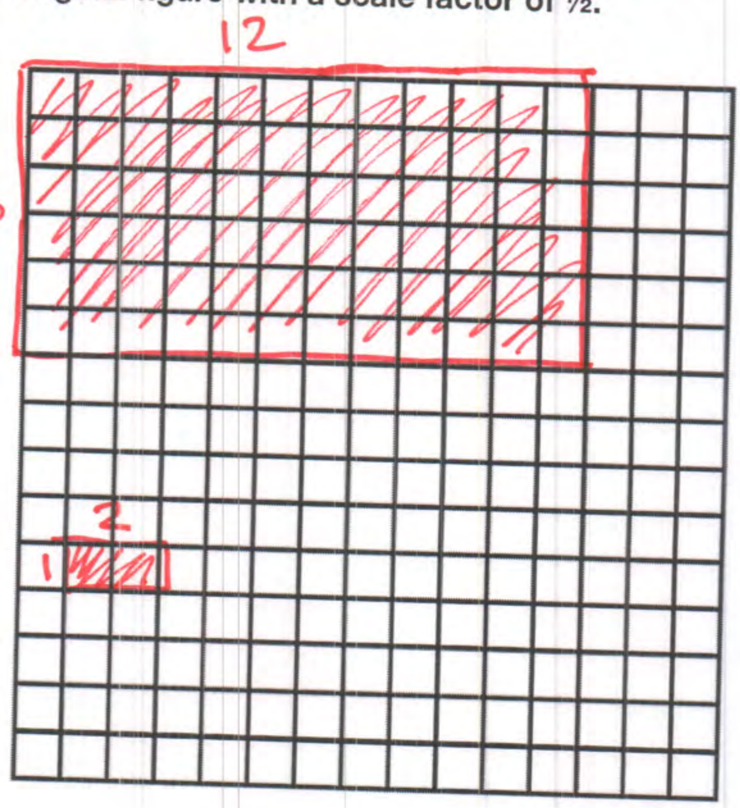
3

3. **Use the grid to create a scaled copy of the original figure with a scale factor of 3. On the same grid, create a scaled copy of the original figure with a scale factor of ½.**



$4 \times 3 = 12$
$2 \times 3 = 6$

$4 \times \frac{1}{2} = 2$
$2 \times \frac{1}{2} = 1$



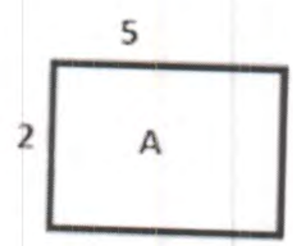
4. **Which dimensions could represent a rectangle that is a scaled copy of Rectangle A? Select all that apply.**

a. LENGTH: 10, WIDTH: 4
b. LENGTH: 20, WIDTH: 8
c. LENGTH: 2.5, WIDTH: 1
~~d. LENGTH: 6, WIDTH: 3~~
~~e. LENGTH: 10, WIDTH: 2~~

$5 \times 2 = 10$
$2 \times 2 = 4$

$5 \times 4 = 20$
$2 \times 4 = 8$

$5 \times \frac{1}{2} = 2.5$
$2 \times \frac{1}{2} = 1$



G7 U1 Lesson 4

Use corresponding sides, corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another

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G7 U1 Lesson 4 - Students will use corresponding sides, corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): For the past several lessons, we've been thinking about scaled copies. Today, we're going to act like detectives. We're going to look closely at corresponding sides and corresponding angles to determine whether one figure is a scaled copy of another or not. Let's jump in!

Let's Talk (Slide 3): Look at the two rectangles shown here, Figure A and Figure B. What do you notice about the figures? What do you wonder? Possible Student Answers, Key Points:

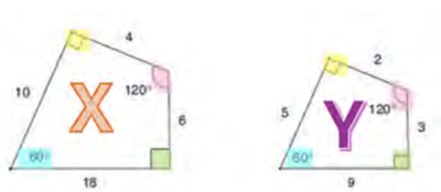
- They are both rectangles. Each figure has four 90-degree angles. Figure A is bigger than Figure B.
- I notice Figure A's width of 9 is multiplied by ⅓ to make Figure B's width of 3. I notice Figure A's length of 16 is multiplied by ½ to make Figure B's length of 8. They can't be scaled copies, since the relationship is not consistent.
- I wonder if whoever did this was trying to make a scaled copy.

These figures might look like scaled copies at first glance, but you'll notice they are not actually scaled copies. In order to be a scaled copy, the figure's corresponding angles must be the same measure <u>and</u> the corresponding sides must be related in a consistent way. In this example, the corresponding angles are the same size, but we can see that the scale factor used to create Figure B are inconsistent. Figure B is not a scaled copy of Figure A.

Let's Think (Slide 4): Let's look at our first problem. Here we have two quadrilaterals. The question wants us to figure out whether Figure Y is a scaled copy of Figure X? Before we look closer, does Figure Y visually look like it could be a scaled copy? Possible Student Answers, Key Points:

- Visually it looks like it could be a scaled copy. It looks a little smaller, but the shape is similar, and it doesn't look stretched or compressed.

They definitely look similar, so there's a possibility Figure Y is a scaled copy of Figure X. Let's make sure it's a scaled copy by checking for two things. First, we need to make sure corresponding angles are the same. Second, we need to make sure that corresponding sides are related using a consistent scale factor. If both those components are true, then we can be certain that Figure Y is a scaled copy of Figure X.

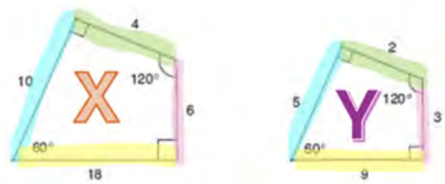


Look at the angles. Let's highlight angles that are corresponding. I know this top left angle on Figure X corresponds with the top left angle on Figure Y. *(have student point to the remaining corresponding sides and highlight each set in a different color if possible)* Corresponding angles must be congruent or the same in a scaled copy.

By marking the corresponding angles, I can see that each pair has the same measure. *(point as you narrate)* We have a pair of corresponding angles that measure 90 degrees, a pair that measure 120 degrees, another pair that measure 90 degrees, and a pair that measure 60 degrees. The first component of a scaled copy, identical corresponding angles, checks out.

Let's look at the sides now. What do you notice about the sides of Figure X and Figure Y? Possible Student Answers, Key Points:

- Figure X has longer sides than Figure Y.
- Figure X has sides that are two times longer than the corresponding side of Figure Y.
- I think the scale factor is ½.



(highlight corresponding sides, color-coding if possible) I'm going to mark my corresponding sides to help me keep track of my thinking. I see 4 corresponds with 2, 6 corresponds with 3, 18 corresponds with 9, and 10 corresponds with 5. Is there a consistent scale factor that can be used to get from Figure X to Figure Y? Possible Student Answers, Key Points:

- The scale factor is ½.
- It is consistent, because I can multiply each side of Figure X by the same factor and end up with the corresponding side length in Figure Y.

$4 \times \frac{1}{2} = 2$

$6 \times \frac{1}{2} = 3$

$18 \times \frac{1}{2} = 9$

$10 \times \frac{1}{2} = 5$

(write equations as you narrate) A scale factor of ½ can take us from Figure X to Figure Y. 4 times a scale factor of ½ gets us to 2. 6 times a scale factor of ½ gets us to 3. 18 times a scale factor of ½ gets us to 9. 10 times a scale factor of ½ gets us to 5.

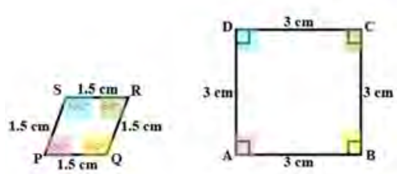
Since the angles in Figure Y were identical to the corresponding angles in Figure X, and since we were able to use a consistent scale factor for each pair of corresponding sides, we can say that Figure Y is a scale copy of Figure X.

We made a prediction that Figure Y looked like it could be a scale copy of Figure X, and now we were able to prove it mathematically by looking at the corresponding sides and angles. Let's look at one more using the same thought process.

Let's Think (Slide 5): Take a look at Quadrilateral PQRS and Quadrilateral ABCD. The question wants us to determine if ABCD is a scaled copy of PQRS. Let's make a prediction just based on how the figure look. Do you think ABCD will be a scaled copy of PQRS? Why or why not? Possible Student Answers, Key Points:

- I don't think it will be a scaled copy, because PQRS is a rhombus and ABCD is a square.
- I don't think it will be a scaled copy, because PQRS looks slanted compared to ABCD.
- It might be a scaled copy, because it looks like the person used a scale of 2. I'm not sure.

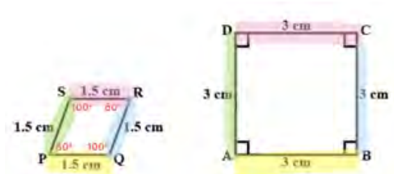
Let's look closely at the corresponding angles and side lengths to officially determine whether ABCD can be considered a scaled copy of figure PQRS. Remember, the corresponding angles have to be the same size <u>and</u> corresponding sides must be related in a consistent way using a single scale factor.



(highlight or point to corresponding angles) Are the corresponding angles in these figures identical? Possible Student Answers, Key Points:

- They are not the same.
- Angle S is 100 degrees and Angle D is 90 degrees. Angle R is 80 degrees and Angle C is 90 degrees. None of the other corresponding angle pairs match.

All corresponding angles must be the same in a figure for it to be a scaled copy of another figure. In this case, none of the corresponding angles are the same. Based on this, we already know quadrilateral ABCD cannot be a scaled copy of quadrilateral PQRS.



Even though we know ABCD is not a scaled copy, let's take a minute to still look at the corresponding side lengths. *(highlight corresponding sides using different colors if possible)* All the side lengths in the original figure are 1.5 centimeters. All the side lengths in figure ABCD measure 3 centimeters. Is there a scale factor that could be used to create ABCD from PQRS? Possible Student Answers, Key Points:

- The scale factor is 2.
- I know 1.5 x 2 is equal to 3. You can multiply each side by a scale factor of 2 to end up with a new side length of 3 centimeters.

$1.5 \times 2 = 3$
$1.5 \times 2 = 3$
$1.5 \times 2 = 3$
$1.5 \times 2 = 3$

(write 1.5 x 2 = 3 for each corresponding side pair as shown) If you multiply each side of the original figure by 2, we can get the side lengths in the second figure. Even though it seems like corresponding sides are related in a consistent way, we still can't call figure ABCD a scaled copy of figure PQRS because the corresponding angles are not identical.

Both things must be true in order for a figure to be a scaled copy. One, the corresponding angles must be equivalent. Two, the corresponding side lengths must be related in a consistent way using a consistent scale factor. If only one thing is true, or neither are true, then the figure cannot be considered a scaled copy.

Let's Try it (Slides 6 - 7): Now it's time to practice a few more together. Once we finish these next few, as usual, you'll get a chance to show what you know on your own. As you work through these next problems with me, what two components will we look for to ensure a given figure is a scaled copy of an original?
Possible Student Answers, Key Points:
- The corresponding angles must be identical.
- The corresponding sides must be related by a common scale factor.

We'll look closely at corresponding angles and corresponding sides to determine whether a figure is a scaled copy of another figure. We can always make a visual prediction, but we want to carefully use angles and sides to make sure our original prediction is correct.

WARM WELCOME

Today we will use corresponding sides, corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another.

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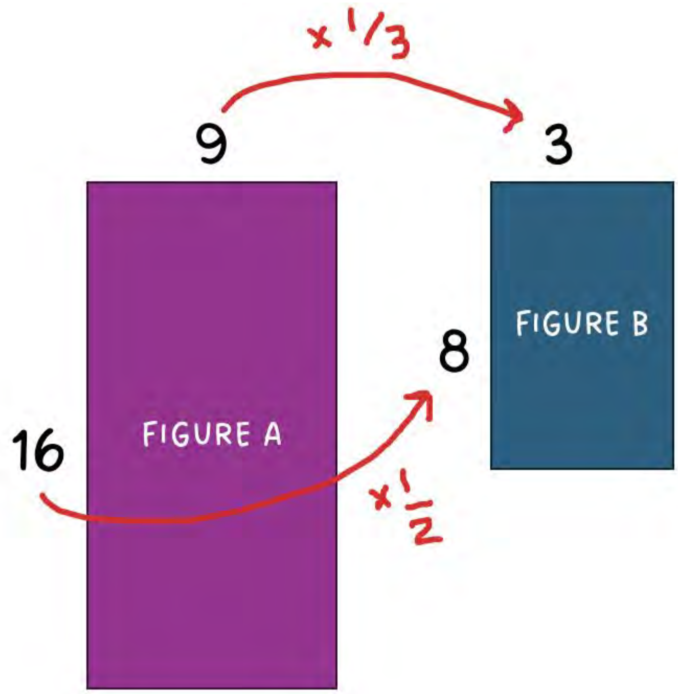
Let's Talk:

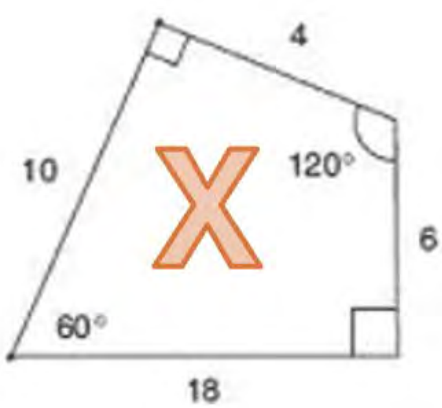
What do you notice?

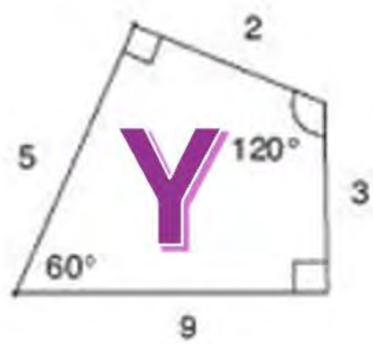
What do you wonder?



Let's Think:

Is Figure Y a scaled copy of Figure X?





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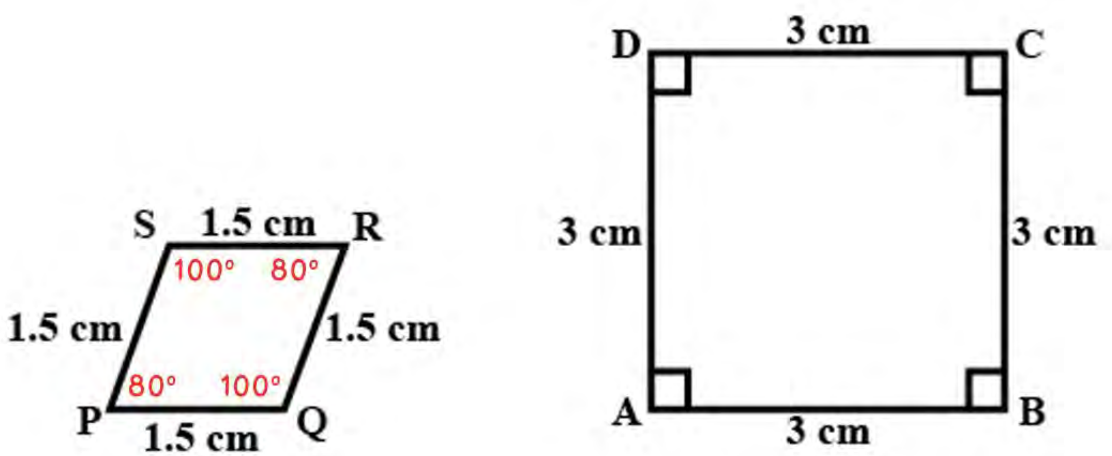
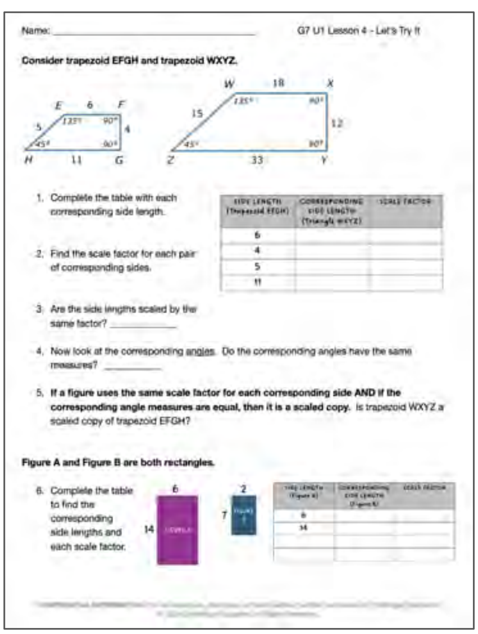
Let's Think:

Is Quadrilateral ABCD a scaled copy of Quadrilateral PQRS?



Let's Try It:

Let's explore using corresponding sides, corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another together.



Name: ______________________ G7 U1 Lesson 4 - Let's Try It

Consider trapezoid EFGH and trapezoid WXYZ.

1. Complete the table with each corresponding side length.

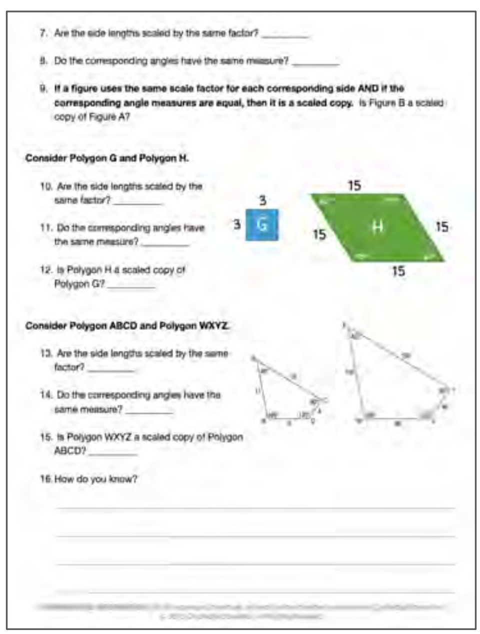
SIDE LENGTH (Trapezoid EFGH)	CORRESPONDING SIDE LENGTH (Triangle WXYZ)	SCALE FACTOR
6		
4		
5		
11		

2. Find the scale factor for each pair of corresponding sides.
3. Are the side lengths scaled by the same factor? __________
4. Now look at the corresponding angles. Do the corresponding angles have the same measures? __________
5. **If a figure uses the same scale factor for each corresponding side AND if the corresponding angle measures are equal, then it is a scaled copy.** Is trapezoid WXYZ a scaled copy of trapezoid EFGH?

Figure A and Figure B are both rectangles.

6. Complete the table to find the corresponding side lengths and each scale factor.

SIDE LENGTH (Figure A)	CORRESPONDING SIDE LENGTH (Figure B)	SCALE FACTOR
6		
14		



7. Are the side lengths scaled by the same factor? __________
8. Do the corresponding angles have the same measure? __________
9. **If a figure uses the same scale factor for each corresponding side AND if the corresponding angle measures are equal, then it is a scaled copy.** Is Figure B a scaled copy of Figure A?

Consider Polygon G and Polygon H.

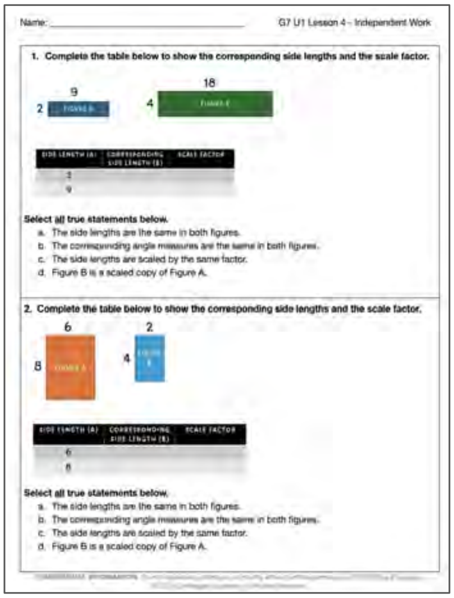
10. Are the side lengths scaled by the same factor? __________
11. Do the corresponding angles have the same measure? __________
12. Is Polygon H a scaled copy of Polygon G? __________

Consider Polygon ABCD and Polygon WXYZ.

13. Are the side lengths scaled by the same factor? __________
14. Do the corresponding angles have the same measure? __________
15. Is Polygon WXYZ a scaled copy of Polygon ABCD? __________
16. How do you know?

On your Own:

Now it's time to use corresponding sides, corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another on your own.


Name: ______________________ G7 U1 Lesson 4 – Independent Work

1. Complete the table below to show the corresponding side lengths and the scale factor.

SIDE LENGTH (A)	CORRESPONDING SIDE LENGTH (B)	SCALE FACTOR
2		
9		

Select all true statements below.

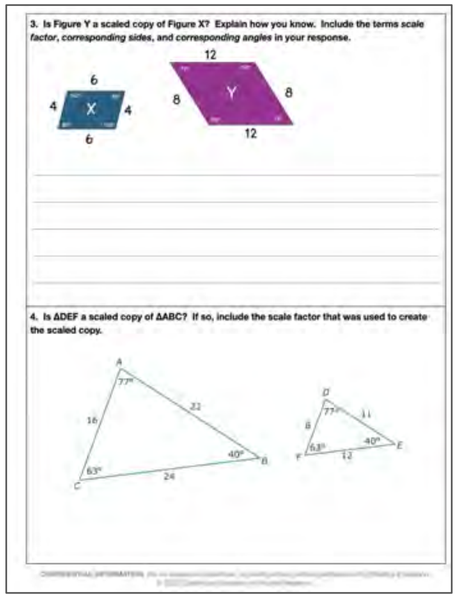
a. The side lengths are the same in both figures.
b. The corresponding angle measures are the same in both figures.
c. The side lengths are scaled by the same factor.
d. Figure B is a scaled copy of Figure A.

2. Complete the table below to show the corresponding side lengths and the scale factor.

SIDE LENGTH (A)	CORRESPONDING SIDE LENGTH (B)	SCALE FACTOR
6		
8		

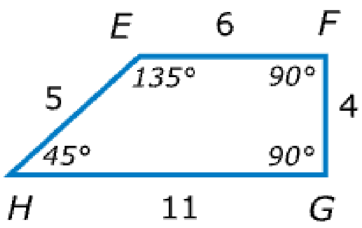
Select all true statements below.

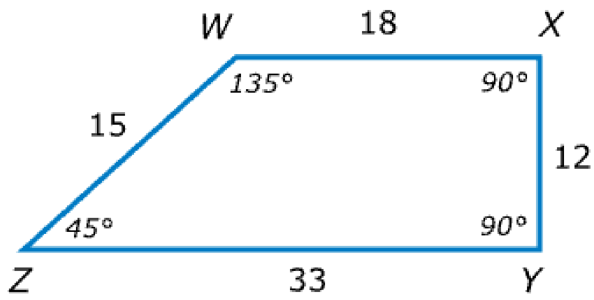
a. The side lengths are the same in both figures.
b. The corresponding angle measures are the same in both figures.
c. The side lengths are scaled by the same factor.
d. Figure B is a scaled copy of Figure A.


3. Is Figure Y a scaled copy of Figure X? Explain how you know. Include the terms *scale factor, corresponding sides*, and *corresponding angles* in your response.

4. Is ΔDEF a scaled copy of ΔABC? If so, include the scale factor that was used to create the scaled copy.

Consider trapezoid EFGH and trapezoid WXYZ.





1. Complete the table with each corresponding side length.

2. Find the scale factor for each pair of corresponding sides.

SIDE LENGTH (Trapezoid EFGH)	CORRESPONDING SIDE LENGTH (Triangle WXYZ)	SCALE FACTOR
6		
4		
5		
11		

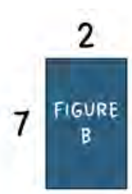
3. Are the side lengths scaled by the same factor? _____________

4. Now look at the corresponding <u>angles</u>. Do the corresponding angles have the same measures? ___________

5. **If a figure uses the same scale factor for each corresponding side AND if the corresponding angle measures are equal, then it is a scaled copy.** Is trapezoid WXYZ a scaled copy of trapezoid EFGH?

Figure A and Figure B are both rectangles.

6. Complete the table to find the corresponding side lengths and each scale factor.



SIDE LENGTH (Figure A)	CORRESPONDING SIDE LENGTH (Figure B)	SCALE FACTOR
6		
14		

7. Are the side lengths scaled by the same factor? __________

8. Do the corresponding angles have the same measure? __________

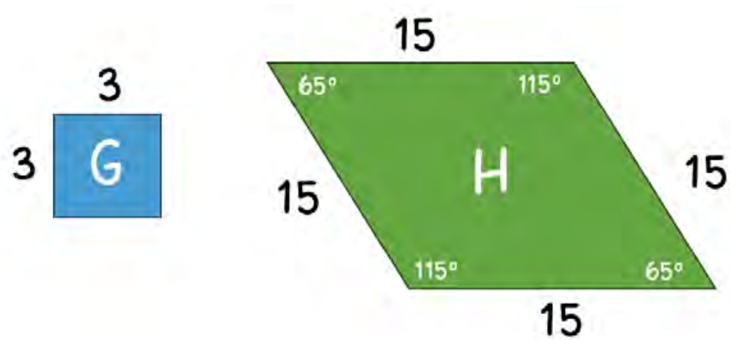
9. **If a figure uses the same scale factor for each corresponding side AND if the corresponding angle measures are equal, then it is a scaled copy.** Is Figure B a scaled copy of Figure A?

Consider Polygon G and Polygon H.

10. Are the side lengths scaled by the same factor? __________

11. Do the corresponding angles have the same measure? __________

12. Is Polygon H a scaled copy of Polygon G? __________

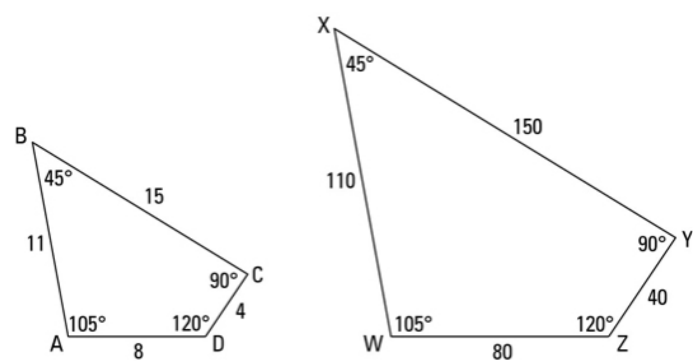


Consider Polygon ABCD and Polygon WXYZ.

13. Are the side lengths scaled by the same factor? __________

14. Do the corresponding angles have the same measure? __________

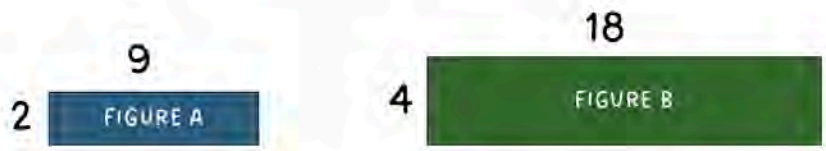
15. Is Polygon WXYZ a scaled copy of Polygon ABCD? __________



16. How do you know?

Name: ________________________________ G7 U1 Lesson 4 - Independent Work

1. Complete the table below to show the corresponding side lengths and the scale factor.

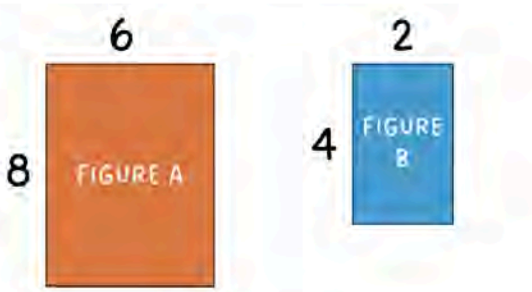


SIDE LENGTH (A)	CORRESPONDING SIDE LENGTH (B)	SCALE FACTOR
2		
9		

Select <u>all</u> true statements below.

a. The side lengths are the same in both figures.
b. The corresponding angle measures are the same in both figures.
c. The side lengths are scaled by the same factor.
d. Figure B is a scaled copy of Figure A.

2. Complete the table below to show the corresponding side lengths and the scale factor.

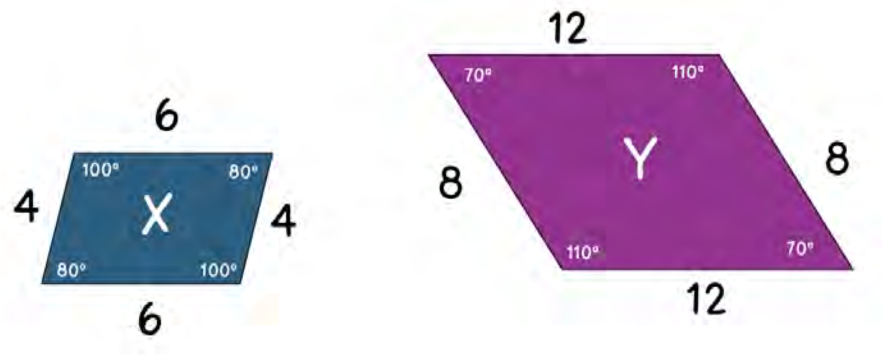


SIDE LENGTH (A)	CORRESPONDING SIDE LENGTH (B)	SCALE FACTOR
6		
8		

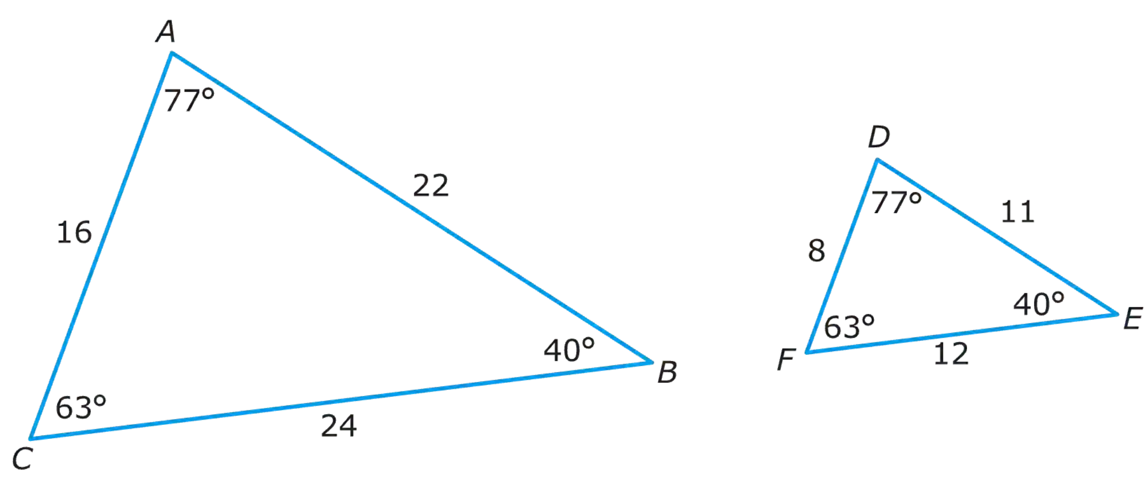
Select <u>all</u> true statements below.

a. The side lengths are the same in both figures.
b. The corresponding angle measures are the same in both figures.
c. The side lengths are scaled by the same factor.
d. Figure B is a scaled copy of Figure A.

3. **Is Figure Y a scaled copy of Figure X? Explain how you know. Include the terms *scale factor*, *corresponding sides*, and *corresponding angles* in your response.**



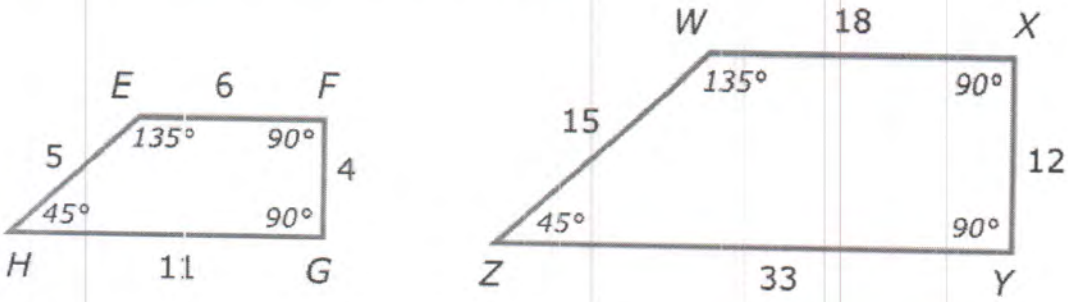
4. **Is ΔDEF a scaled copy of ΔABC? If so, include the scale factor that was used to create the scaled copy.**



Name: KEY

G7 U1 Lesson 4 - Let's Try It

Consider trapezoid EFGH and trapezoid WXYZ.



1. Complete the table with each corresponding side length.

2. Find the scale factor for each pair of corresponding sides.

SIDE LENGTH (Trapezoid EFGH)	CORRESPONDING SIDE LENGTH (Triangle WXYZ)	SCALE FACTOR
6	18	3
4	12	3
5	15	3
11	33	3

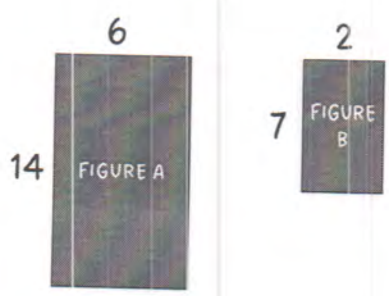
3. Are the side lengths scaled by the same factor? YES

4. Now look at the corresponding <u>angles</u>. Do the corresponding angles have the same measures? YES

5. **If a figure uses the same scale factor for each corresponding side AND if the corresponding angle measures are equal, then it is a scaled copy.** Is trapezoid WXYZ a scaled copy of trapezoid EFGH? YES

Figure A and Figure B are both rectangles.

6. Complete the table to find the corresponding side lengths and each scale factor.



SIDE LENGTH (Figure A)	CORRESPONDING SIDE LENGTH (Figure B)	SCALE FACTOR
6	2	1/3
14	7	1/2
6	2	1/3
14	7	1/2

7. Are the side lengths scaled by the same factor? NO

8. Do the corresponding angles have the same measure? YES

9. **If a figure uses the same scale factor for each corresponding side AND if the corresponding angle measures are equal, then it is a scaled copy.** Is Figure B a scaled copy of Figure A?

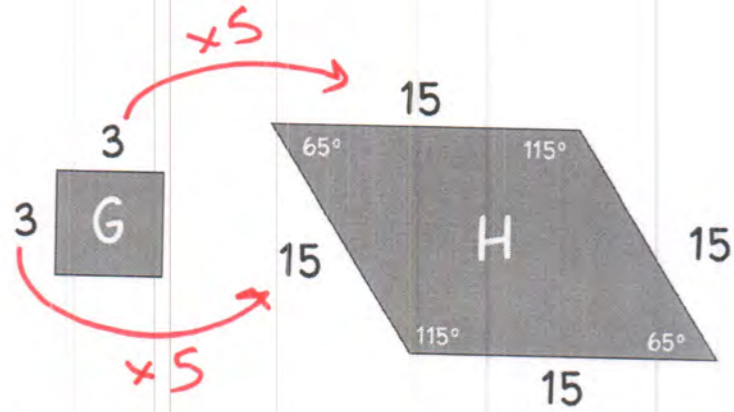
NO

Consider Polygon G and Polygon H.

10. Are the side lengths scaled by the same factor? YES

11. Do the corresponding angles have the same measure? NO

12. Is Polygon H a scaled copy of Polygon G? NO

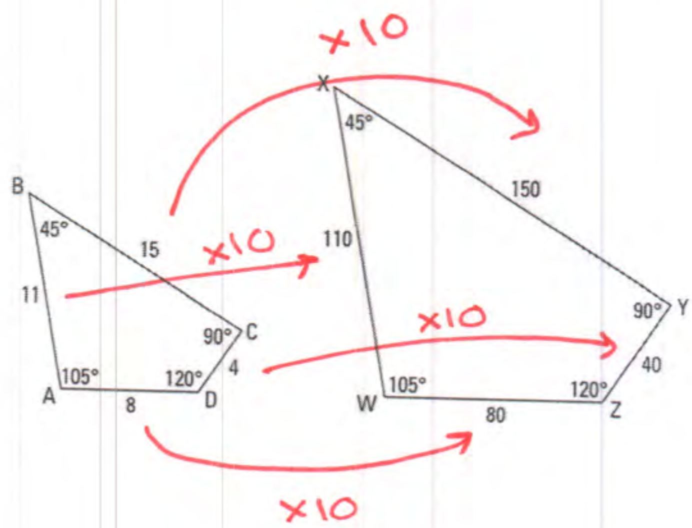


Consider Polygon ABCD and Polygon WXYZ.

13. Are the side lengths scaled by the same factor? YES

14. Do the corresponding angles have the same measure? YES

15. Is Polygon WXYZ a scaled copy of Polygon ABCD? YES



16. How do you know?

The angle measures are identical and the scale factor is consistent for each pair of corresponding sides.

Name: KEY

1. Complete the table below to show the corresponding side lengths and the scale factor.

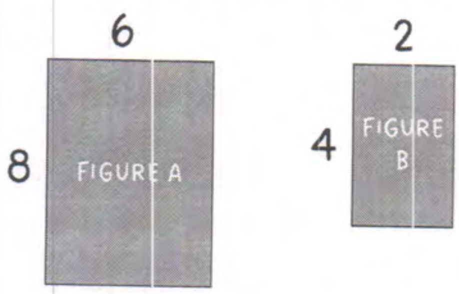
SIDE LENGTH (A)	CORRESPONDING SIDE LENGTH (B)	SCALE FACTOR
2	4	2
9	18	2

×2

Select all true statements below.

~~a.~~ The side lengths are the same in both figures.
b. The corresponding angle measures are the same in both figures.
c. The side lengths are scaled by the same factor.
d. Figure B is a scaled copy of Figure A.

2. Complete the table below to show the corresponding side lengths and the scale factor.



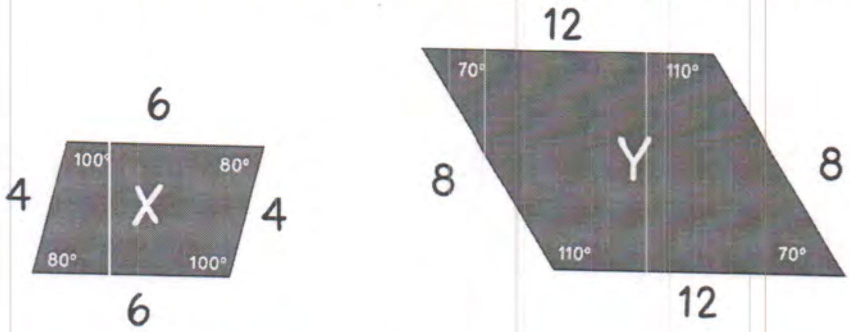
SIDE LENGTH (A)	CORRESPONDING SIDE LENGTH (B)	SCALE FACTOR
6	2	1/3
8	4	1/2

×1/3
×1/2

Select all true statements below.

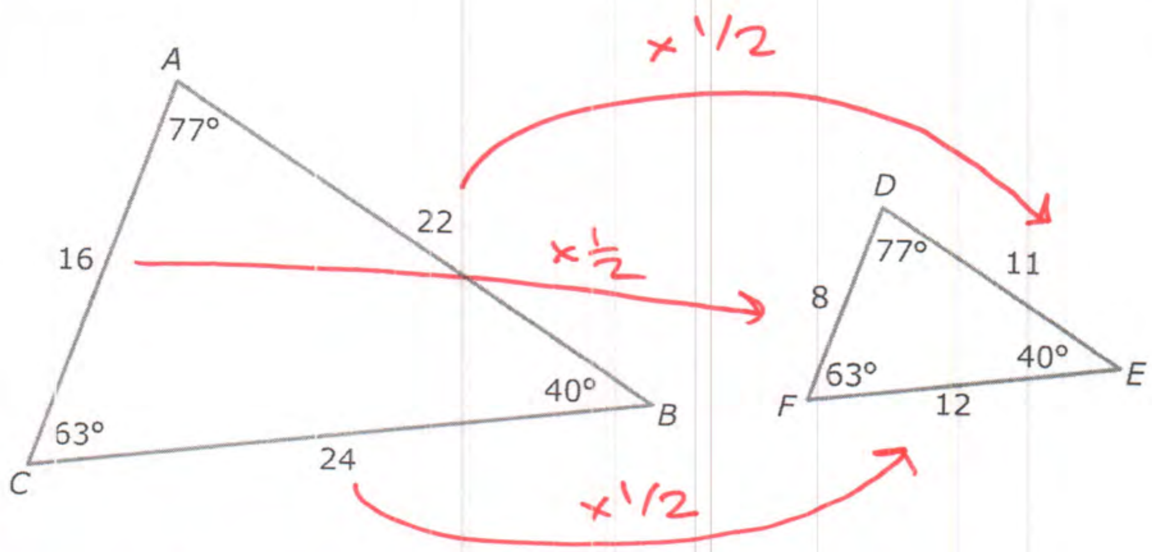
~~a.~~ The side lengths are the same in both figures.
b. The corresponding angle measures are the same in both figures.
~~c.~~ The side lengths are scaled by the same factor.
~~d.~~ Figure B is a scaled copy of Figure A.

3. **Is Figure Y a scaled copy of Figure X? Explain how you know. Include the terms *scale factor*, *corresponding sides*, and *corresponding angles* in your response.**



No, Figure Y is not a scaled copy. The side lengths appear to be related by a scale factor of 2, but the corresponding angles are not the same measures.

4. **Is ΔDEF a scaled copy of ΔABC? If so, include the scale factor that was used to create the scaled copy.**



Yes, ΔDEF is a scale copy. The scale factor is 1/2.

G7 U1 Lesson 5

Describe how scale factors of 1, less than 1, and greater than 1 affect the size of a scaled copy, and explain how scaling can be reversed using reciprocal scale factors

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G7 U1 Lesson 5 - Students will describe how scale factors of 1, less than 1, and greater than 1 affect the size of a scaled copy, and explain how scaling can be reversed using reciprocal scale factors

Warm Welcome (Slide 1): Tutor choice

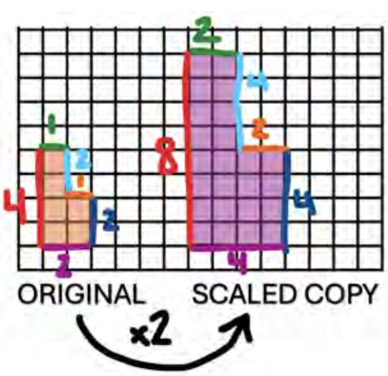
Frame the Learning/Connect to Prior Learning (Slide 2): We've been working hard to build our understanding of scale copies and scale factor. We've learned how to identify a scaled copy, we've learned the importance of looking at corresponding sides and angles, and we've even drawn our own scaled copies of figures. Today, we're going to look closely at how different types of scale factors can impact a scaled copy of an image. Let's jump right in!

Let's Talk (Slide 3): Take a moment to look at the two sets of images here. What do you notice is the same? What's different? Possible Student Answers, Key Points:

- I notice both grids have the same two figures on them. I notice they both show an original and a scaled copy. I notice all the shapes are hexagons.
- I notice that in the first set, the scaled copy is larger than the original. In the second set, the scaled copy is smaller than the original.

These two pairs of images shows the same figures, but in a different order. In the first set, the scaled copy is a bigger version of the original. In the second set, the scaled copy is a smaller version of the original. Let's explore the difference in how these scaled copies were created. I want you to keep an eye out for anything you notice about the scale factors used in each set of figures.

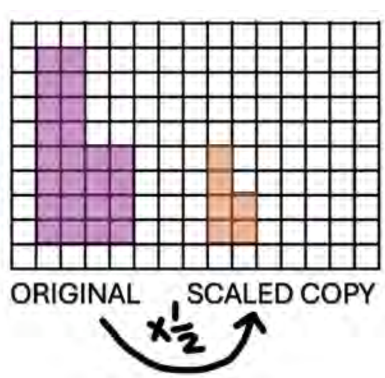
Let's Think (Slide 4): The first problem we'll tackle wants us to find the scale factor for the two pairs of images we just looked at.



Let's look at the first set. Which sides are corresponding? What scale factor was used? *(highlight and label corresponding sides as the student shares, supporting as needed)* Possible Student Answers, Key Points:

- 4 corresponds with 8. 1 corresponds with 2. 2 corresponds with 4. 1 corresponds with 2. 2 corresponds with 4. 2 corresponds with 4.
- The scale factor is 2, since we can multiply each side length in the original by 2 to end up with the side lengths in the scaled copy.

The scale factor here is 2. *(write x 2 with an arrow connecting both images as shown)* 4 times 2 is 8, 1 times 2 is 2, 2 times 2 is 4, 1 times 2 is 2, 2 times 2 is 4, and 2 times 2 is 4. We can multiply each side length in the original image by 2 to end up with the corresponding side lengths in the scaled copy. Each side of the scaled copy is two times larger than the sides in the original figure.



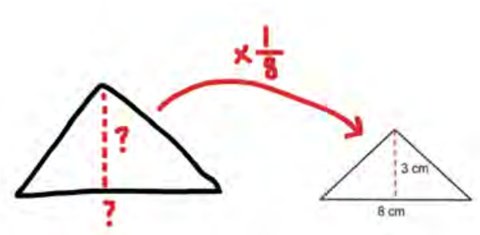
Now we'll look at the other set of figures. We already know the corresponding side lengths, since the images are the same; they're just in a different order. The bigger figure is the original, and the smaller figure is the scaled copy. Thinking about the long side on the left of the figure, we knew that 4 x 2 = 8 before. Now, I need to think about 8 times what number would equal 4? The scale factor is ½, because 8 x ½ = 4. All of the other sides in the original can be multiplied by ½ to create the smaller scaled figure.

How does this scale factor compare to the previous scale factor? Possible Student Answers, Key Points:

- The first scale factor was a whole number. This scale factor is a fraction.
- They are inverses. ½ is the inverse of 2. They are reciprocals of each other.

A few things are important to note here. First, we've seen this before, but multiplying an original by a scale factor greater than 1 will result in a larger scaled copy. Multiplying an original by a scale factor less than 1 will result in a smaller scaled copy. The other thing that's important to note is that these scales are reciprocals or multiplicative inverses. If you want to reverse or undo the effects of a scaling an image, you can use the reciprocal or the multiplicative inverse to get the figure back to its original form.

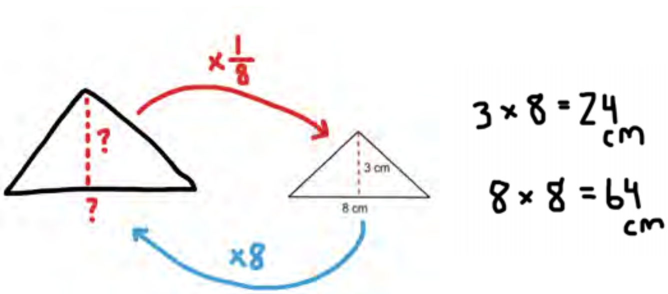
Let's Think (Slide 5): Let's try one more problem together.



This one shows us a triangle, and the directions say this triangle is a scaled copy of an original that we don't see shown. The scaled copy was made using a scale factor of ⅛. If I want to visualize this, I know the original triangle must be bigger, since this scaled copy we see is ⅛ the size of the original. *(sketch a larger triangle as shown, and draw an arrow showing a scale of ⅛ was used to go from the larger triangle to the smaller scaled copy)*

The first question asks us what scale factor we can use to return this scaled copy back to its original size. We can think about the last problem we solved to help us. If they originally used a scale of ⅛, how can we reverse that or undo that using a different scale factor? Possible Student Answers, Key Points:

- We can find the reciprocal or the multiplicative inverse of ⅛.
- I know the reciprocal or multiplicative inverse of ⅛ is 8/1 or 8.



To "undo" or reverse the effects of the scaling, we can use the multiplicative inverse of the scale factor. The multiplicative inverse of ⅛ is 8/1 or 8. The scale factor we can use to scale the triangle to its original form is 8. *(draw an arrow from the scaled copy to the sketch of the original triangle and label it with x 8)* If we want to find the original height and base, we just need to multiply the dimensions of the scaled copy by 8.

What is the original height? What is the original base? How do you know? Possible Student Answers, Key Points:

- The original height is 24 centimeters, because 3 x 8 = 24.
- The original base is 64 centimeters, because 8 x 8 = 64.

(write 3 x 8 = 24 and 8 x 8 = 64 as student shares) The original height is 24 centimeters, because 3 times a scale factor of 8 is 24. The original base is 64 centimeters, because 8 times a scale factor of 8 is 64. Nice work!

Let's Try it (Slides 6 - 7):   We've seen today that when we multiply an original by scale factor that is a fraction less than 1, the scaled copy will shrink. If we multiply by a scale copy by a scale factor greater than 1, the scaled copy will get bigger. We also explored how we can use the multiplicative inverse to undo or reverse the effects of scaling an image. Let's keep these important ideas in mind as we tackle a few more problems together. After you're feeling even more confident, you'll get the opportunity to try some out on your own. Let's get started!

WARM WELCOME

Today we will describe how scale factors of 1, less than 1, and greater than 1 affect the size of a scaled copy, and explain how scaling can be reversed using reciprocal scale factors.

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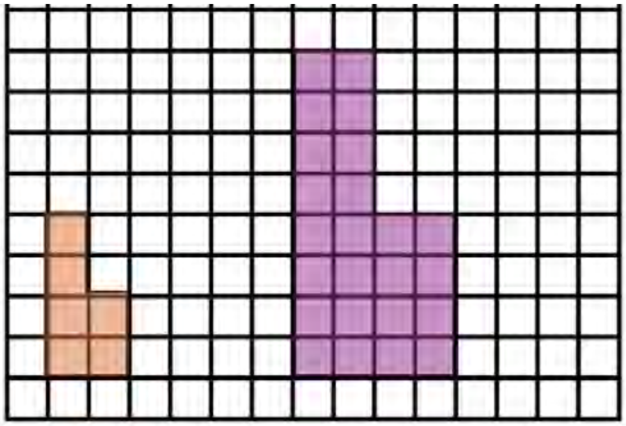
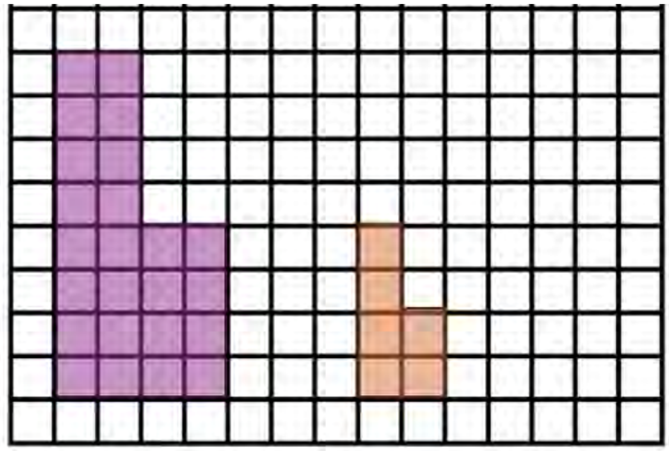
Let's Talk:

What's the same?
What's different?



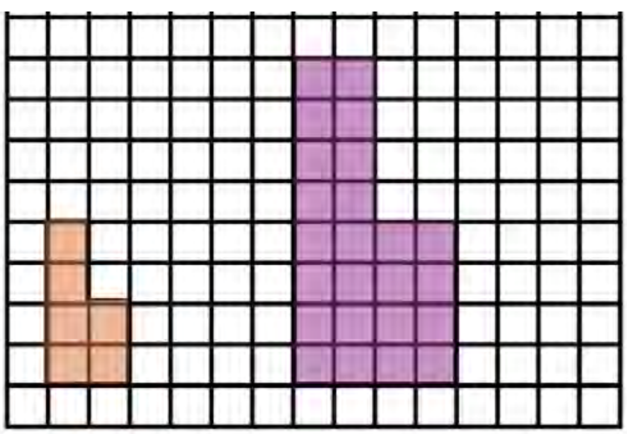
ORIGINAL SCALED COPY



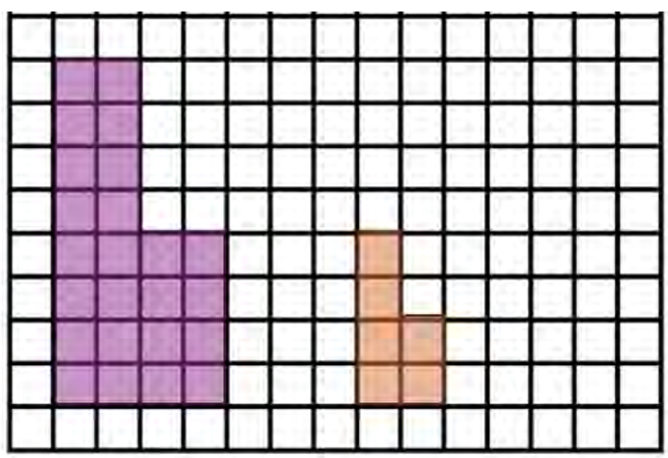
ORIGINAL SCALED COPY

Let's Think:

Determine the scale factor for each set of polygons.



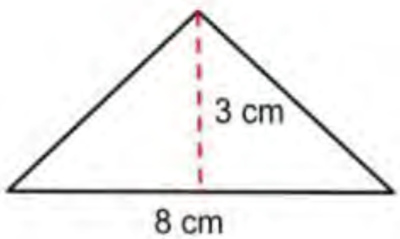
ORIGINAL SCALED COPY



ORIGINAL SCALED COPY

Let's Think:

The triangle here is a scaled copy. It was scaled by a factor of ⅛.

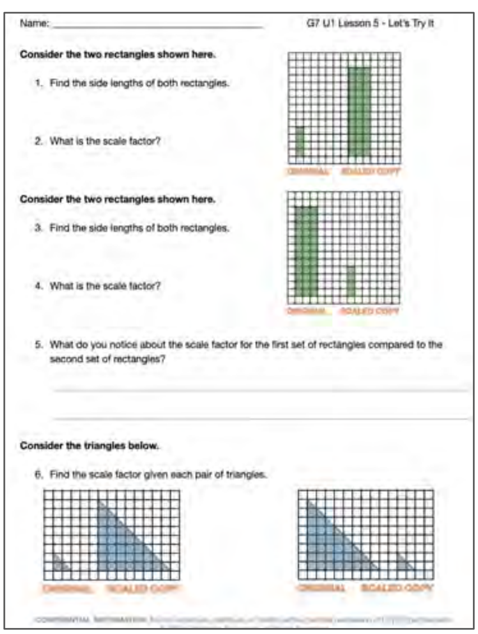


a. What scale factor can you use to scale the triangle to its original size?

b. What is the triangle's original height? Base?

Let's Try It:

Let's explore describing how scale factors of 1, less than 1, and greater than 1 affect the size of a scaled copy, and explaining how scaling can be reversed using reciprocal scale factors together.



Name: ____________________ G7 U1 Lesson 5 - Let's Try It

Consider the two rectangles shown here.

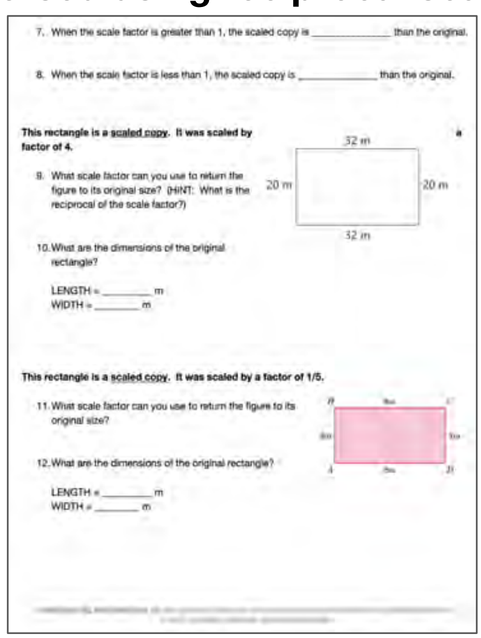
1. Find the side lengths of both rectangles.
2. What is the scale factor?

Consider the two rectangles shown here.

3. Find the side lengths of both rectangles.
4. What is the scale factor?
5. What do you notice about the scale factor for the first set of rectangles compared to the second set of rectangles?

Consider the triangles below.

6. Find the scale factor given each pair of triangles.



7. When the scale factor is greater than 1, the scaled copy is ____________ than the original.

8. When the scale factor is less than 1, the scaled copy is ____________ than the original.

This rectangle is a scaled copy. It was scaled by a factor of 4.

32 m; 20 m; 20 m; 32 m

9. What scale factor can you use to return the figure to its original size? (HINT: What is the reciprocal of the scale factor?)

10. What are the dimensions of the original rectangle?

LENGTH = ________ m
WIDTH = ________ m

This rectangle is a scaled copy. It was scaled by a factor of 1/5.

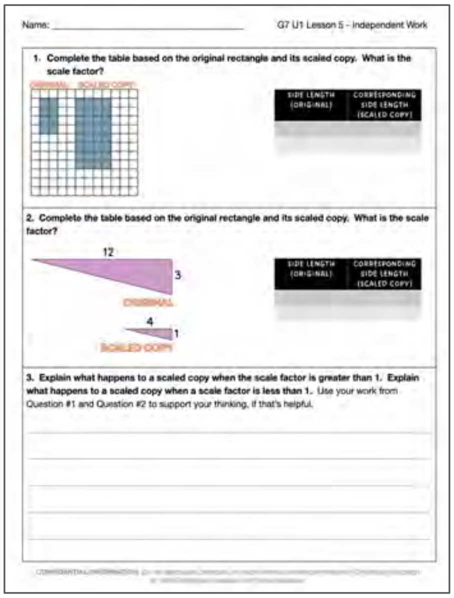
11. What scale factor can you use to return the figure to its original size?

12. What are the dimensions of the original rectangle?

LENGTH = ________ m
WIDTH = ________ m

On your Own:

Now it's time to describe how scale factors of 1, less than 1, and greater than 1 affect the size of a scaled copy, and explain how scaling can be reversed using reciprocal scale factors on your own.



Name: ______________________ G7 U1 Lesson 5 – Independent Work

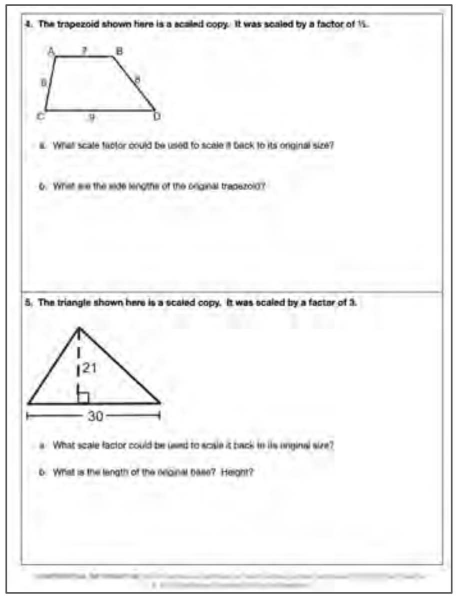
1. Complete the table based on the original rectangle and its scaled copy. What is the scale factor?

SIDE LENGTH (ORIGINAL)	CORRESPONDING SIDE LENGTH (SCALED COPY)

2. Complete the table based on the original rectangle and its scaled copy. What is the scale factor?

SIDE LENGTH (ORIGINAL)	CORRESPONDING SIDE LENGTH (SCALED COPY)

3. Explain what happens to a scaled copy when the scale factor is greater than 1. Explain what happens to a scaled copy when a scale factor is less than 1. Use your work from Question #1 and Question #2 to support your thinking, if that's helpful.



4. The trapezoid shown here is a scaled copy. It was scaled by a factor of $\frac{1}{3}$.

a. What scale factor could be used to scale it back to its original size?

b. What are the side lengths of the original trapezoid?

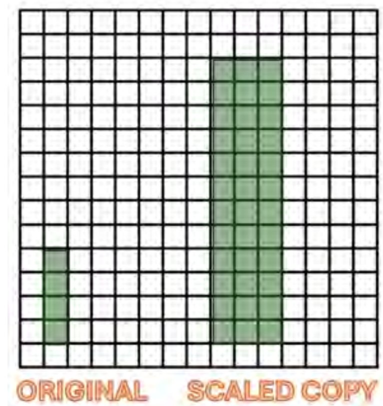
5. The triangle shown here is a scaled copy. It was scaled by a factor of 3.

a. What scale factor could be used to scale it back to its original size?

b. What is the length of the original base? Height?

Name: ____ G7 U1 Lesson 5 - Let's Try It

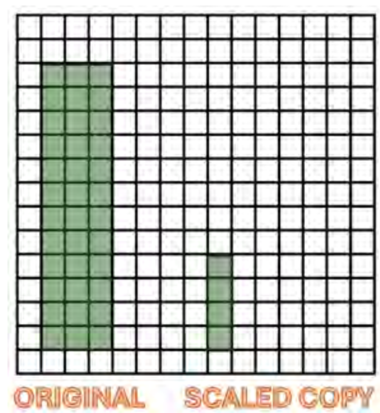
Consider the two rectangles shown here.



1. Find the side lengths of both rectangles.

2. What is the scale factor?

Consider the two rectangles shown here.



3. Find the side lengths of both rectangles.

4. What is the scale factor?

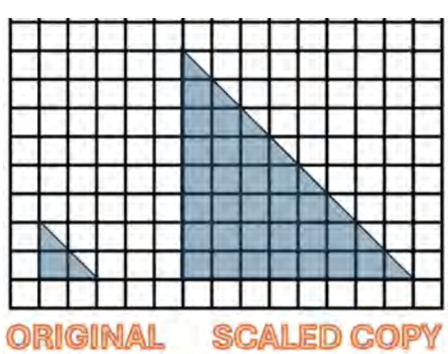
5. What do you notice about the scale factor for the first set of rectangles compared to the second set of rectangles?

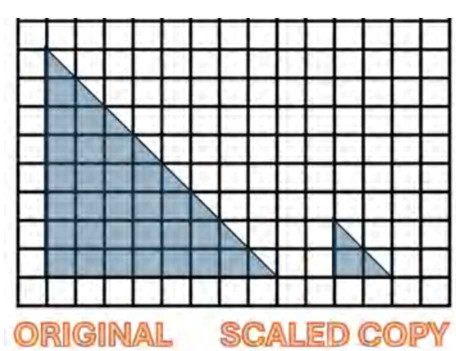
____

____

Consider the triangles below.

6. Find the scale factor given each pair of triangles.

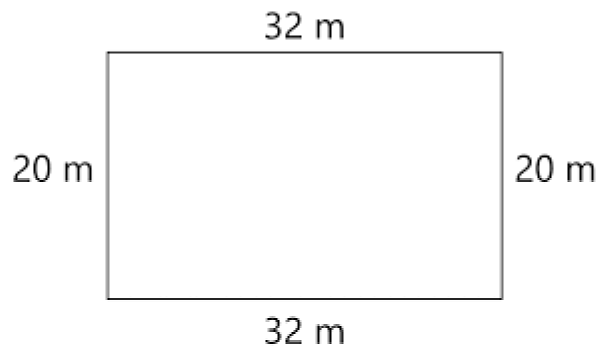




7. When the scale factor is greater than 1, the scaled copy is _______________ than the original.

8. When the scale factor is less than 1, the scaled copy is _______________ than the original.

This rectangle is a scaled copy. It was scaled by a factor of 4.

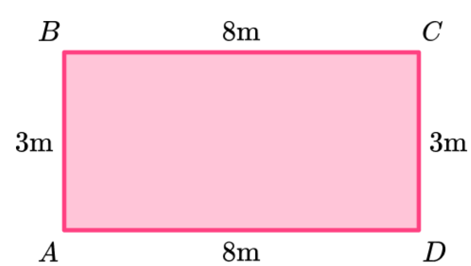


9. What scale factor can you use to return the figure to its original size? (HINT: What is the reciprocal of the scale factor?)

10. What are the dimensions of the original rectangle?

    LENGTH = __________ m
    WIDTH = _________ m

This rectangle is a scaled copy. It was scaled by a factor of 1/5.

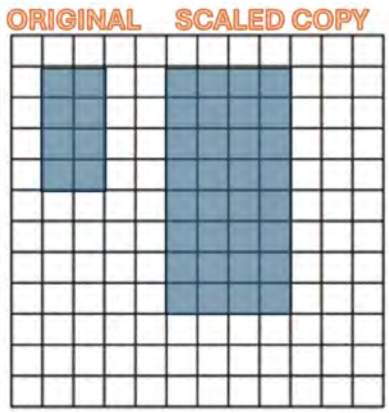


11. What scale factor can you use to return the figure to its original size?

12. What are the dimensions of the original rectangle?

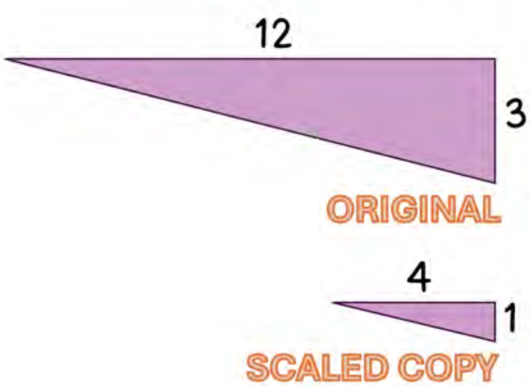
    LENGTH = __________ m
    WIDTH = _________ m

1. **Complete the table based on the original rectangle and its scaled copy. What is the scale factor?**



SIDE LENGTH (ORIGINAL)	CORRESPONDING SIDE LENGTH (SCALED COPY)

2. **Complete the table based on the original rectangle and its scaled copy. What is the scale factor?**



SIDE LENGTH (ORIGINAL)	CORRESPONDING SIDE LENGTH (SCALED COPY)

3. **Explain what happens to a scaled copy when the scale factor is greater than 1. Explain what happens to a scaled copy when a scale factor is less than 1.** Use your work from Question #1 and Question #2 to support your thinking, if that's helpful.

____

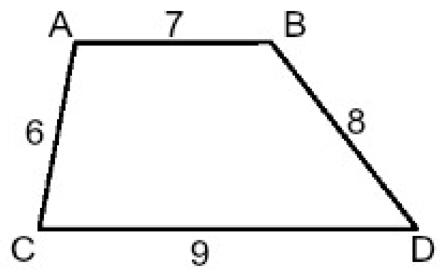
____

____

____

____

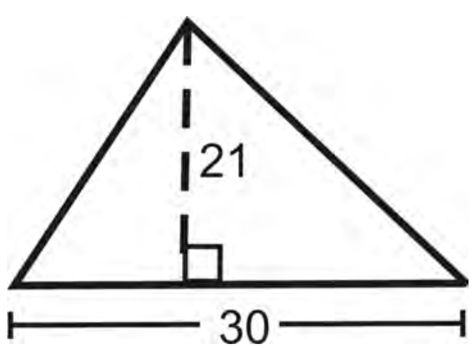
4. The trapezoid shown here is a scaled copy. It was scaled by a factor of ½.



a. What scale factor could be used to scale it back to its original size?

b. What are the side lengths of the original trapezoid?

5. The triangle shown here is a scaled copy. It was scaled by a factor of 3.

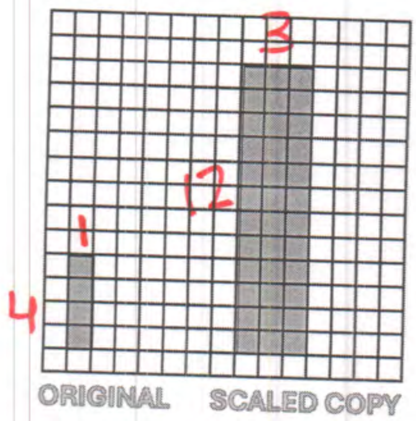


a. What scale factor could be used to scale it back to its original size?

b. What is the length of the original base? Height?

Name: KEY

Consider the two rectangles shown here.



1. Find the side lengths of both rectangles.

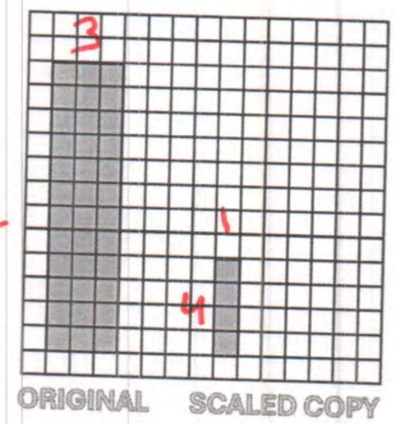
   $\times 3$ 1, 4 $\times 3$

   3, 12

2. What is the scale factor?

   3

Consider the two rectangles shown here.



3. Find the side lengths of both rectangles.

   (same as above) →

4. What is the scale factor?

   $\frac{1}{3}$ $\quad 3 \times \frac{1}{3} = 1$

   $12 \times \frac{1}{3} = 4$

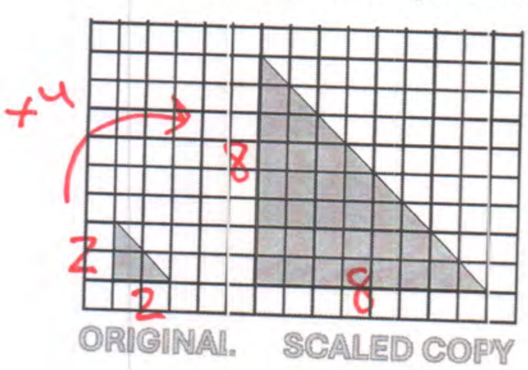
5. What do you notice about the scale factor for the first set of rectangles compared to the second set of rectangles?

   The first is 3, and the second is $\frac{1}{3}$.

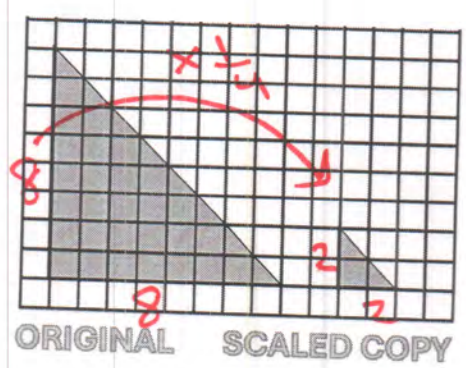
   They are reciprocals or multiplicative inverses.

Consider the triangles below.

6. Find the scale factor given each pair of triangles.



4



$\frac{1}{4}$

7. When the scale factor is greater than 1, the scaled copy is bigger than the original.

8. When the scale factor is less than 1, the scaled copy is smaller than the original.

This rectangle is a <u>scaled copy</u>. It was scaled by a factor of 4.

9. What scale factor can you use to return the figure to its original size? (HINT: What is the reciprocal of the scale factor?)

$\frac{1}{4}$

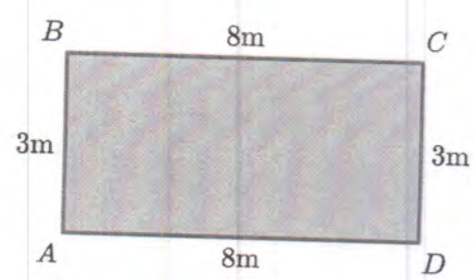
10. What are the dimensions of the original rectangle?

LENGTH = 8 m
WIDTH = 5 m

$32 \times \frac{1}{4} = 8$

$20 \times \frac{1}{4} = 5$

This rectangle is a <u>scaled copy</u>. It was scaled by a factor of 1/5.



11. What scale factor can you use to return the figure to its original size?

5

12. What are the dimensions of the original rectangle?

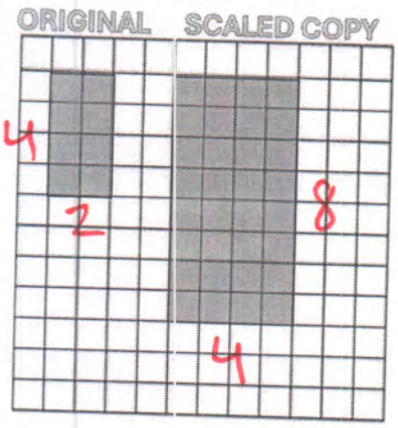
LENGTH = 40 m
WIDTH = 15 m

$8 \times 5 = 40$

$3 \times 5 = 15$

Name: KEY

1. Complete the table based on the original rectangle and its scaled copy. What is the scale factor?

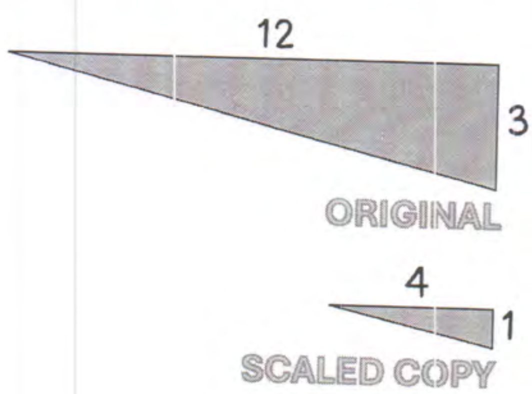


SIDE LENGTH (ORIGINAL)	CORRESPONDING SIDE LENGTH (SCALED COPY)
4 →	8
2 →	4

×2

Scale factor = 2

2. Complete the table based on the original rectangle and its scaled copy. What is the scale factor?



SIDE LENGTH (ORIGINAL)	CORRESPONDING SIDE LENGTH (SCALED COPY)
12 →	4
3 →	1

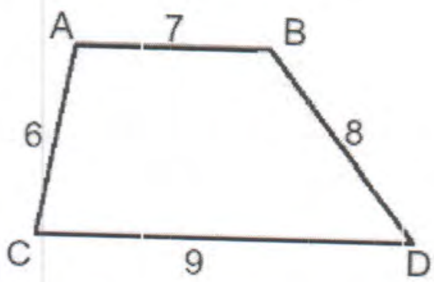
$\times \frac{1}{3}$

Scale factor = $\frac{1}{3}$

3. Explain what happens to a scaled copy when the scale factor is greater than 1. Explain what happens to a scaled copy when a scale factor is less than 1. Use your work from Question #1 and Question #2 to support your thinking, if that's helpful.

When the scale factor is greater than 1, the scaled copy is bigger than the original. When the scale factor is less than 1, the scaled copy is smaller than the original.

4. The trapezoid shown here is a scaled copy. It was scaled by a factor of ½.



a. What scale factor could be used to scale it back to its original size?

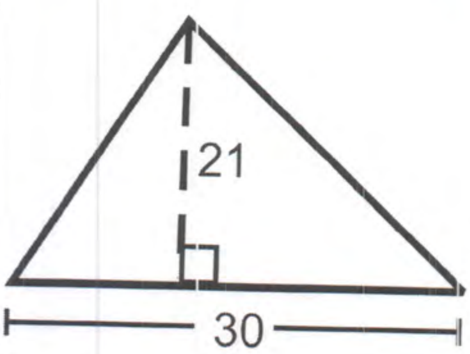
2

b. What are the side lengths of the original trapezoid?

$7 \times 2 = 14$ $8 \times 2 = 16$

$6 \times 2 = 12$ $9 \times 2 = 18$

5. The triangle shown here is a scaled copy. It was scaled by a factor of 3.



a. What scale factor could be used to scale it back to its original size? 1/3

b. What is the length of the original base? Height?

$30 \times \frac{1}{3} = 10$ base

$21 \times \frac{1}{3} = 7$ height

G7 U1 Lesson 6

Use a scale drawing and its scale to calculate actual distances

CITYTUTOR DC

G7 U1 Lesson 6 - Students will use a scale drawing and its scale to calculate actual distances

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): We've been working with scale factor and scaled copies for the past several lessons. Today, we'll keep thinking about those things, but we'll look specifically at scale drawings. A scale drawing is a drawing where all lengths correspond to the original object by the same scale. Scale drawings are used in a number of fields of study. A blueprint for a house is a type of scale drawing. An engineer might make a scale drawing or a scale model of a bridge they are designing. Artists sometimes use scale drawings to precisely make a work of art or create a computer rendering of something.

Why do you think it's useful for designers, engineers, scientists, or artists to make bigger or smaller scale drawings of figures? Possible Student Answers, Key Points:

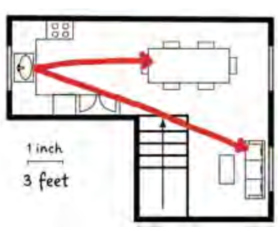
- If an object is too big to work with, it might be helpful to make a smaller scale drawing to more easily work with whatever the object is.
- If something is really small, like a cell or a small insect, a scale drawing might help them more clearly see and think about what they're working with.

Let's Talk (Slide 3): Here is one example of a scale drawing. This is a scale drawing of Manny's apartment. What do you notice about the scale drawing? What do you wonder? Possible Student Answers, Key Points:

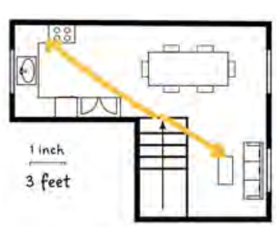
- I notice there is a scale that says 1 inch is equivalent to 3 feet. I notice his apartment has stairs, a sink, a stove, a dining table, a sofa, and a coffee table.
- I wonder what some of the symbols mean. I wonder how big his apartment is in real life. I wonder why he made this scale drawing.

That's interesting! I noticed a lot of the objects in his apartment are represented by symbols. I also saw the scale that he used where 1 inch is equivalent to 3 feet in his actual apartment. Let's look at a problem that involves a scale drawing.

Let's Think (Slide 4): This problem wants us to answer a few questions about Manny's scale drawing. Since it's a scale drawing, it's safe to assume that the dimensions of every object in the drawing correspond with the dimensions of every object in real life using the same scale.



The first question wants us to determine whether Manny's sink is closer to the table or the couch. We can't actually see Manny's apartment in real life, but since the drawing is done using a consistent scale, we can use the drawing to determine which object the sink is closer to. *(draw two lines pointing from the sink to the each of the named objects)* Without seeing the apartment in real life, we can still know that Manny's actual sink is closer to the dining room table than the couch.



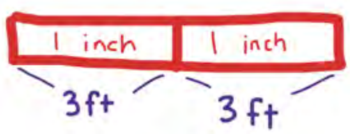
The next question wants us to determine whether the stairs are closers to the stove or the coffee table. How can the scale drawing help us? Which object is the stairs closer to? Possible Student Answers, Key Points:

- The lengths in real life would be longer than the lengths in the drawing, but we can use the drawing since it was made using a consistent scale.
- The stairs are closer to the coffee table than the stove.

Without having to visit Manny's apartment in person, the scale drawing helped us to easily think about the proximity of an object to other objects around it.

The third question tells us that the dining room table in the scale drawing is 2 inches long, and it wants us to figure out how long the table would be in real life. What information does this problem give us that will be helpful in determining the actual length of the table? Possible Student Answers, Key Points:

- The table is 2 inches in the drawing.
- The model is drawn using a scale where 1 inch is equivalent to 3 feet.



$2 \times 3 = 6\text{ft}$

The drawing includes the scale that was used to make it. I see here that it says 1 inch on the drawing is equal to 3 feet in real life. *(point to scale in image)* The table is 2 inches. *(draw a tape diagram partitioned into two boxes that are each labeled as 1 inch)* I know each inch corresponds with 3 feet in real life. *(label 3 feet underneath each box of the tape diagram)* So, if the drawing shows a table that is 2 inches, I can see that the actual table would be 3 feet. I can also show that by multiplying 2 x 3, if I didn't want to draw a tape diagram.

The last question about Manny's scale drawing asks us to determine the actual length of the coffee table. What information does this problem give us that will be helpful in determining the actual length of the coffee table? Possible Student Answers, Key Points:

- The coffee table is 1 ⅓ inches in the drawing.
- The model is drawn using a scale where 1 inch is equivalent to 3 feet.

$1\frac{1}{3} \times 3 = 4\text{ ft}$

I know each inch on the drawing represents 3 feet in real life. I can multiply the number of inches on the drawing by 3 to find the actual length of any object in the scale drawing. Take a moment to find the value of 1 ⅓ times 3. *(write 1 ⅓ x 3 =)* (4 or 3 3/3) I know 3 x 1 is 3, and 3 x ⅓ is 1. So the total product of 1 ⅓ times 3 is 4. The actual length of the coffee table is 4 feet. We used the scale to help us multiply to find the actual length of the coffee table.

Let's Think (Slide 5): In this problem, we see a scale drawing of part of a neighborhood. Take a moment to look over the visual. What do you notice? What stands out to you as being potentially important? Possible Student Answers, Key Points:

- I notice there are 3 houses.
- I notice House X and House Y are 9 centimeters apart in the drawing.
- I notice there is a scale that states that 1 centimeter on the drawing is equivalent to 15 feet in real life.

Part A asks us how far House X is from House Y in actuality. I can see from the picture that they measure 9 centimeters apart in the scale drawing. *(draw t-chart showing centimeters on the left and feet on the right)* The scale that is provided shows that 1 centimeter is equal to 15 feet. *(fill 1 and 15 into respective columns)* This means that if I know the number of centimeters, I know the number of feet in real life will be 15 times that amount. *(draw arrow from 1 to 15 labeled as "x 15")*

$9 \times 15 = 135\text{ ft}$

The distance in the scale drawing is 9 centimeters. *(fill 9 in the centimeters column of the t-chart)* Now, all we need to do is find the product of 9 x 15. Take a moment. What is the product of 9 and 15? (135) *(write equation)* 9 times 15 is 135, so I know 9 centimeters in the drawing is equivalent to 135 feet in real life. House X is 135 feet away from House Y.

The last part of this question wants us to estimate, so our answer might not be exact. Specifically, it asks us to estimate the actual distance between House Y and House Z.

Look at the image. Just by looking, what do you notice about the distance between House Y and Z?
Possible Student Answers, Key Points:

- It's not labeled.
- House Z and House Y are closer together than House X and House Y.
- It looks like maybe 3 or 4 centimeters, based on the distance that *is* labeled.

These houses are closer together than the other pair we looked at, but it's not labeled. If the other distance in the scale drawing is 9 centimeters, about how long do you think this unlabeled distance will be? (maybe 2 or 3 centimeters) I think 2 or 3 centimeters looks about right.

If we say the distance between House Y and House Z in the drawing is about 3 centimeters. How can we use the given scale to find the actual distance between the houses? Possible Student Answers, Key Points:

- I can multiply 3 times 15.
- I know 1 centimeter is 15 feet in real life, so I can add 15 ft + 15 ft + 15 ft to find three centimeters.

$3 \times 15 = 45 \text{ ft}$

The number of feet in real life is fifteen times the number of centimeters in the scale drawing. I know 3 times 15 is equal to 45. *(write equation)* The actual distance between House Y and House Z is 45 feet.

Let's Try it (Slides 6 - 7): We just looked at two different problems involving scale drawings. One scale drawing was a floorplan of an apartment. One scale drawing was a map of a neighborhood. Scale drawings are drawings where the lengths in the drawing correspond to lengths in real life in a consistent way using a consistent scale. As we work through other examples today, we'll want to carefully notice any scale that is provided. We'll also want to pay attention to our units, as scale drawings often involve scales with varied units. Let's work a bit more together, and then you'll get a chance to show what you know independently.

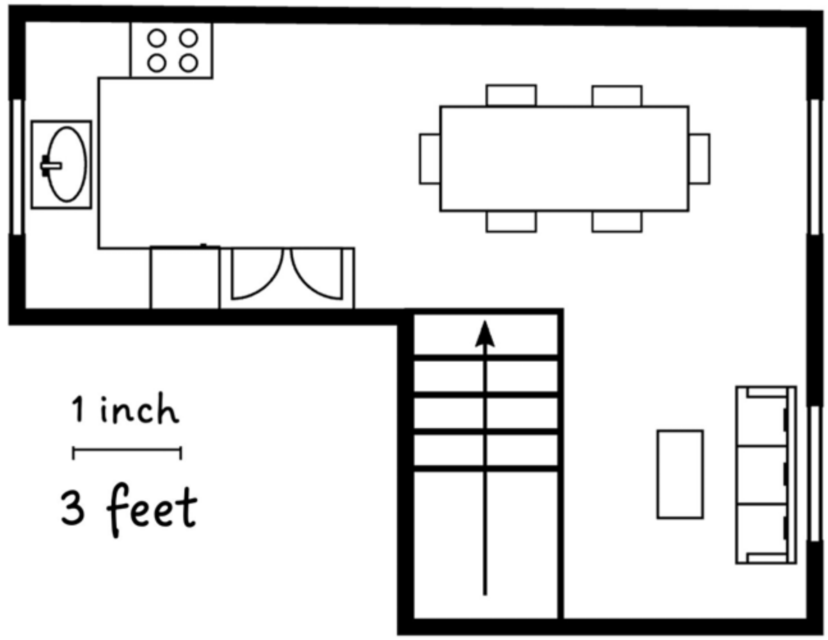
WARM WELCOME

Today we will use a scale drawing and its scale to calculate actual distances.

Let’s Talk:

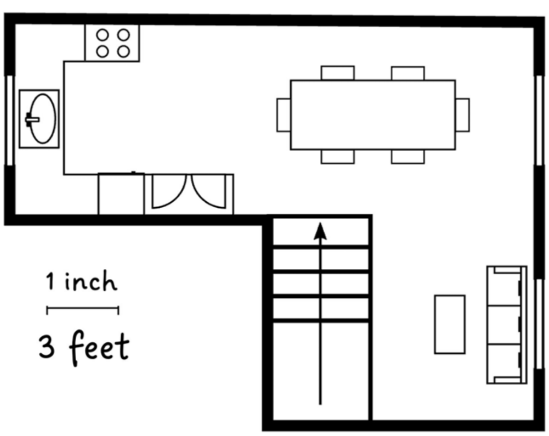
This is a scale drawing of Manny’s apartment.

What do you notice?
What do you wonder?



Let’s Think:

Use the scale drawing to answer the following questions.



1. Is the sink closer to the dining table or the couch?

2. Are the stairs closer to the stove or the coffee table?

3. In the drawing, the dining room table is 2 inches long. How long is it in real life?

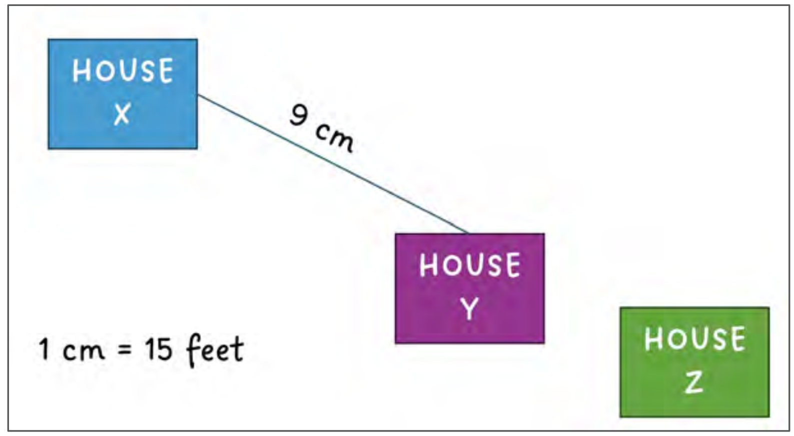
4. In the drawing, the coffee table is 1 ⅓ inches long. What is the actual length?

Let's Think:

Use the scale drawing to answer the questions.

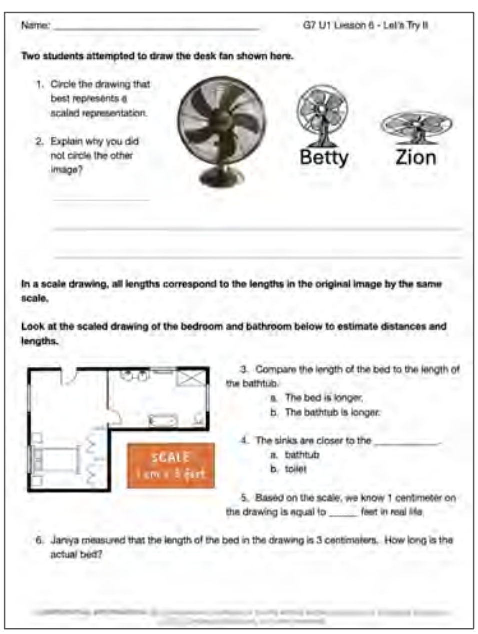
a. How far is House Y from House X in real life?

b. About how apart are House Y and House Z in real life?



Let's Try It:

Let's explore using a scale drawing and its scale to calculate actual distances together.



Name: ______________________ G7 U1 Lesson 6 - Let's Try It

Two students attempted to draw the desk fan shown here.

1. Circle the drawing that best represents a scaled representation.
2. Explain why you did not circle the other image?

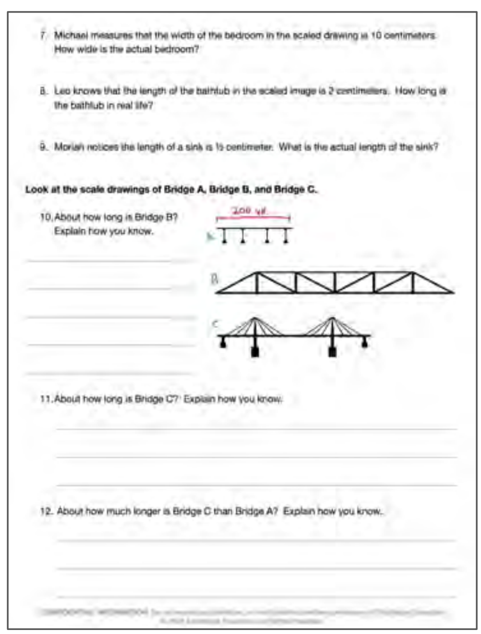
Betty Zion

In a scale drawing, all lengths correspond to the lengths in the original image by the same scale.

Look at the scaled drawing of the bedroom and bathroom below to estimate distances and lengths.

SCALE 1 cm = 3 feet

3. Compare the length of the bed to the length of the bathtub.
   a. The bed is longer.
   b. The bathtub is longer.
4. The sinks are closer to the __________.
   a. bathtub
   b. toilet
5. Based on the scale, we know 1 centimeter on the drawing is equal to _____ feet in real life.
6. Janiya measured that the length of the bed in the drawing is 3 centimeters. How long is the actual bed?



7. Michael measures that the width of the bedroom in the scaled drawing is 10 centimeters. How wide is the actual bedroom?
8. Leo knows that the length of the bathtub in the scaled image is 2 centimeters. How long is the bathtub in real life?
9. Moriah notices the length of a sink is ½ centimeter. What is the actual length of the sink?

Look at the scale drawings of Bridge A, Bridge B, and Bridge C.

10. About how long is Bridge B? Explain how you know.

200 yd

A

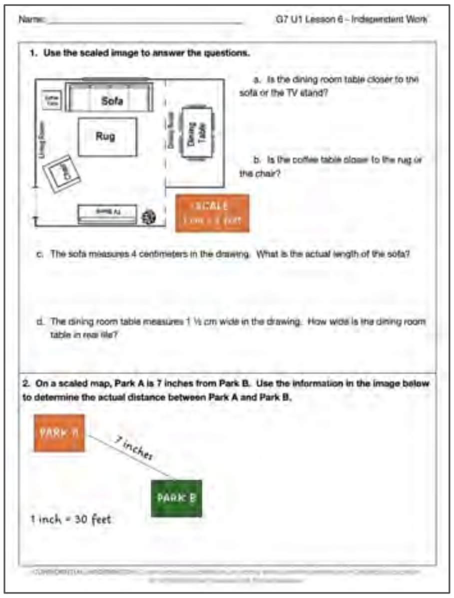
B

C

11. About how long is Bridge C? Explain how you know.
12. About how much longer is Bridge C than Bridge A? Explain how you know.

On your Own:

Now it's time to use a scale drawing and its scale to calculate actual distances on your own.


Name: ______________ G7 U1 Lesson 6 – Independent Work

1. Use the scaled image to answer the questions.

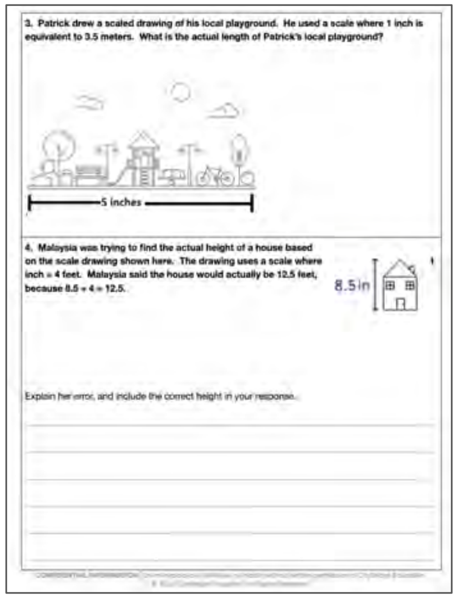
a. Is the dining room table closer to the sofa or the TV stand?

b. Is the coffee table closer to the rug or the chair?

c. The sofa measures 4 centimeters in the drawing. What is the actual length of the sofa?

d. The dining room table measures 1 ½ cm wide in the drawing. How wide is the dining room table in real life?

2. On a scaled map, Park A is 7 inches from Park B. Use the information in the image below to determine the actual distance between Park A and Park B.


3. Patrick drew a scaled drawing of his local playground. He used a scale where 1 inch is equivalent to 3.5 meters. What is the actual length of Patrick's local playground?

4. Malaysia was trying to find the actual height of a house based on the scale drawing shown here. The drawing uses a scale where inch = 4 feet. Malaysia said the house would actually be 12.5 feet, because 8.5 + 4 = 12.5.

Explain her error, and include the correct height in your response.

Name: ____ G7 U1 Lesson 6 - Let's Try It

Two students attempted to draw the desk fan shown here.

1. Circle the drawing that best represents a scaled representation.

2. Explain why you did not circle the other image?

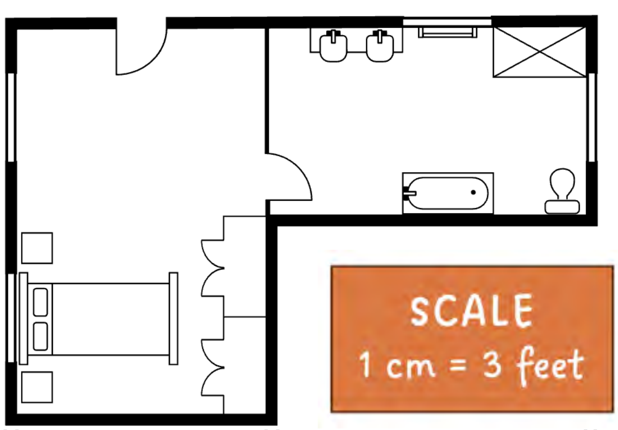
____

____

____

In a scale drawing, all lengths correspond to the lengths in the original image by the same scale.

Look at the scale drawing of the bedroom and bathroom below to estimate distances and lengths.



3. Compare the length of the bed to the length of the bathtub.
    a. The bed is longer.
    b. The bathtub is longer.

4. The sinks are closer to the ____________.
    a. bathtub
    b. toilet

5. Based on the scale, we know 1 centimeter on the drawing is equal to _____ feet in real life.

6. Janiya measured that the length of the bed in the drawing is 3 centimeters. How long is the actual bed?

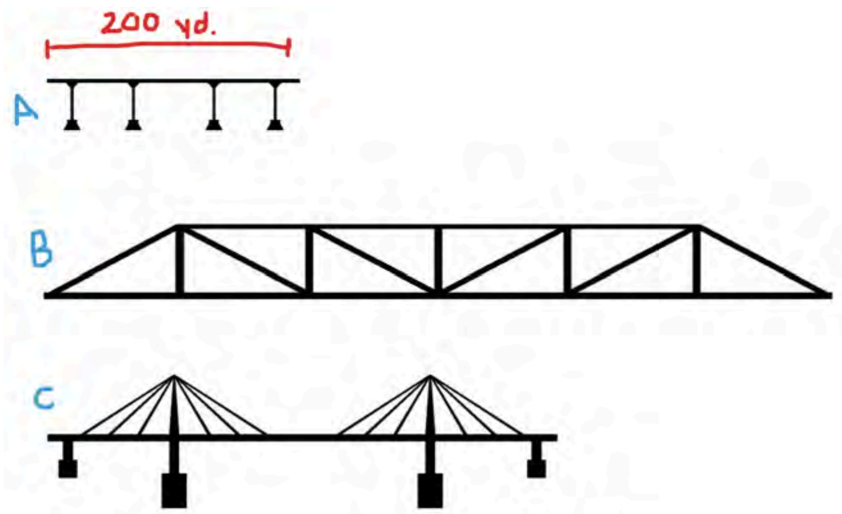
7. Michael measures that the width of the bedroom in the scaled drawing is 10 centimeters. How wide is the actual bedroom?

8. Leo knows that the length of the bathtub in the scaled image is 2 centimeters. How long is the bathtub in real life?

9. Moriah notices the length of a sink is ½ centimeter. What is the actual length of the sink?

Look at the scale drawings of Bridge A, Bridge B, and Bridge C.

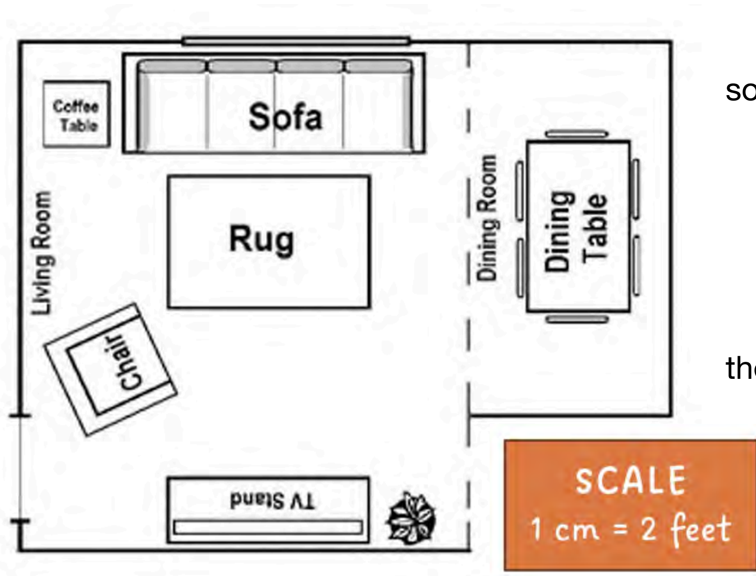
10. About how long is Bridge B? Explain how you know.



11. About how long is Bridge C? Explain how you know.

12. About how much longer is Bridge C than Bridge A? Explain how you know.

1. Use the scaled image to answer the questions.



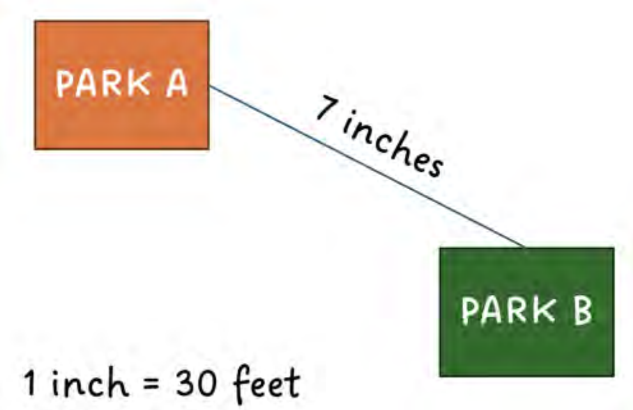
a. Is the dining room table closer to the sofa or the TV stand?

b. Is the coffee table closer to the rug or the chair?

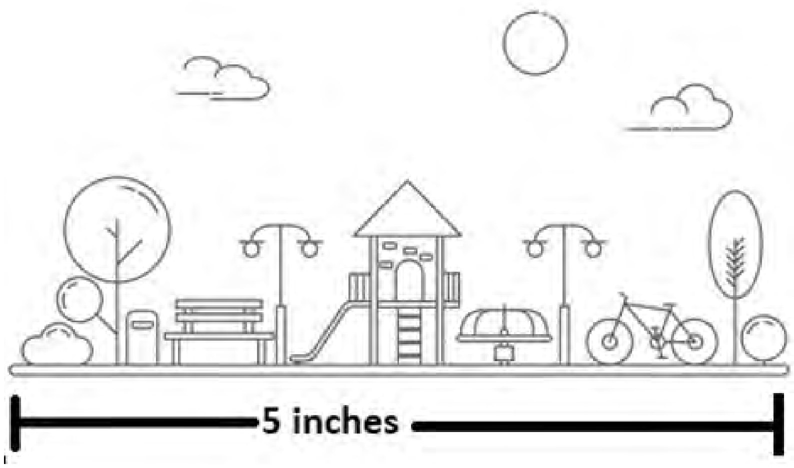
c. The sofa measures 4 centimeters in the drawing. What is the actual length of the sofa?

d. The dining room table measures 1 ½ cm wide in the drawing. How wide is the dining room table in real life?

2. On a scaled map, Park A is 7 inches from Park B. Use the information in the image below to determine the actual distance between Park A and Park B.



3. Patrick drew a scaled drawing of his local playground. He used a scale where 1 inch is equivalent to 3.5 meters. What is the actual length of Patrick's local playground?



4. Malaysia was trying to find the actual height of a house based on the scale drawing shown here. The drawing uses a scale where 1 inch = 4 feet. Malaysia said the house would actually be 12.5 feet, because 8.5 + 4 = 12.5.

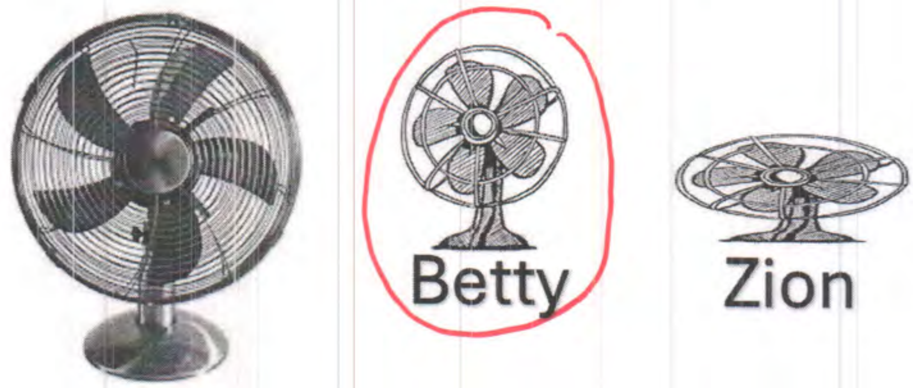
Explain her error, and include the correct height in your response.

Name: KEY

Two students attempted to draw the desk fan shown here.

1. Circle the drawing that best represents a scaled representation.

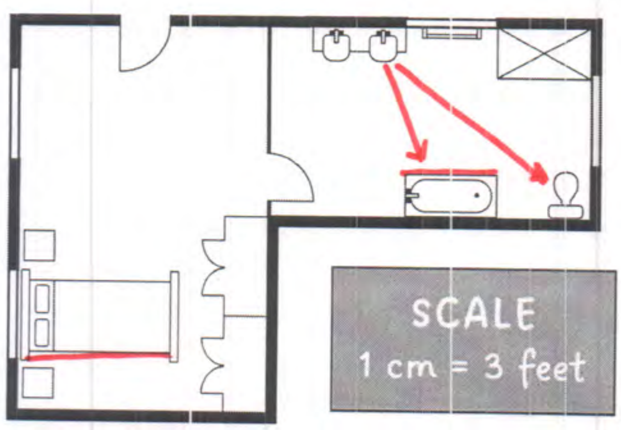
2. Explain why you did not circle the other image?



Zion's image is distorted. It's squished and looks flattened.

In a scale drawing, all lengths correspond to the lengths in the original image by the same scale.

Look at the scale drawing of the bedroom and bathroom below to estimate distances and lengths.



3. Compare the length of the bed to the length of the bathtub.
   a. The bed is longer.
   b. The bathtub is longer.

4. The sinks are closer to the ____________.
   a. bathtub
   b. toilet

5. Based on the scale, we know 1 centimeter on the drawing is equal to __3__ feet in real life.

6. Janiya measured that the length of the bed in the drawing is 3 centimeters. How long is the actual bed?

cm	ft
1	3
3	9

×3

9 ft

$3 \times 3 = 9$

7. Michael measures that the width of the bedroom in the scaled drawing is 10 centimeters. How wide is the actual bedroom?

$10 \times 3 = 30$ 30 ft

8. Leo knows that the length of the bathtub in the scaled image is 2 centimeters. How long is the bathtub in real life?

$2 \times 3 = 6$ 6 ft

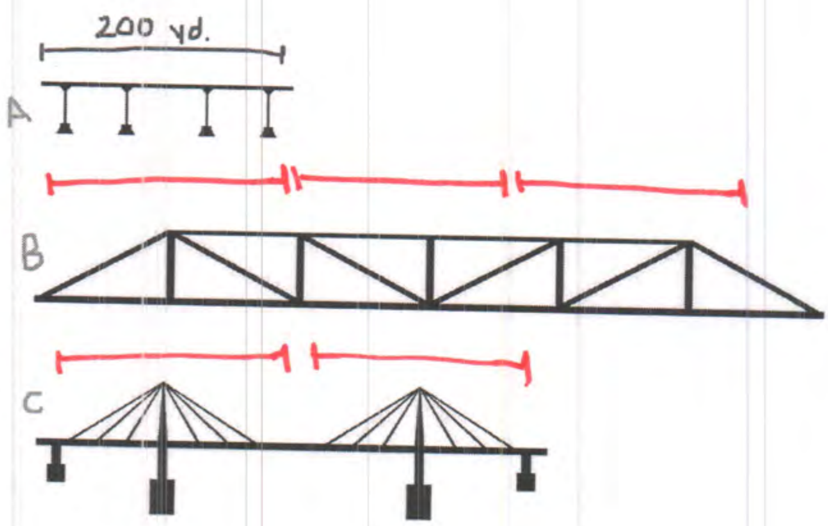
9. Moriah notices the length of a sink is ½ centimeter. What is the actual length of the sink?

$\frac{1}{2} \times 3 = \frac{3}{2}$ $1\frac{1}{2}$ ft

Look at the scale drawings of Bridge A, Bridge B, and Bridge C.

10. About how long is Bridge B? Explain how you know.

Bridge B looks about 3 times as long as A, so (200 × 3) it is about 600 yards.



11. About how long is Bridge C? Explain how you know.

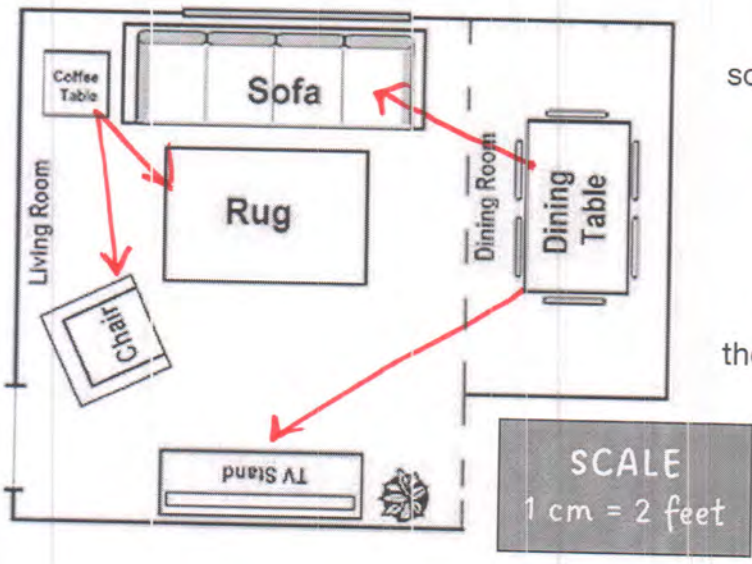
Bridge C looks twice as long as Bridge A. It is about 400 yards long. (200 × 2)

12. About how much longer is Bridge C than Bridge A? Explain how you know.

Bridge C is about 400 yards and Bridge A is 200 yards. Bridge C is about 200 yards longer than Bridge A. (400 - 200)

Name: KEY

1. Use the scaled image to answer the questions.



a. Is the dining room table closer to the sofa or the TV stand?

It is closer to the sofa.

b. Is the coffee table closer to the rug or the chair?

It is closer to the rug.

c. The sofa measures 4 centimeters in the drawing. What is the actual length of the sofa?

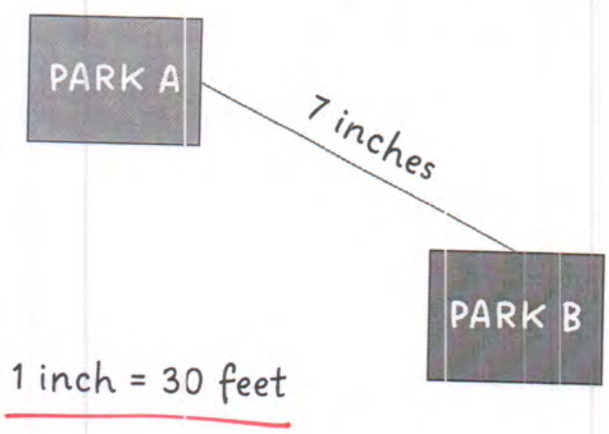
cm	ft
1	2
4	?

$4 \times 2 = 8$ ft

d. The dining room table measures 1 ½ cm wide in the drawing. How wide is the dining room table in real life?

$1\frac{1}{2} \times 2 = ?$ $\quad \frac{3}{2} \times 2 = \frac{6}{2} = 3$ ft

2. On a scaled map, Park A is 7 inches from Park B. Use the information in the image below to determine the actual distance between Park A and Park B.



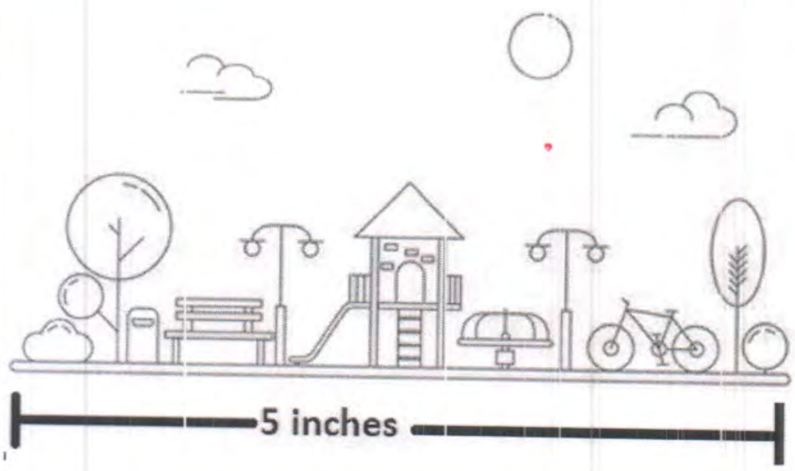
in	ft
1	30
7	210

×30

×30

210 ft

3. Patrick drew a scaled drawing of his local playground. He used a scale where 1 inch is equivalent to 3.5 meters. What is the actual length of Patrick's local playground?



in	m
1	3.5
5	?

×3.5

×3.5

$$\begin{array}{r} \overset{2}{3.5} \\ \times\ 5 \\ \hline 17.5 \end{array}$$

17.5 m

4. Malaysia was trying to find the actual height of a house based on the scale drawing shown here. The drawing uses a scale where 1 inch = 4 feet. Malaysia said the house would actually be 12.5 feet, because 8.5 + 4 = 12.5.

1

$8.5 \times 4 = ?$

$(8.5 \times 2) + (8.5 \times 2)$

$17 + 17 = 34$ ft.

Explain her error, and include the correct height in your response.

If the scale is 1 inch = 4 feet, she should multiply 8.5 by 4. She should not have added 4. The correct height is 34 feet.

G7 U1 Lesson 7

Determine the scale and the dimensions of a scale drawing when given the actual dimensions of an object

G7 U1 Lesson 7 - Students will determine the scale and the dimensions of a scale drawing when given the actual dimensions of an object

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): In our previous lesson, we calculated real-life, actual distances or measurements based on a scale drawing. Today, we'll consider how to use the actual distances or measurements and a scale to determine dimensions of a scale drawing. It's almost like we're doing the opposite of what we did in the previous lesson.

Let's Talk (Slide 3): Take a look at the images here. What do you notice? What do you wonder? Possible Student Answers, Key Points:

- I notice one picture shows a computer image of a statue, and one image shows the actual statue. I notice the height of the statue on the screen is 5 centimeters, but the height of the statue in real life is 20 feet.
- I wonder if the image on the computer is a scale model of the actual statue. I wonder what the scale factor is.

The picture on the computer screen represents a scale model of the actual statue. What scale do you think was used to make the image? Possible Student Answers, Key Points:

- I know 5 inches is the same as 20 feet in real life. So, 5 in = 20 ft could be the scale.
- I know every inch represents 4 feet of the statue. So, the scale is 1 in = 4 ft.

5 in = 20 ft
1 in = 4 ft

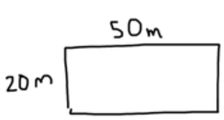
(write 5 in = 20 ft and 1 in = 4 ft) In our last lesson, we would have thought through how to move from the scaled image to the actual statue. We would have multiplied each inch by 4 to find the height of the actual statue in feet. Today, we're going to be thinking about how we could go from the statue to the scaled image. It's like we're moving in the opposite direction.

If we could multiply the inches by 4 to find the number of feet, what do you think we could do to go from the number of actual feet to the number of inches in the scale model? Possible Student Answers, Key Points:

- We could divide the number of feet by 4, since division is the inverse of multiplication.
- We could multiply the number of feet by ¼, since ¼ is the multiplicative inverse of 4.

Interesting! Let's try out a couple problems together to see if what you're considering is true or not!

Let's Think (Slide 4): This problem gives us the dimensions of an actual swimming pool.



They want us to consider the dimensions of two different scale drawings. Since there is no visual of the pool, I'm going to sketch a rectangle so I can picture what the actual pool looks like. *(sketch a rectangle labeled with 50 m and 20 m)*

in	m
1	2
?	50
?	20

$\times 2$

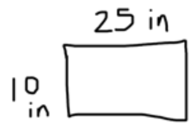
Part A wants us to find the dimensions of a scale drawing if the scale used is 1 inch = 2 meters. I'll use a t-chart to think about that relationship. *(draw t-chart labeled with inches and meters, and include 1 inch and 2 meters as the first row of values)* I know 1 inch in the scale drawing is equal to 2 meters in the actual pool. That means the number of meters in real life is 2 times the number of inches in the drawing. *(draw arrow from 1 in to 2 m labeled with "x 2")* We need to use that relationship to think about how many inches long and how many inches wide the scale drawing will be. *(fill in 50 and 20 in the meter column of the chart and two question marks in the inch column as shown)*

We know we can multiply the number of inches by 2 to find the number of meters. With that information in mind, what math can we do to find the number of inches instead? Possible Student Answers, Key Points:

- We could divide the number of meters by 2, since division is the inverse of multiplication.
- We could multiply the number of meters by ½, since ½ is the multiplicative inverse of 2.

$50 \times \frac{1}{2} = 25$

$20 \times \frac{1}{2} = 10$



I know 50 times ½ is 25. I know 20 times ½ is 10. *(write equations)* The dimensions of the scale drawing will be 25 inches and 10 inches. *(sketch and label a rectangle with the dimensions of the scale drawing)*

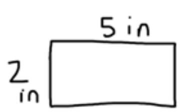
in	m
½	5
1	10
?	50
?	20

×10

Part B gives us a different scale. This scale says that ½ inch on the drawing is equal to 5 meters in real life. Let's set up a table to show that. *(sketch a table and write ½ and 5 in the inch and meter columns respectively)* It's a little tricky for me to think about ½ and 5 are related. I could figure out how many times I need to multiply ½ to make 5, but it might be a bit easier if I scale this relationship up. If I know ½ an inch represents 5 meters, then if I double that, I know 1 inch would represent 10 meters. That's a simpler scale to think about. *(add 1 inch and 10 meters in their columns and label with an arrow showing "x 10")* The number of meters is ten times the number of inches in the scale drawing. *(write 50 and 20 in the meters column)*

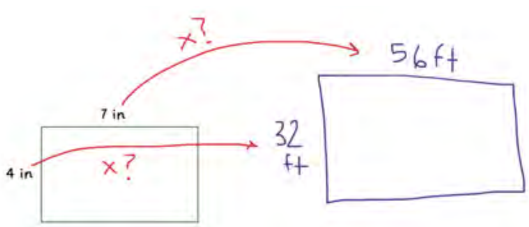
How can I use this scale now to find the dimensions of the scale drawing? Possible Student Answers, Key Points:

- I know 50 x 1/10 is 5. I know 20 x 1/10 is 2.
- We can divide. I know 50 divided by 10 is 5, and 20 divided by 10 is 2.



Great! Using the scale of ½ inch = 5 meters, we figured out that the dimensions of the scale drawing will be 5 inches by 2 inches. *(sketch a and label a rectangle accordingly)* We just used two different scales to think about the same swimming pool.

Let's Think (Slide 5): Our final problem before we jump into some practice gives us information about a rectangular playground. We also see a scale drawing of the playground. Instead of finding the dimensions of the scale drawing like in our previous problem, we are asked to find the scale that was used to create the drawing.



Since the problem does not provide us a visual of the actual playground, I'll sketch and label a rectangle to represent the actual playground. This will help me compare corresponding sides. *(sketch a rectangle and label with the dimensions of the playground)* Which sides are corresponding?

What relationship do you notice between corresponding sides? Possible Student Answers, Key Points:

- The longer sides correspond with each other, and the shorter sides correspond with each other. I know 7 inches corresponds with 56 feet. I know 4 inches corresponds with 32 feet.
- I notice you can multiply each side length in the scale drawing by 8 to end up with the number of feet on the actual playground.

1 in = 8 ft

The drawing helps me see that the corresponding sides are related by a factor of 8. Every 1 inch in the scale drawing corresponds with 8 feet in the actual playground. *(write 1 inch = 8 feet)*

We just determined the scale when given the dimensions of an actual object and its scale drawing. Well done!

Let's Try it (Slides 6 - 7): Now let's practice! We'll do a few more problems together before you get a chance to work independently. As we saw today, tables can help us keep track of our units and think carefully about the relationship between corresponding sides. We also saw that if we know the relationship between units in one direction, like inches to meters, we can use the inverse or opposite operation to move between units in the other direction, like meters back to inches. Let's keep these things in mind as we try out a few more similar problems.

WARM WELCOME

Today we will determine the scale and the dimensions of a scale drawing when given the actual dimensions of an object.

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Let's Talk:

What do you notice?

What do you wonder?

Let's Think:

A swimming pool measures 50 meters long and 20 meters wide. Find the dimensions of a scale drawing using the given scales.

a. 1 inch = 2 meters

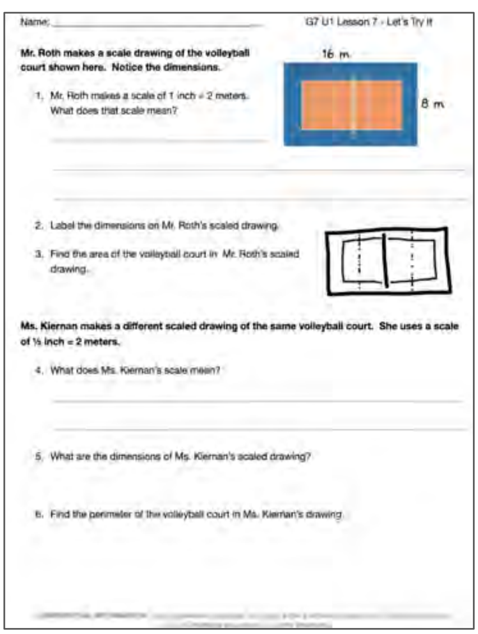
b. ½ inch = 5 meters

Let's Think:

The actual dimensions of a playground are 32 feet by 56 feet. A scale drawing of the playground is shown here. What is the scale?

Let's Try It:

Let's explore determining the scale and the dimensions of a scale drawing when given the actual dimensions of an object together.



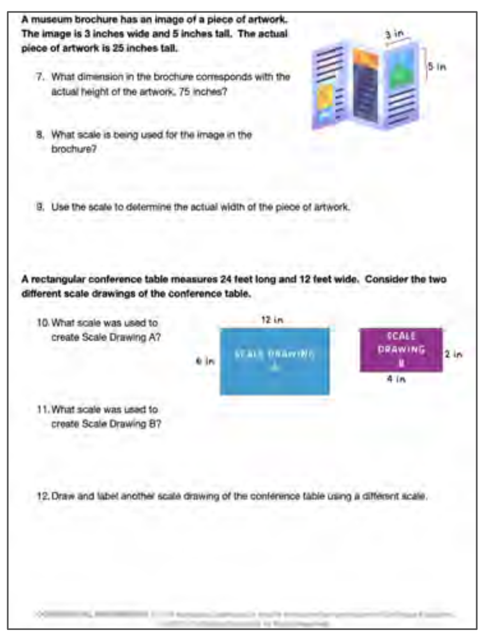
Name: ______________________ G7 U1 Lesson 7 - Let's Try It

Mr. Roth makes a scale drawing of the volleyball court shown here. Notice the dimensions.

1. Mr. Roth makes a scale of 1 inch = 2 meters. What does that scale mean?
2. Label the dimensions on Mr. Roth's scaled drawing.
3. Find the area of the volleyball court in Mr. Roth's scaled drawing.

Ms. Kiernan makes a different scaled drawing of the same volleyball court. She uses a scale of ½ inch = 2 meters.

4. What does Ms. Kiernan's scale mean?
5. What are the dimensions of Ms. Kiernan's scaled drawing?
6. Find the perimeter of the volleyball court in Ms. Kiernan's drawing.



A museum brochure has an image of a piece of artwork. The image is 3 inches wide and 5 inches tall. The actual piece of artwork is 25 inches tall.

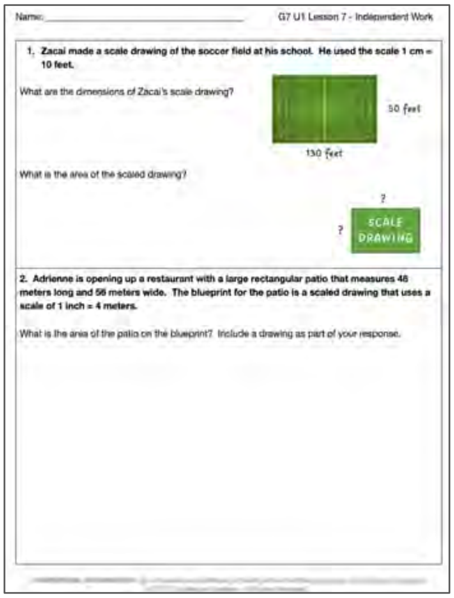
7. What dimension in the brochure corresponds with the actual height of the artwork, 75 inches?
8. What scale is being used for the image in the brochure?
9. Use the scale to determine the actual width of the piece of artwork.

A rectangular conference table measures 24 feet long and 12 feet wide. Consider the two different scale drawings of the conference table.

10. What scale was used to create Scale Drawing A?
11. What scale was used to create Scale Drawing B?
12. Draw and label another scale drawing of the conference table using a different scale.

On your Own:

Now it's time to determine the scale and the dimensions of a scale drawing when given the actual dimensions of an object on your own.



Name:________________________ G7 U1 Lesson 7 - Independent Work

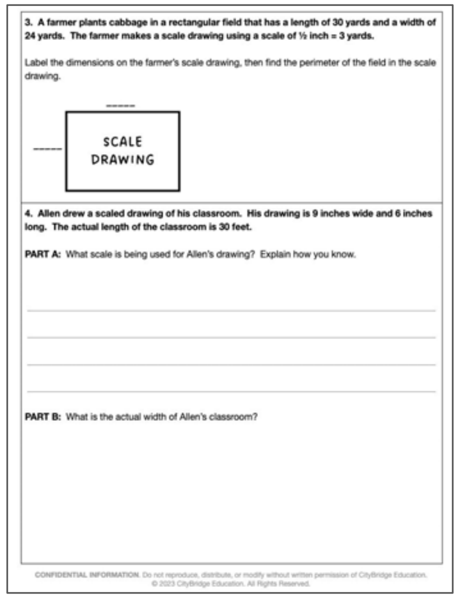
1. **Zacai made a scale drawing of the soccer field at his school. He used the scale 1 cm = 10 feet.**

What are the dimensions of Zacai's scale drawing?

What is the area of the scaled drawing?

2. **Adrienne is opening up a restaurant with a large rectangular patio that measures 48 meters long and 56 meters wide. The blueprint for the patio is a scaled drawing that uses a scale of 1 inch = 4 meters.**

What is the area of the patio on the blueprint? Include a drawing as part of your response.



3. **A farmer plants cabbage in a rectangular field that has a length of 30 yards and a width of 24 yards. The farmer makes a scale drawing using a scale of ½ inch = 3 yards.**

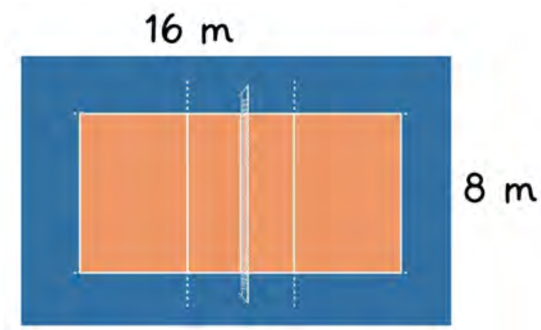
Label the dimensions on the farmer's scale drawing, then find the perimeter of the field in the scale drawing.

4. **Allen drew a scaled drawing of his classroom. His drawing is 9 inches wide and 6 inches long. The actual length of the classroom is 30 feet.**

PART A: What scale is being used for Allen's drawing? Explain how you know.

PART B: What is the actual width of Allen's classroom?

Mr. Roth makes a scale drawing of the volleyball court shown here. Notice the dimensions.



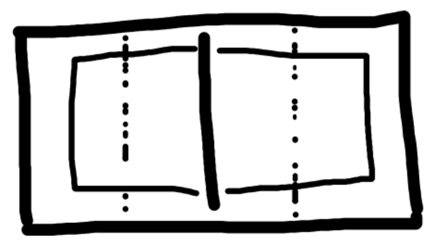
1. Mr. Roth makes a scale of 1 inch = 2 meters. What does that scale mean?

____

____

____

2. Label the dimensions on Mr. Roth's scaled drawing.



3. Find the area of the volleyball court in Mr. Roth's scaled drawing.

Ms. Kiernan makes a different scaled drawing of the same volleyball court. She uses a scale of ½ inch = 2 meters.

4. What does Ms. Kiernan's scale mean?

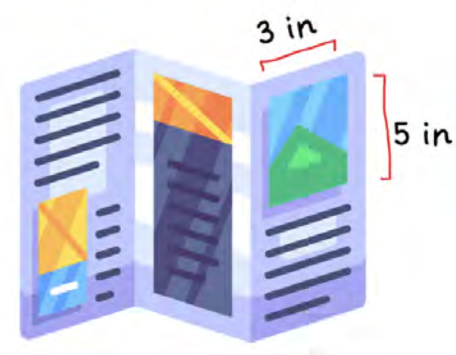
____

____

5. What are the dimensions of Ms. Kiernan's scaled drawing?

6. Find the perimeter of the volleyball court in Ms. Kiernan's drawing.

A museum brochure has an image of a piece of artwork. The image is 3 inches wide and 5 inches tall. The actual piece of artwork is 75 inches tall.



7. What dimension in the brochure corresponds with the actual height of the artwork, 75 inches?

8. What scale is being used for the image in the brochure?

9. Use the scale to determine the actual width of the piece of artwork.

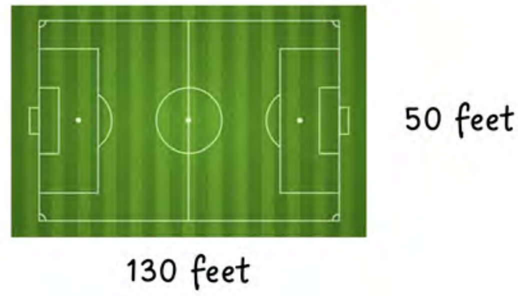
A rectangular conference table measures 24 feet long and 12 feet wide. Consider the two different scale drawings of the conference table.

10. What scale was used to create Scale Drawing A?

11. What scale was used to create Scale Drawing B?

12. Draw and label another scale drawing of the conference table using a different scale.

1. **Zacai made a scale drawing of the soccer field at his school. He used the scale 1 cm = 10 feet.**



What are the dimensions of Zacai's scale drawing?

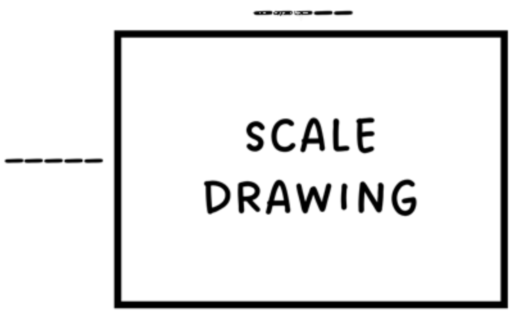
What is the area of the scaled drawing?

2. Adrienne is opening up a restaurant with a large rectangular patio that measures 48 meters long and 56 meters wide. The blueprint for the patio is a scaled drawing that uses a scale of 1 inch = 4 meters.

What is the area of the patio on the blueprint? Include a drawing as part of your response.

3. A farmer plants cabbage in a rectangular field that has a length of 30 yards and a width of 24 yards. The farmer makes a scale drawing using a scale of ½ inch = 3 yards.

Label the dimensions on the farmer's scale drawing, then find the perimeter of the field in the scale drawing.



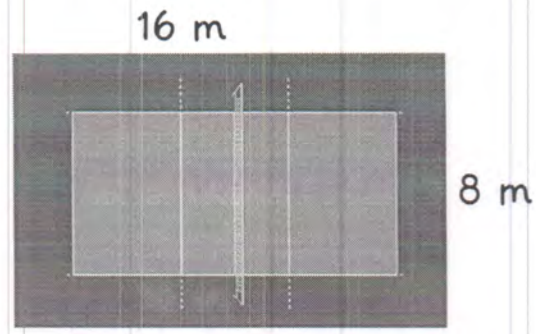
4. Allen drew a scaled drawing of his classroom. His drawing is 9 inches wide and 6 inches long. The actual length of the classroom is 30 feet.

PART A: What scale is being used for Allen's drawing? Explain how you know.

PART B: What is the actual width of Allen's classroom?

Name: KEY

Mr. Roth makes a scale drawing of the volleyball court shown here. Notice the dimensions.

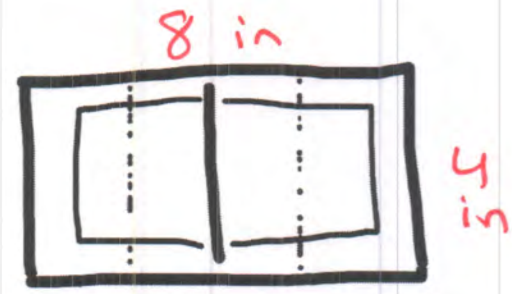


1. Mr. Roth makes a scale of 1 inch = 2 meters. What does that scale mean?

Every 1 inch of the scale drawing represents 2 meters on the actual court.

2. Label the dimensions on Mr. Roth's scaled drawing.

$16 \div 2 = 8$ $8 \div 2 = 4$



3. Find the area of the volleyball court in Mr. Roth's scaled drawing.

$8 \times 4 = 32 \text{ in}^2$

Ms. Kiernan makes a different scaled drawing of the same volleyball court. She uses a scale of ½ inch = 2 meters.

4. What does Ms. Kiernan's scale mean?

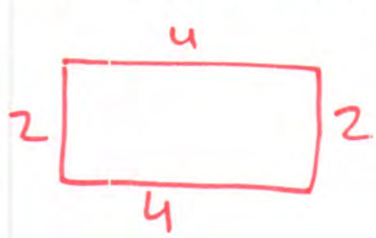
Every half inch in the drawing represents 2 meters in real life. Also, 1 inch = 4 m.

5. What are the dimensions of Ms. Kiernan's scaled drawing?

$16 \div 4 = 4$
$8 \div 4 = 2$

4 in by 2 in

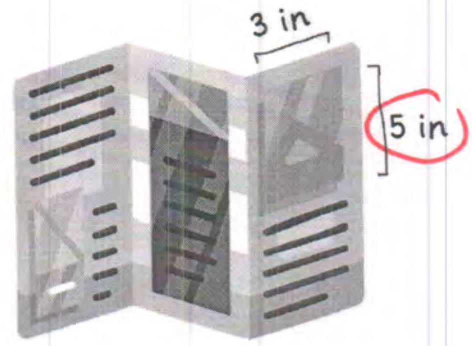
6. Find the perimeter of the volleyball court in Ms. Kiernan's drawing.



$\underbrace{\underbrace{4+4}_{8}+\underbrace{2+2}_{4}}_{12}$

12 in

A museum brochure has an image of a piece of artwork. The image is 3 inches wide and 5 inches tall. The actual piece of artwork is ~~25~~ 75 inches tall.



7. What dimension in the brochure corresponds with the actual height of the artwork, 75 inches?

5 in

8. What scale is being used for the image in the brochure?

$5 \times ? = 75$

OR

$75 \div 5 = ?$

$? = 15$

1 in = 15 in

9. Use the scale to determine the actual width of the piece of artwork.

$3 \times 15 =$ 45 in

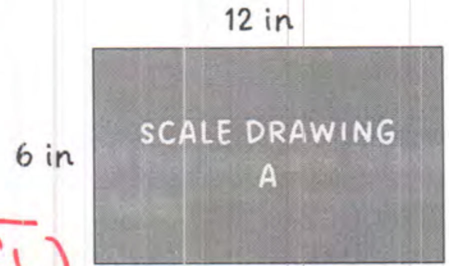
A rectangular conference table measures 24 feet long and 12 feet wide. Consider the two different scale drawings of the conference table.

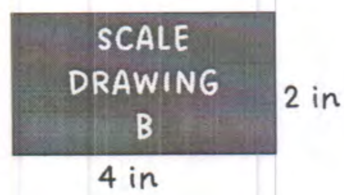
10. What scale was used to create Scale Drawing A?

$24 \times \frac{1}{2} = 12$

$12 \times \frac{1}{2} = 6$

1 in = 2 ft





11. What scale was used to create Scale Drawing B?

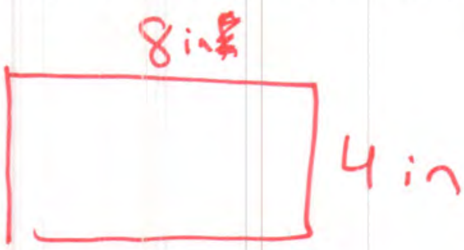
1 in = 6 ft

$4 \times 6 = 24$

$2 \times 6 = 12$

12. Draw and label another scale drawing of the conference table using a different scale.

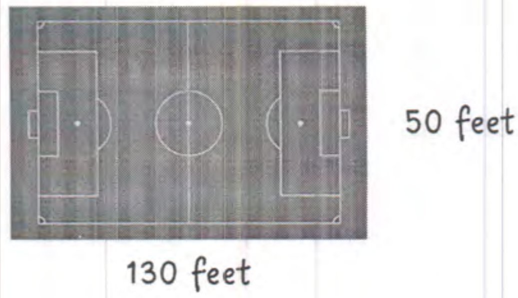
1 in = 3 ft



Name: KEY

1. Zacai made a scale drawing of the soccer field at his school. He used the scale 1 cm = 10 feet.

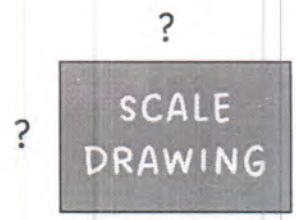
What are the dimensions of Zacai's scale drawing?



? × 10 = 50   5 cm

? × 10 = 130   13 cm

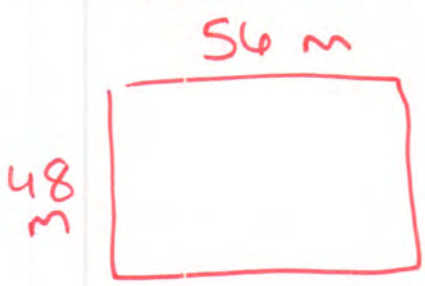
What is the area of the scaled drawing?



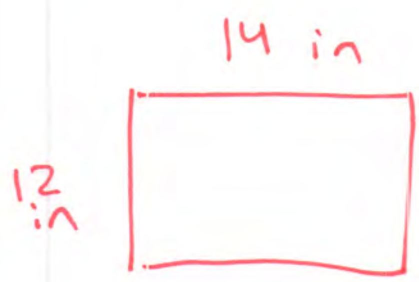
5 × 13 = ?   65 cm^2

2. Adrienne is opening up a restaurant with a large rectangular patio that measures 48 meters long and 56 meters wide. The blueprint for the patio is a scaled drawing that uses a scale of 1 inch = 4 meters.

What is the area of the patio on the blueprint? Include a drawing as part of your response.



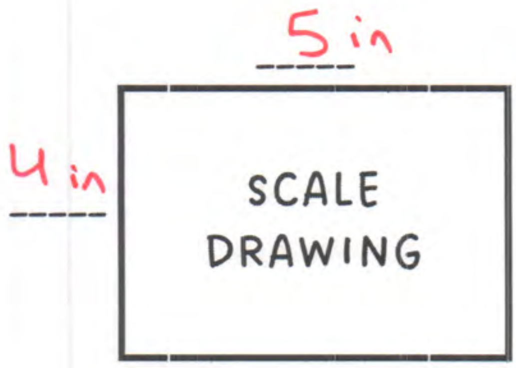
56 ÷ 4 = 14
48 ÷ 4 = 12



14 × 12 = ?
(14 × 10) + (14 × 2)
140 + 28
168 in^2

3. A farmer plants cabbage in a rectangular field that has a length of 30 yards and a width of 24 yards. The farmer makes a scale drawing using a scale of ½ inch = 3 yards.

Label the dimensions on the farmer's scale drawing, then find the perimeter of the field in the scale drawing.



1 inch = 6 yards

$30 \div 6 = 5$

$24 \div 6 = 4$

$5+5+4+4 = 18$ in

4. Allen drew a scaled drawing of his classroom. His drawing is 9 inches wide and 6 inches long. The actual length of the classroom is 30 feet.

PART A: What scale is being used for Allen's drawing? Explain how you know.

He used a scale of 1 inch = 5 feet. I know because 30 divided by 6 is 5. So an inch on the drawing represents 5 feet in real life.

PART B: What is the actual width of Allen's classroom?

$9 \times 5 = 45$

45 ft

G7 U1 Lesson 8

Reproduce a scale drawing at a different scale and determine how much actual area is represented by one square unit in a scale drawing

CITYTUTOR DC

G7 U1 Lesson 8 - Students will reproduce a scale drawing at a different scale and determine how much actual area is represented by one square unit in a scale drawing

Warm Welcome (Slide 1): Tutor choice

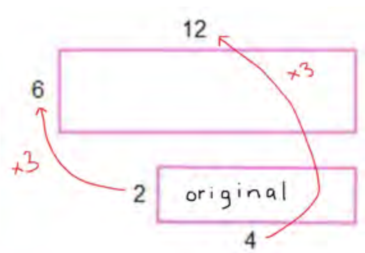
Frame the Learning/Connect to Prior Learning (Slide 2): Today we're going to keep up our work with scale drawings. When you think about working with scale factor and scale drawings, what comes to mind for you? What have you learned so far that feels important or memorable? Possible Student Answers, Key Points:

- A scaled copy's dimensions are related to a figure's dimensions in a consistent way.
- When we scale something, we make it bigger or smaller, but we don't distort it in any other way.
- Sometimes scale drawings can involve different units, like 1 inch can represent 2 kilometers.
- A scale factor is a factor we can multiply by to make a scale drawing or model. The scale factor must be the same for all dimensions.
- Maps, blueprints, and floorplans are all examples of scale drawings.

We've learned a lot! We'll keep thinking about all those ideas today, and we'll draw special attention to the area of our scale drawings compared to the area of the actual object.

Let's Talk (Slide 3): Here we see two rectangles. What do you notice about how the sides are related? Possible Student Answers, Key Points:

- The scale factor is 3.
- The sides of the scale copy are 3 times the length of the sides in the original.



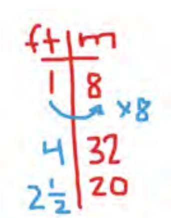
The sides in the original can be multiplied by a scale factor of 3, and the resulting figure will be the scale copy we see here. *(draw arrows labeled with "x 3" from each side of the original to its corresponding side)*

Now think about the area. What is the area of each rectangle? How are the area's related? Possible Student Answers, Key Points:

- The area of the original rectangle is 8 square units, because 2 x 4 = 8. The area of the scale copy is 72 square units, because 6 x 12 = 72.
- The area of the scale copy is significantly greater than the area of the original rectangle. It's 9 times bigger.

The area of the original rectangle is 8. The area of the scale copy is 72. We noticed the sides of the scale copy were 3 times bigger than the sides of the original. Is the area 3 times bigger than the original? (No.) No, the area of the scale copy is 9 times bigger than the area of the original. Since both the length and the width are multiplied by 3, the area is multiplied by 3 squared, or 9. 8 times 3 squared, or 8 times 9, equals 72. The area of the scale copy is 9 times the area of the original. Let's try out a few problems involving area of scale drawings.

Let's Think (Slide 4): Here we have an image that shows the actual dimensions of a parking lot. We're trying to figure out the dimensions of a scale model if we use a scale where 1 foot represents 8 meters. *(sketch a t-chart with columns representing feet and meters, and put 1 and 8 in their respective columns)*

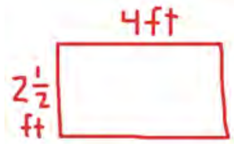


We can multiply the number of feet by 8 to find the number of meters. How can we use that relationship to find how many feet represent 32 meters and 20 meters? *(write 32 and 20 in the meters column)* Possible Student Answers, Key Points:

- We can multiply 32 and 20 by ⅛, since ⅛ is the multiplicative inverse of 8.
- We can divide 32 and 20 by 8, since division is the opposite of multiplication.

$20 \div 8 = \frac{20}{8} = 2\frac{4}{8}$

32 times ⅛, or divided by 8, is 4. *(write 4 in the t-chart)* 20 times ⅛, or divided by 8, isn't quite as intuitive since 8 is not a whole number factor of 20. We can still figure it out. *(write equation as you narrate)* 20 divided by 8 is 20/8. We can rewrite that as a mixed number of 2 4/8 or 2 ½.

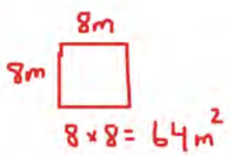


$$A = L \times W$$
$$4 \times 2\tfrac{1}{2}$$
$$4 \times (2 + \tfrac{1}{2})$$
$$8 + 2 = 10\text{ ft}^2$$

The dimensions of the scale model will be 4 feet long by 2 ½ feet wide. *(sketch and label a rectangle showing the dimensions of the scale model)* Now that we know the side lengths, we can find the area of the scale model. How can we find the area of the model? *(Write the multiplication equation as the student shares, even if the steps are different than the example shown here)*

Possible Student Answers, Key Points:
- We can multiply length times width.
- I know 4 x 2 ½ is like 4 x 2 and 4 x ½. 4 x 2 is 8 and 4 x ½ is 2. 8 + 2, means the area is 10 square units.
- I can multiply 4 times 5/2. 4 times 5/2 is 20/2, which is equivalent to 10.

The area is of the model 10 square feet. Now, we can think about the second prompt. The question wants to know how many square meters are represented by 1 square foot. We can think of this in two different ways.



One way is to picture 1 square foot. *(sketch a square)* This square is 1 square foot. The scale tells me that each foot represents 8 meters, so instead of labeling this square foot with side lengths of 1 foot, I'll just label the side lengths 8 meters. *(label 8 meters on each side of the square)* What is the area of this square foot when we think about it in terms of meters? How do you know? Possible Student Answers, Key Points:
- The area is 64 square meters. I can multiply the length times the width.
- I know the area, because 8 meters times 8 meters is 64 square meters.

So, 1 square foot in the model represents 64 square meters in the actual parking lot.

The other way we can think about this is by comparing the areas of the scale model to the actual parking lot. We found the area of the scale model to be 10 square feet. Look at the image of the actual parking lot's dimensions. What would be the area of the actual parking lot? Possible Student Answers, Key Points:
- It would be 640 square meters. I can multiply the length times the width.
- 32 times 20 equals 640.

$10 \times \_\_\_ = 640$

If the scale model's area is 10 square inches, and the actual parking lot's area is 640 square meters. I can think: 10 times what number gets me to 640? *(write 10 x ____ = 640)* I know the answer is 64. So, each square foot of the model represents 64 square meters of the actual parking lot.

Either strategy can help us think about how much 1 square unit of a model represents in real life. We can visualize 1 square unit and actually calculate the area, *or* we can think about the relationship between the area of the scale drawing and the actual area.

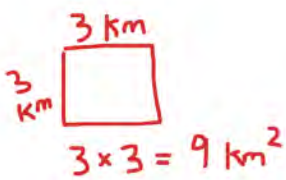
Let's Think (Slide 5): Let's look at one more problem involving scale drawings and area. In this problem, Jayla is using a table to keep track of the dimensions of a national park and her scale drawing of the national park. Take a moment to look closely at the information in the table. *(pause)* What information do you see in the table? Possible Student Answers, Key Points:

- I notice there are widths and lengths. I notice Jayla calculated the area. I notice the scale is missing in the second row.

Let's use the table to determine the scale Jayla used for her drawing. How are the dimensions of the actual national park related to the dimensions of the drawing? Possible Student Answers, Key Points:

- The number of centimeters is ⅓ the number of kilometers.
- The number of kilometers is 3 times the number of centimeters.

(draw arrows between corresponding measurements and label with x ⅓) The table shows us that the number of centimeters in the drawing is ⅓ the number of kilometers. Or we can think of it as the number of kilometers is three times the number of centimeters. The scale Jayla uses is 1 centimeter = 3 kilometers. *(write 1 cm = 3 km)*



Now we'll answer part B. It wants us to find how many square kilometers are represented by 1 square centimeter. Let's do this both ways we've learned. We'll start by visualizing 1 square centimeter. *(sketch a square)* Instead of labeling each side as being 1 cm, I'll label each side as being 3 km, since the scale tells me I can represent 1 cm as 3 km. *(label square)* What's the area of this square? (9 square kilometers) One square centimeter on the scale drawing represents 9 square kilometers in real life.

We can also think about this by comparing the areas of the scale drawing and the actual park. The area of the drawing is 20 square centimeters. The area of the actual park is 180 square kilometers. I can think 20 times *what number* is equal to 180? *(draw arrow from 20 to 180)* 20 times 9 is equal to 180, so I know each square centimeter represents 9 square kilometers.

Let's Try it (Slides 6 - 7): We just solved a number of problems involving scale drawings with a particular focus on area of scale figures. We saw that the area isn't related in the same way as the side lengths. For example, if I scale length by a factor of 2 and width by a factor of 2, the area will scale by a factor of 4. We also explored two different ways to consider how much area is represented by 1 square unit on a scale drawing. We can visualize 1 square unit using the given scale, or we can compare the area of the scale image to the area of the actual image. Let's try a few more problems to practice some of this thinking. When we wrap up, you'll get a chance to try some out independently.

WARM WELCOME

Today we will reproduce a scale drawing at a different scale and determine how much actual area is represented by one square unit within a scale drawing.

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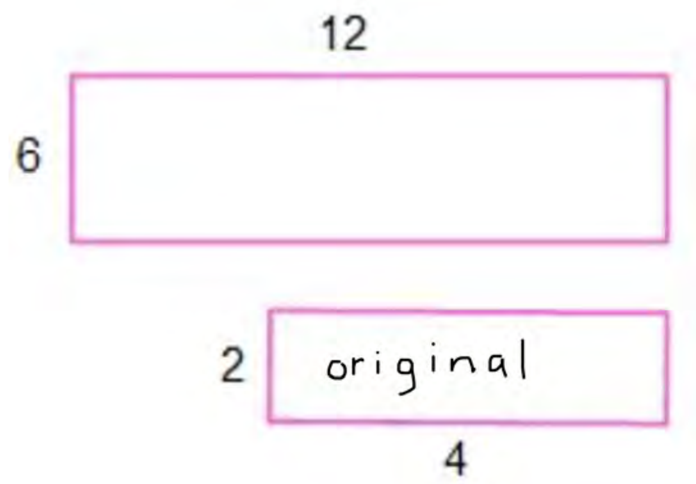
Let's Talk:

How do the <u>side lengths</u> compare?

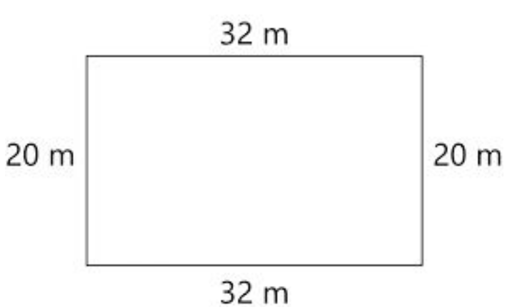
How do the <u>areas</u> compare?



Let's Think:

The dimensions of a parking lot are shown.

What is the area of a scale model of the parking lot using a scale of 1 foot = 8 meters?



How many square meters are represented by 1 square foot?

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Let's Think:

Jayla made a scale drawing of a national park that is actually 15 km wide and 12 km long. She recorded dimensions in the table below.

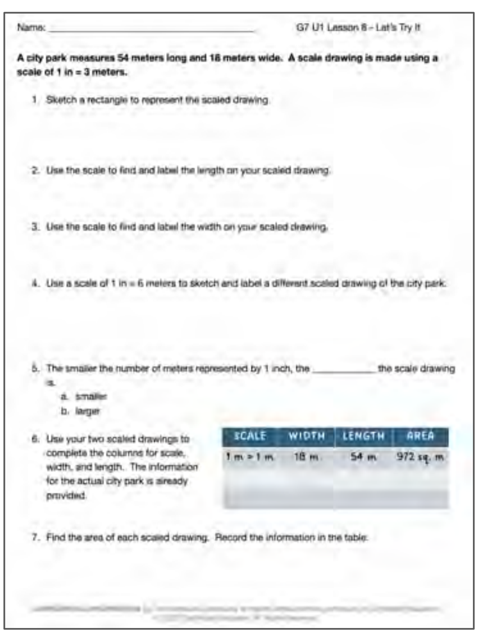
SCALE	WIDTH	LENGTH	AREA
1 km = 1 km	15 km	12 km	180 sq. km
	5 cm	4 cm	20 sq. cm

a. What scale did Jayla use?

b. How many square kilometers are represented by 1 square centimeter?

Let's Try It:

Let's explore reproducing a scale drawing at a different scale and determining how much actual area is represented by one square unit in a scale drawing together.



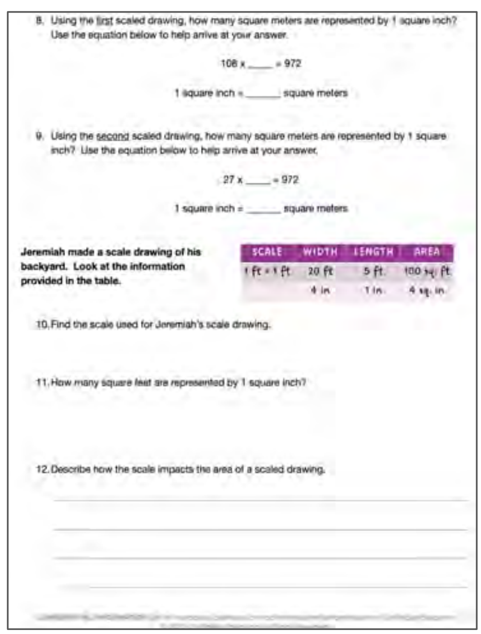
Name: ______________________ G7 U1 Lesson 8 – Let's Try It

A city park measures 54 meters long and 18 meters wide. A scale drawing is made using a scale of 1 in = 3 meters.

1. Sketch a rectangle to represent the scaled drawing.
2. Use the scale to find and label the length on your scaled drawing.
3. Use the scale to find and label the width on your scaled drawing.
4. Use a scale of 1 in = 6 meters to sketch and label a different scaled drawing of the city park.
5. The smaller the number of meters represented by 1 inch, the __________ the scale drawing is.
   a. smaller
   b. larger
6. Use your two scaled drawings to complete the columns for scale, width, and length. The information for the actual city park is already provided.

SCALE	WIDTH	LENGTH	AREA
1 m = 1 m	18 m	54 m	972 sq. m

7. Find the area of each scaled drawing. Record the information in the table.



8. Using the first scaled drawing, how many square meters are represented by 1 square inch? Use the equation below to help arrive at your answer.

   108 x ____ = 972

   1 square inch = ______ square meters

9. Using the second scaled drawing, how many square meters are represented by 1 square inch? Use the equation below to help arrive at your answer.

   27 x ____ = 972

   1 square inch = ______ square meters

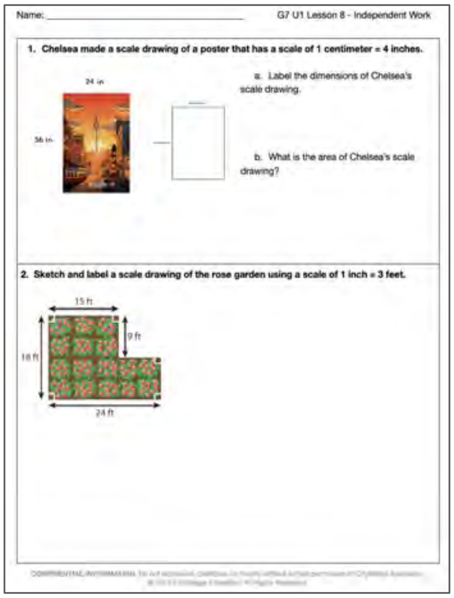
Jeremiah made a scale drawing of his backyard. Look at the information provided in the table.

SCALE	WIDTH	LENGTH	AREA
1 ft = 1 ft	20 ft	5 ft	100 sq. ft
	4 in	1 in	4 sq. in

10. Find the scale used for Jeremiah's scale drawing.
11. How many square feet are represented by 1 square inch?
12. Describe how the scale impacts the area of a scaled drawing.

On your Own:

Now it's time to reproduce a scale drawing at a different scale and determine how much actual area is represented by one square unit in a scale drawing on your own.

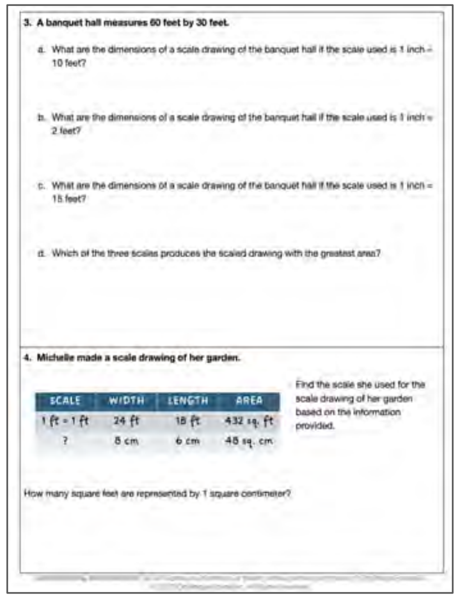

Name: ______________________ G7 U1 Lesson 8 - Independent Work

1. Chelsea made a scale drawing of a poster that has a scale of 1 centimeter = 4 inches.

a. Label the dimensions of Chelsea's scale drawing.

b. What is the area of Chelsea's scale drawing?

2. Sketch and label a scale drawing of the rose garden using a scale of 1 inch = 3 feet.


3. A banquet hall measures 60 feet by 30 feet.

a. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 10 feet?

b. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 2 feet?

c. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 15 feet?

d. Which of the three scales produces the scaled drawing with the greatest area?

4. Michelle made a scale drawing of her garden.

SCALE	WIDTH	LENGTH	AREA
1 ft = 1 ft	24 ft	18 ft	432 sq. ft
?	8 cm	6 cm	48 sq. cm

Find the scale she used for the scale drawing of her garden based on the information provided.

How many square feet are represented by 1 square centimeter?

A city park measures 54 meters long and 18 meters wide. A scale drawing is made using a scale of 1 in = 3 meters.

1. Sketch a rectangle to represent the scaled drawing.

2. Use the scale to find and label the length on your scaled drawing.

3. Use the scale to find and label the width on your scaled drawing.

4. Use a scale of 1 in = 6 meters to sketch and label a different scaled drawing of the city park.

5. The smaller the number of meters represented by 1 inch, the ____________ the scale drawing is.
   a. smaller
   b. larger

6. Use your two scaled drawings to complete the columns for scale, width, and length. The information for the actual city park is already provided.

SCALE	WIDTH	LENGTH	AREA
1 m = 1 m	18 m	54 m	972 sq. m

7. Find the area of each scaled drawing. Record the information in the table.

8. Using the first scaled drawing, how many square meters are represented by 1 square inch? Use the equation below to help arrive at your answer.

108 x _____ = 972

1 square inch = _______ square meters

9. Using the second scaled drawing, how many square meters are represented by 1 square inch? Use the equation below to help arrive at your answer.

27 x _____ = 972

1 square inch = _______ square meters

Jeremiah made a scale drawing of his backyard. Look at the information provided in the table.

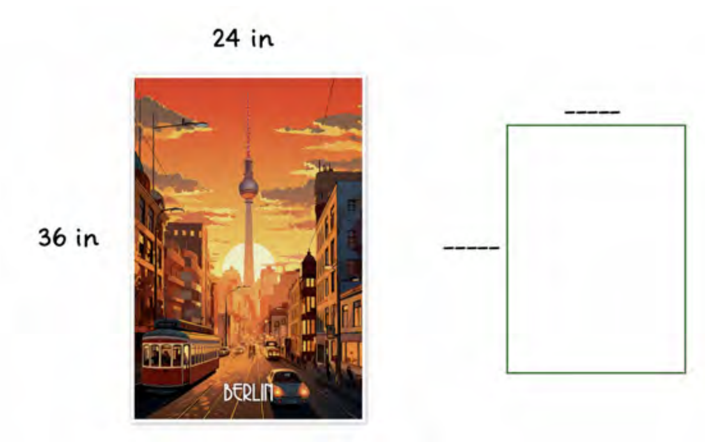
SCALE	WIDTH	LENGTH	AREA
1 ft = 1 ft	20 ft	5 ft	100 sq. ft
	4 in	1 in	4 sq. in

10. Find the scale used for Jeremiah's scale drawing.

11. How many square feet are represented by 1 square inch?

12. Describe how the scale impacts the area of a scaled drawing.

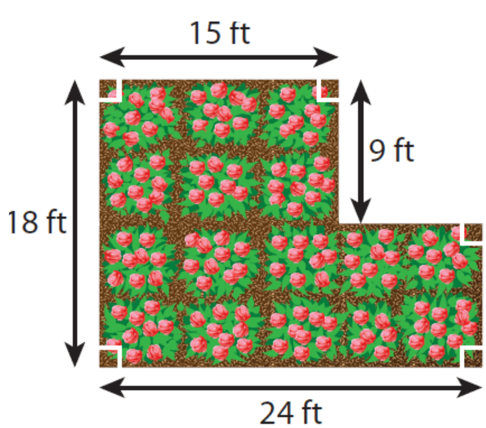
1. Chelsea made a scale drawing of a poster that has a scale of 1 centimeter = 4 inches.



a. Label the dimensions of Chelsea's scale drawing.

b. What is the area of Chelsea's scale drawing?

2. Sketch and label a scale drawing of the rose garden using a scale of 1 inch = 3 feet.



3. A banquet hall measures 60 feet by 30 feet.

a. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 10 feet?

b. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 2 feet?

c. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 15 feet?

d. Which of the three scales produces the scaled drawing with the greatest area?

4. Michelle made a scale drawing of her garden.

SCALE	WIDTH	LENGTH	AREA
1 ft = 1 ft	24 ft	18 ft	432 sq. ft
?	8 cm	6 cm	48 sq. cm

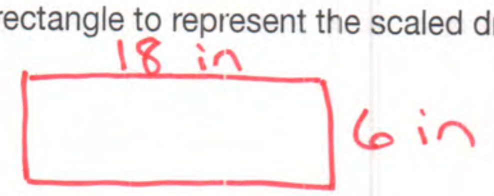
Find the scale she used for the scale drawing of her garden based on the information provided.

How many square feet are represented by 1 square centimeter?

Name: KEY

A city park measures 54 meters long and 18 meters wide. A scale drawing is made using a scale of 1 in = 3 meters.

1. Sketch a rectangle to represent the scaled drawing.



2. Use the scale to find and label the length on your scaled drawing.

$54 \div 3 = 18$

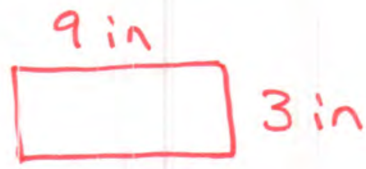
$18 \div 3 = 6$

3. Use the scale to find and label the width on your scaled drawing.

4. Use a scale of 1 in = 6 meters to sketch and label a different scaled drawing of the city park.

$54 \div 6 = 9$

$18 \div 6 = 3$



5. The smaller the number of meters represented by 1 inch, the ____________ the scale drawing is.
   a. smaller
   b. larger

6. Use your two scaled drawings to complete the columns for scale, width, and length. The information for the actual city park is already provided.

SCALE	WIDTH	LENGTH	AREA
1 m = 1 m	18 m	54 m	972 sq. m
1 in = 3 m	6 in	18 in	108 in^2
1 in = 6 m	3 in	9 in	27 in^2

7. Find the area of each scaled drawing. Record the information in the table.

$6 \times 18 = 108$

$3 \times 9 = 27$

8. Using the first scaled drawing, how many square meters are represented by 1 square inch? Use the equation below to help arrive at your answer.

108 x 9 = 972

1 square inch = 9 square meters

9. Using the second scaled drawing, how many square meters are represented by 1 square inch? Use the equation below to help arrive at your answer.

27 x 36 = 972

1 square inch = 36 square meters

Jeremiah made a scale drawing of his backyard. Look at the information provided in the table.

SCALE	WIDTH	LENGTH	AREA
1 ft = 1 ft	20 ft	5 ft	100 sq. ft
1 in = 5 ft	4 in ×5	1 in	4 sq. in

10. Find the scale used for Jeremiah's scale drawing.

1 in = 5 ft

11. How many square feet are represented by 1 square inch?

25 ft^2 $4 \times \underline{25} = 100$

12. Describe how the scale impacts the area of a scaled drawing.

In this case, ~~[illegible]~~ the length is multiplied by 5 and the width is multiplied by 5. This means the area is scaled by 5^2 or 25.

1. Chelsea made a scale drawing of a poster that has a scale of 1 centimeter = 4 inches.

$\times \frac{1}{4}$

24 in

36 in

$\times \frac{1}{4}$

6 cm

9 cm

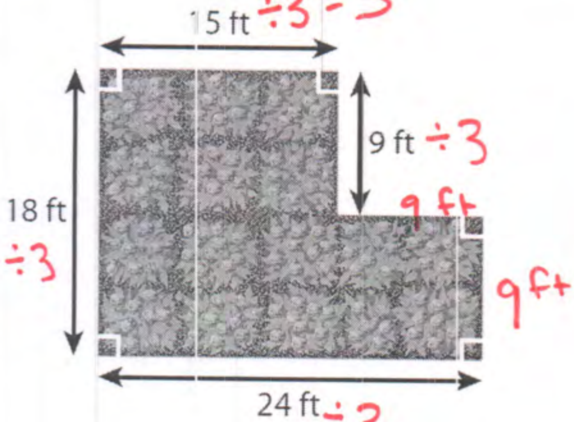
a. Label the dimensions of Chelsea's scale drawing.

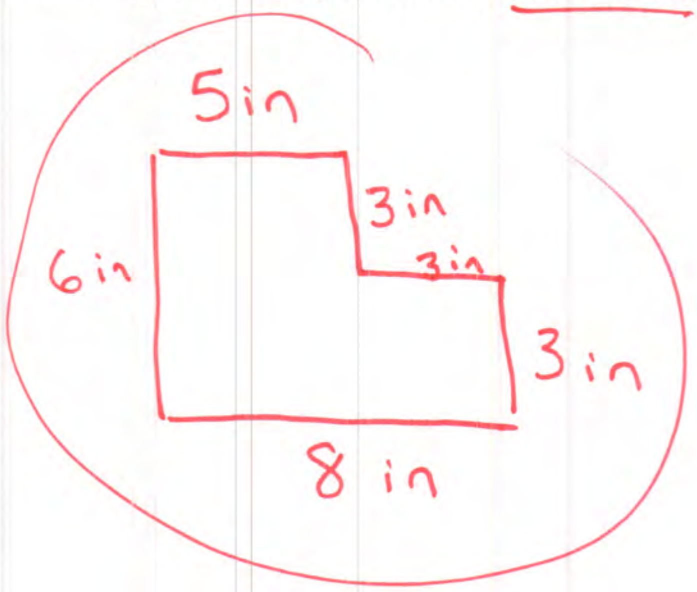
b. What is the area of Chelsea's scale drawing?

$6 \times 9 = 54$

$54\ cm^2$

2. Sketch and label a scale drawing of the rose garden using a scale of 1 inch = 3 feet.





3. A banquet hall measures 60 feet by 30 feet.

a. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 10 feet?

$60 \div 10 = 6$

$30 \div 10 = 3$

6 in x 3 in

b. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 2 feet?

$60 \div 2 = 30$

$30 \div 2 = 15$

30 in x 15 in

c. What are the dimensions of a scale drawing of the banquet hall if the scale used is 1 inch = 15 feet?

$60 \div 15 = 4$

$30 \div 15 = 2$

4 in x 2 in

d. Which of the three scales produces the scaled drawing with the greatest area?

The drawing using a scale of 1 inch = 2 feet!

$6 \times 3 = 18$

$30 \times 15 = 450$ ✓

$4 \times 2 = 8$

4. Michelle made a scale drawing of her garden.

SCALE	WIDTH	LENGTH	AREA
1 ft = 1 ft	24 ft	18 ft	432 sq. ft
?	×3 8 cm	6 cm	48 sq. cm

Find the scale she used for the scale drawing of her garden based on the information provided.

1 cm = 3 ft

How many square feet are represented by 1 square centimeter?

$48 \times ? = 432$

9 ft^2

G7 U1 Lesson 9

Explain how to use scales without units to determine scaled or actual distances.

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G7 U1 Lesson 9 - Students will explain how to use scales without units to determine scaled or actual distances

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): We've almost reached the end of our unit that's all about scale. Our work today will have us think about how we can use scales with units and scales without units to think about scaled or actual distances. Let's jump right in

Let's Talk (Slide 3): Here we see an image of a giraffe. Take a second to look over the provided information. What do you notice? What do you wonder? Possible Student Answers, Key Points:

- I notice the giraffe is 18 units tall. I notice the scale is 1 = 10.
- I wonder how tall the giraffe actually is. I wonder what units these numbers represent.

This scale does not have units. Not all scales are expressed using units. Since the scale is 1 = 24 and does not include units, we can assume that the actual giraffe is 24 times as tall as the scale image we're provided. Let's look at some examples of problems that include scales without units.

Let's Think (Slide 4): Here we see a scale image of parade float. The height of the house on the float's model is labeled as 5 inches. Does the provided scale include units? What do you think the scale mean in this context? Possible Student Answers, Key Points:

- No, this scale does not include units.
- The scale is 1 = 24, so the parade float is 24 times bigger than the image we're provided.

$5 \times 24 = ?$

120 in.

We can use the scale to find the actual height of the house. Since the scale is not expressed in units, we can assume that the height we find will also be in inches. We can multiply 5 by 24, since we know the height of the actual house will be 24 times the size of the house in the drawing. *(write 5 x 24 = ?)* Take a second and calculate. What is 5 x 24? (120) The height of the house on the parade float will be 120 inches. The unit stays constant since the scale did not tell us to use a different unit.

Now that we have the height of the house in inches, we can find the height of the house in feet? What math can I do to convert 120 inches into feet? Possible Student Answers, Key Points:

- I know 1 foot is 12 inches. I can think about 120 divided by 12.
- I can use multiplication and think about how many groups of 12 inches will get me up to 120 inches.

$120 \div 12 = ?$

$12 \times ? = 120$

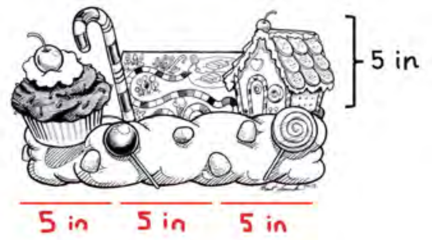
10 ft

There are 12 inches in 1 foot. I can divide 120 by 12 to find the answer in feet, *or* I can think about 12 times *what* equals 120. *(write equations as shown as you narrate)* No matter how we think about it, the height of the house on the actual float will be 10 feet. *(write 10 feet)*

Let's move on to Part B. They want us to estimate the entire length of the float in inches. Is the length of the float labeled? (No.) If the height of the house portion of the float is 5 inches on the scale image, how can I use that to estimate the length of the scale image? Possible Student Answers, Key Points:

- I can use my fingers to show the length of the 5-inch bracket, and then see how many of that distance goes across the length of the float.
- It looks like the float is maybe 3 or 4 times as long as the house is tall based on the size of the bracket.

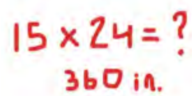
We can iterate the length of the 5-inch bracket to get a general sense of how long the image of the float is. Once we figure that out, we can use the scale to determine how long the float will be in real life. Let's do that now.



(sketch lines that are about as long as the 5-inch bracket along the bottom of the image, labeling each as 5 inches)

I can see that the float is about 3 brackets long, or about 3 groups of 5 inches. Based on that, how long can we estimate the image to be? (15 inches) If the length of the scale image of the float is about 15 inches, how can I calculate the actual length of the float? Possible Student Answers, Key Points:

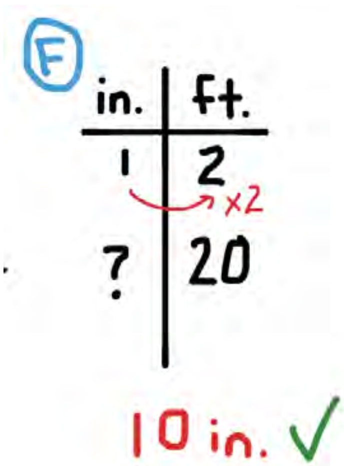
- We can multiply 15 times 24, since each inch on the image is equal to 24 inches on the actual float.
- I know 15 x 24 = 360.



Each inch in the image is equal to 24 inches. 15 times 24 is 360, so I know the actual length of the float is 360 inches. *(write 15 x 24 = 360)*

Let's Think (Slide 5): Let's try one more problem. *(read through the problem once)* Both Frank and Kierra are correct, but they took different approaches. What do you is different about the scales each person used? Possible Student Answers, Key Points:

- I see that Frank used a scale of 1 inch to 2 feet. His scale includes units.
- I notice Kierra's scale is 1 = 24, which does not include units.



The question asks us to figure out how they can both end up with a correct length of 10 inches, even though they used seemingly different scales. Let's start by thinking about Frank's approach. I'll put Frank's scale into a t-chart. *(sketch a t-chart labeled with inches and feet, and put 1 and 2 in their respective columns)* Based on Frank's scale, I know the at the number of feet will be two times the number of inches. *(draw arrow from 1 to 2 showing "x 2")* How do you think Frank used that information to arrive at a scale drawing length of 10 inches? Possible Student Answers, Key Points:

- He could take 20 and divide it by 2. Or he could take 20 and multiply it by ½.
- He could think about what number times 10 would equal 20.

If Frank knows that the number of feet is twice the number of inches, he knows that the number of inches that are needed to represent 20 feet would be 10 inches.

Let's think about what would happen if Kierra took the same approach. *(draw a t-chart labeled with inches and feet, putting 1 in the inches column and 24 in the feet column)* This wouldn't work. The relationship here would mean that the number of feet is 24 times the number of inches in the scale drawing. Is Kierra going to get an answer of 10? (No.) 10 times 24 would not be 20. *(cross out the t-chart)* Kierra must have thought about the problem in a different way.

The fact that Kierra's scale does not include units, clues us into the fact that she likely thought about the scale drawing and the actual room in terms of the same unit. I know 2 feet is the same as 24 inches, so this leads me to believe that she converted feet into inches.

If the room is 20 feet long, how long would that be in inches? How do you know? Possible Student Answers, Key Points:

- I know 1 foot is 12 inches, so I can use multiplication to find how many inches 20 feet would be.
- I know 20 x 12 = 240, so 20 feet is equivalent to 240 inches.

20 × 12 = 240 in

(write 20 x 12 = 240 inches) We can multiply 20 by 12 inches to see that 20 feet is the same as 240 inches.

in.	in.
1	24
?	240

10 in. ✓

Now, Kierra can use the scale of 1 to 24 to determine the length of the scale drawing. *(sketch t-chart showing 1 inch to 24 inches and ? to 240 inches as shown)* We can multiply the number of inches in the scale drawing by 24 to find the length of the actual room, so I know we can do the opposite to find the length of the scale drawing. What is 240 divided by 24, or 240 times 1/24? (10) Kierra also ended up with an answer of 10 inches.

We just walked through what both students likely did to arrive at 10 inches. In your own words, how were they able to arrive at the same answer with different scales? Possible Student Answers, Key Points:

- Frank thought about how many *feet* each *inch* represents. His scale compared inches to feet.
- Kierra converted the length of the room into inches, so it was the same unit as the scale drawing. This meant her scale looked a little different, but did not require units since the units she was comparing were the same.

Both showed a scale of 1 to 24, but in different ways. Frank thought of it as 1 inch to 2 feet, and Kierra thought of it as 1 inch to 24 inches. 2 feet and 24 inches are equivalent, so they were able to arrive at the same scaled length.

Let's Try it (Slides 6 - 7): We're becoming scale experts. We've spent several days becoming experts with scales that include units, and today we were able to brush up on our skills with scales that don't include units. When we are comparing objects with similar units, we know that we don't need to use units in our scale. When our objects are measured in different units, it's important that we name the units as part of our scale. Let's try a few more together, and then you'll get a chance to practice on your own.

WARM WELCOME

Today we will explain how to use scales without units to determine scaled or actual distances.

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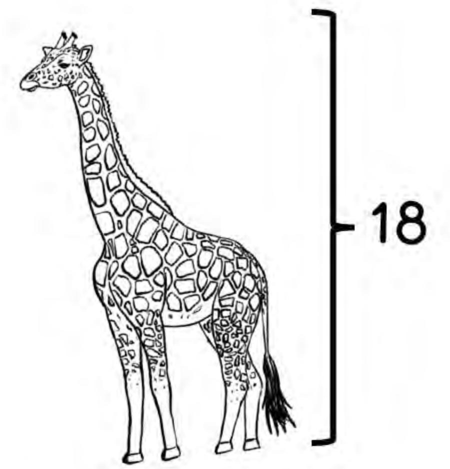
Let's Talk:

SCALE
1 = 10

A scale image of a giraffe is shown.

What do you notice?
What do you wonder?



Let's Think:

The image below shows a scale image of a parade float.

SCALE
1 = 24

a. What's the height of the actual house in inches? Feet?

b. Estimate the length of the entire float in inches.

Let's Think:

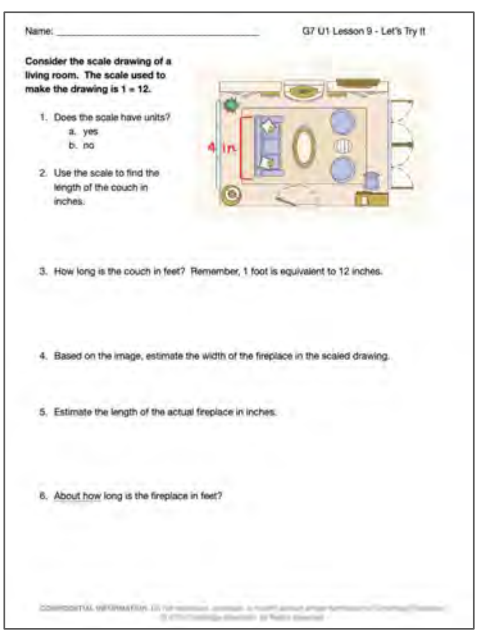
A room measures 20 feet long. Frank and Kierra make scale drawings of the field.

- **Frank uses a scale of 1 inch to 2 feet.**
- **Kierra uses a scale of 1 to 24.**

They both end up with a scale drawing that is 10 inches long. How is that possible?

Let's Try It:

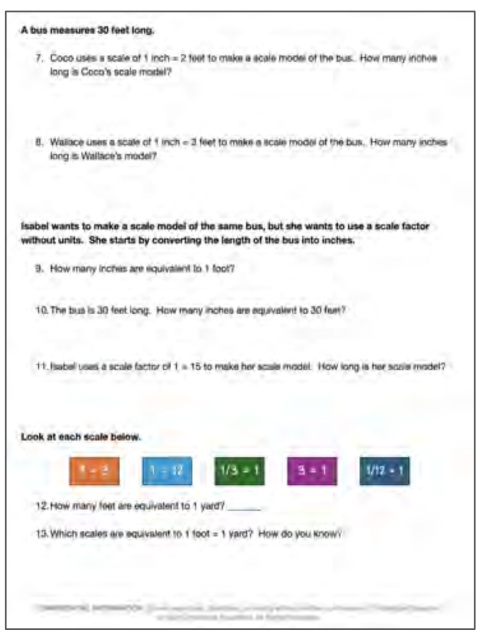
Let's explore explaining how to use scales without units to determine scaled or actual distances together.



Name: ______________________ G7 U1 Lesson 9 - Let's Try It

Consider the scale drawing of a living room. The scale used to make the drawing is 1 = 12.

1. Does the scale have units?
   a. yes
   b. no
2. Use the scale to find the length of the couch in inches.
3. How long is the couch in feet? Remember, 1 foot is equivalent to 12 inches.
4. Based on the image, estimate the width of the fireplace in the scaled drawing.
5. Estimate the length of the actual fireplace in inches.
6. About how long is the fireplace in feet?



A bus measures 30 feet long.

7. Coco uses a scale of 1 inch = 2 feet to make a scale model of the bus. How many inches long is Coco's scale model?
8. Wallace uses a scale of 1 inch = 3 feet to make a scale model of the bus. How many inches long is Wallace's model?

Isabel wants to make a scale model of the same bus, but she wants to use a scale factor without units. She starts by converting the length of the bus into inches.

9. How many inches are equivalent to 1 foot?
10. The bus is 30 feet long. How many inches are equivalent to 30 feet?
11. Isabel uses a scale factor of 1 = 15 to make her scale model. How long is her scale model?

Look at each scale below.

12. How many feet are equivalent to 1 yard? ______
13. Which scales are equivalent to 1 foot = 1 yard? How do you know?

On your Own:

Now it's time to explain how to use scales without units to determine scaled or actual distances on your own.

Name: ______________________ G7 U1 Lesson 9 - Independent Work

1. Which scales are equivalent to 1 centimeter to 1 meter? Select ALL that apply.

a. 1 to 100

b. 1/100 to 1

c. 1 to 10

d. 10 to 1

e. 100 to 1

2. A scale model of a playground slide is built at a scale of 1 to 48. If the model slide is 5 inches tall, how tall is the actual slide in inches? Feet?

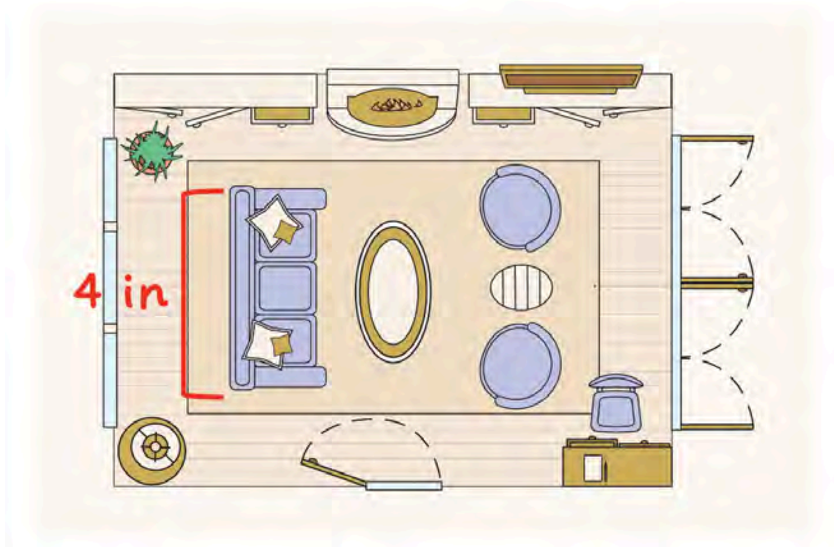
3. A rectangular parking lot is 40 meters long and 25 meters wide.

- Blake made a scale drawing of the parking lot using a scale of 1 cm to 5 meters.
- Layla made a scale drawing of the parking lot using a scale of 1 to 500.

They both ended up with a scale drawing that measured 8 centimeters by 5 centimeters. Explain how that is possible.

4. Darryl drew a plan of a swimming pool using a scale of 1 to 60. The length of the swimming pool in his drawing is 1.75 inches. What is the actual measurement of the length of the swimming pool?

Consider the scale drawing of a living room. The scale used to make the drawing is 1 = 12.



1. Does the scale have units?
   a. yes
   b. no

2. Use the scale to find the length of the couch in inches.

3. How long is the couch in feet? Remember, 1 foot is equivalent to 12 inches.

4. Based on the image, estimate the width of the fireplace in the scaled drawing.

5. Estimate the length of the actual fireplace in inches.

6. About how long is the fireplace in feet?

A bus measures 30 feet long.

7. Coco uses a scale of 1 inch = 2 feet to make a scale model of the bus. How many inches long is Coco's scale model?

8. Wallace uses a scale of 1 inch = 3 feet to make a scale model of the bus. How many inches long is Wallace's model?

Isabel wants to make a scale model of the same bus, but she wants to use a scale factor without units. She starts by converting the length of the bus into inches.

9. How many inches are equivalent to 1 foot?

10. The bus is 30 feet long. How many inches are equivalent to 30 feet?

11. Isabel uses a scale factor of 1 = 15 to make her scale model. How long is her scale model?

Look at each scale below.

1 = 3	1 = 12	1/3 = 1	3 = 1	1/12 = 1

12. How many feet are equivalent to 1 yard? _______

13. Which scales are equivalent to 1 foot = 1 yard? How do you know?

1. Which scales are equivalent to 1 centimeter to 1 meter? Select ALL that apply.

a. 1 to 100

b. 1/100 to 1

c. 1 to 10

d. 10 to 1

e. 100 to 1

2. A scale model of a playground slide is built at a scale of 1 to 48. If the model slide is 5 inches tall, how tall is the actual slide in inches? Feet?

3. A rectangular parking lot is 40 meters long and 25 meters wide.

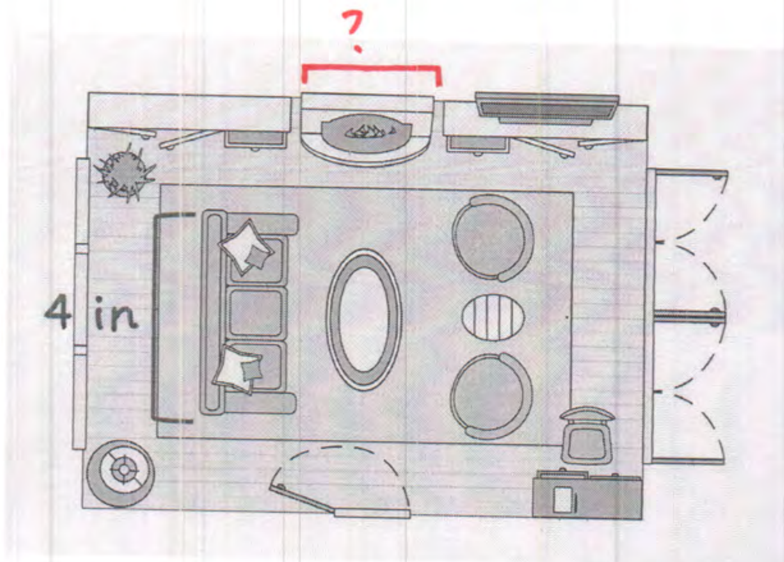
- Blake made a scale drawing of the parking lot using a scale of 1 cm to 5 meters.
- Layla made a scale drawing of the parking lot using a scale of 1 to 500.

They both ended up with a scale drawing that measured 8 centimeters by 5 centimeters. Explain how that is possible.

4. Darryl drew a plan of a swimming pool using a scale of 1 to 60. The length of the swimming pool in his drawing is 1.75 inches. What is the actual measurement of the length of the swimming pool?

Name: KEY

Consider the scale drawing of a living room. The scale used to make the drawing is 1 = 12.



1. Does the scale have units?
   a. yes
   b. no

2. Use the scale to find the length of the couch in inches.

1	12
4	?

×12

48 in

3. How long is the couch in feet? Remember, 1 foot is equivalent to 12 inches.

$48 \div 12 =$ 4 feet

4. Based on the image, estimate the width of the fireplace in the scaled drawing.

about 2 inches

5. Estimate the length of the actual fireplace in inches.

$2 \times 12 =$ 24 inches

6. About how long is the fireplace in feet?

$24 \div 12 =$ 2 feet

A bus measures 30 feet long.

7. Coco uses a scale of 1 inch = 2 feet to make a scale model of the bus. How many inches long is Coco's scale model?

$30 \div 2 = 15$ 15 inches

8. Wallace uses a scale of 1 inch = 3 feet to make a scale model of the bus. How many inches long is Wallace's model?

$30 \div 3 = 10$ 10 inches

Isabel wants to make a scale model of the same bus, but she wants to use a scale factor without units. She starts by converting the length of the bus into inches.

9. How many inches are equivalent to 1 foot?

12 inches

10. The bus is 30 feet long. How many inches are equivalent to 30 feet?

$30 \times 12 = 360$ 360 inches

11. Isabel uses a scale factor of 1 = 15 to make her scale model. How long is her scale model?

$360 \div 15 = ?$

$15 \times ? = 360$

24 inches

Look at each scale below.

1 = 3	1 = 12	1/3 = 1	3 = 1	1/12 = 1

12. How many feet are equivalent to 1 yard? 3 ft

13. Which scales are equivalent to 1 foot = 1 yard? How do you know?

1 foot is $\frac{1}{3}$ of a yard.

1 = 3 (foot, feet) $\frac{1}{3}$ = 1 (yard, yard)

Name: KEY

1. Which scales are equivalent to 1 centimeter to 1 meter? Select ALL that apply.

a. 1 to 100

b. 1/100 to 1

~~c. 1 to 10~~

~~d. 10 to 1~~

~~e. 100 to 1~~

$1 \text{ cm} = \frac{1}{100} \text{ m}$

$100 \text{ cm} = 1 \text{ m}$

2. A scale model of a playground slide is built at a scale of 1 to 48. If the model slide is 5 inches tall, how tall is the actual slide in inches? Feet?

$5 \times 48 = ?$

$$\begin{array}{r} \overset{4}{4}8 \\ \times\ 5 \\ \hline 240 \end{array}$$

240 inches

$240 \div 12 = ?$

20 feet

3. **A rectangular parking lot is 40 meters long and 25 meters wide.**

- Blake made a scale drawing of the parking lot using a scale of 1 cm to 5 meters.
- Layla made a scale drawing of the parking lot using a scale of 1 to 500.

They both ended up with a scale drawing that measured 8 centimeters by 5 centimeters. Explain how that is possible.

They seemingly used different scales, but Blake's uses units and Layla's does not. Blake can divide each dimension by 5 to end up with 8 cm x 5 cm. Layla's scale means "1 cm to 500 cm" which is the same as "1 cm to 5 m" since 500 cm = 5 m. She would need to convert 40 m x 25 m to 4000 cm x 2500 cm first.

4. **Darryl drew a plan of a swimming pool using a scale of 1 to 60. The length of the swimming pool in his drawing is 1.75 inches.** What is the actual measurement of the length of the swimming pool?

1	60
1.75	?

×60

×60

$$\begin{array}{r} {}^{4}\ \ {}^{3}\ \ \\ 1.75 \\ \times\ 60 \\ \hline 000 \\ 10500 \\ \hline 105.00 \end{array}$$

105 in

G7 U1 Lesson 10

Use different scales, with or without units, to describe the same drawings.

G7 U1 Lesson 10 - Students will use different scales, with or without units, to describe the same drawings

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today is our final day learning about scale and scale factor for now. Like our previous lesson, today we'll see some scales with units and some scales without. We were able to navigate this before, so we can think of today as being mostly an opportunity to enhance our skills.

Let's Talk (Slide 3): As we've seen before, it helps to be familiar with unit conversions when dealing with scale drawings. Before we jump into our main problems today, let's make sure we're clear around some important unit conversions. Look at the first, red box. These are customary units of length. About how big is each of these units? Possible Student Answers, Key Points:

- A foot is the length of a ruler or about the length of a notebook.
- An inch is about the length of the top part of my thumb or the size of an inch-tile I've used in math.
- A yard is about the width of a door or three rulers.

1 foot = 12 inches
1 yard = 3 feet

(if student shares conversions, fill them in the blanks as they share) We know that 1 foot is equivalent to 12 inches. We also know that 1 yard is equivalent to 3 feet. We'll use these customary units throughout our work today.

Now look at the second, blue box. These are metric units of length. About how big is each of these units? Possible Student Answers, Key Points:

- A meter is about the size of yard. That's about the width of the door.
- A centimeter is smaller than an inch. It's like the width of my fingernail.

1 meter = 100 centimeters

(if student shares conversions, fill them in the blanks as they share) We know that 1 meter is equivalent to 100 centimeters. We'll use this information in some problems today. Now that we've refreshed on our customary and metric length units, let's try out a couple problems.

Let's Think (Slide 4): Our first problem wants us to find the actual height of this building in meters. What unit is the scale image measured in? (Centimeters.) Does the provided scale include units? (No.) Since the scale does not include units, I know if I multiply 6 using the scale, the resulting height will be in centimeters. I'll want to keep that in mind, since the question wants us to find the height of the actual building in meters.

$6 \times 700 = 4200$

4200 cm

Let's use the scale to find the height of the building in centimeters. The scale tells us that the actual height of the building is 700 times the height of the drawing. What is 6 x 700? (4,200) *(write 6 x 700 = 4,200)* The height of the building is 4,200 centimeters.

If we want to convert this height to now be in meters, how can I use what we just reviewed about meters and centimeters to help us? Possible Student Answers, Key Points:

- I know 100 centimeters is equal to 1 meter.
- I can divide 4,200 centimeters by 100 to find how many meters.
- I can think about a number I can multiply 100 by to get to 4,200.

Let's set up a table to help us keep track of our units. I'll draw a t-chart and label one column with centimeters and one column with meters. I'll put the conversion we know in the top row of the table.

cm	m
100	1
4200	?

$\times \frac{1}{100}$

(sketch t-chart as described, putting 100 centimeters and 1 meter in the top row) We know 100 centimeters is equivalent to 1 meter. So to convert from centimeters to meters, I can divide by 100 or multiply by 1/100. *(draw arrow from 100 cm to 1 m showing "x 1/100")* Take a minute to figure out what 4,200 centimeters is in terms of meters. How do you know? Possible Student Answers, Key Points:

- I know 4,200 divided by 100 is 42.
- I know 4,200 times 1/100 is 4,200/100 or 42.

$4200 \times \frac{1}{100} = \frac{4200}{100}$

42 m

(write equation and answer as you narrate) We can multiply 4,200 by 1/100 to get 4,200/100. That's equivalent to 42. 4,200 centimeters is equivalent to 42 meters.

Using the scale without units meant that the actual height we calculated was in centimeters, the same unit we started with. The only thing we had to do to answer the question in terms of meters was to convert the centimeters to meters. The table was a helpful way to keep our thinking organized.

Let's Think (Slide 5): Let's try one more. What do you notice is the same and different about this problem compared to the last problem we did? Possible Student Answers, Key Points:

- It's the same in that we're finding the actual height of a building. It's the same in that the scale does not include units.
- It's different because the building looks different. It's different because it uses customary units.

This problem is very similar to the last one, just with customary units. Rather than solve it the exact same way, let me show you another way we can tackle problems like this. In our last problem, we used the scale and then converted our answer into the designated unit. For this one, let's try converting *first* so our answer comes out in the correct unit automatically.

1 in = 24 in

1 in = 2 ft.

The scale is 1 = 24. *(write 1 in = 24 in)* Instead of thinking of this as 1 inch representing 24 inches, I can think of this same scale as 1 inch representing 2 feet. 24 inches is the same thing as 2 feet. *(write 1 in = 2 ft directly underneath 1 in = 24 in)* We didn't change the meaning of the scale, we just made the scale work for the units in the problem. Now if we use this scale, the answer we get will be in feet.

in.	ft.
1	2
20	?

$\times 2$

I'm going to sketch a t-chart to help us find the actual height of the building given the scale image of 20 inches. *(draw t-chart with a column for inches and a column for feet, and put 1 inch and 2 feet in the top row)* The scale of 1 inch to 2 feet is in my table. I know to move from inches to feet, we can multiply by 2. How can I use that to find the actual height of the building? Possible Student Answers, Key Points:

- We can multiply the number of inches by 2 to find the number of feet.
- I know 20 x 2 = 40, so the actual height of the building is 40 feet.

$20 \times 2 = 40ft$

The drawing is 20 inches. If we multiply 20 by 2, we end up with 40. The actual height of the building is 40 feet. *(write 20 x 2 = 40)*

Because we already converted inches to feet when thinking about our scale, we don't need to convert now. Whether you prefer solving problems like this the original way we did with the first example or this way, you'll end up with the same answer.

Let's Try it (Slides 6 - 7): Now that we've seen two different ways to tackle similar problems, let's practice a little more. When we're finished, you'll get to try out a few independently. We'll want to look closely at the scales we are given. If they don't have units, we'll want to pay close attention to the units in our actual objects and scale drawings. As we saw with our two examples, we can scale and then convert our answer *or* we can reason about units for the scale and avoid having to convert at the end. Pick which option works best for you, and know that it might vary from problem to problem. Let's give it a try!

WARM WELCOME

Today we will use different scales, with or without units, to describe the same drawings.

Let's Talk:

1 foot = ____ inches

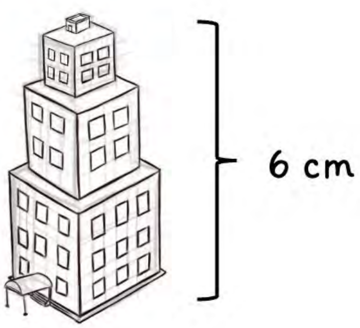
1 yard = ____ feet

1 meter = ____ centimeters

Let's Think:

Find the actual height of the building in <u>meters</u> by finding the height in centimeters first.

SCALE
1 = 700



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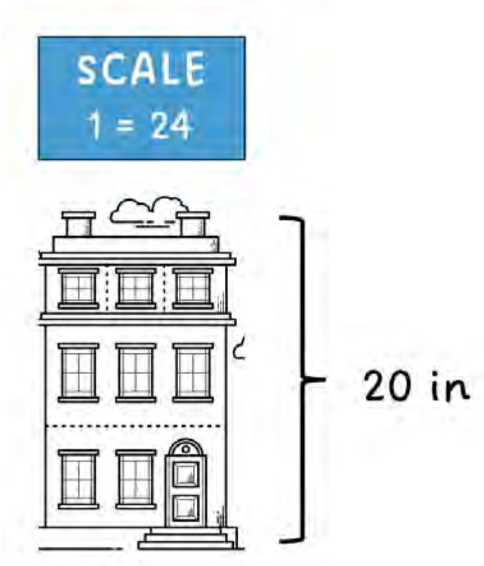
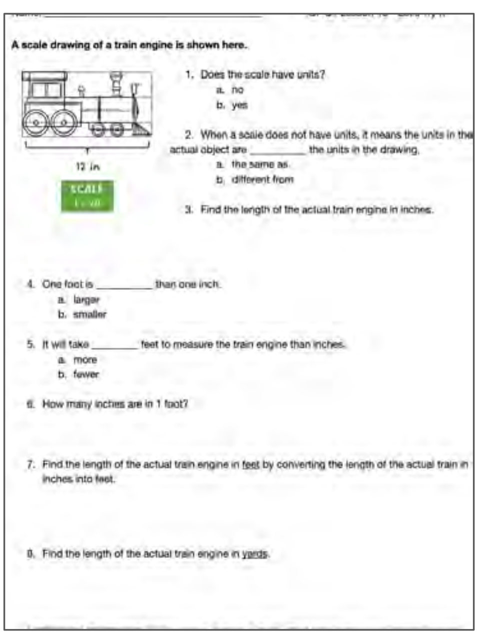
Let's Think:

Find the actual height of the building in <u>feet</u> by converting the scale factor into feet.



Let's Try It:

Let's explore using different scales, with and without units, to describe the same drawings together.



A scale drawing of a train engine is shown here.

12 in

1. Does the scale have units?
   a. no
   b. yes

2. When a scale does not have units, it means the units in the actual object are ________ the units in the drawing.
   a. the same as
   b. different from

3. Find the length of the actual train engine in inches.

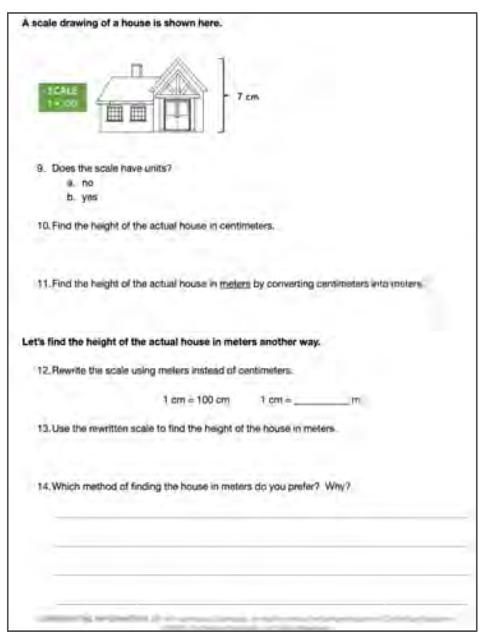
4. One foot is ________ than one inch.
   a. larger
   b. smaller

5. It will take ________ feet to measure the train engine than inches.
   a. more
   b. fewer

6. How many inches are in 1 foot?

7. Find the length of the actual train engine in feet by converting the length of the actual train in inches into feet.

8. Find the length of the actual train engine in yards.



A scale drawing of a house is shown here.

7 cm

9. Does the scale have units?
   a. no
   b. yes

10. Find the height of the actual house in centimeters.

11. Find the height of the actual house in meters by converting centimeters into meters.

Let's find the height of the actual house in meters another way.

12. Rewrite the scale using meters instead of centimeters.

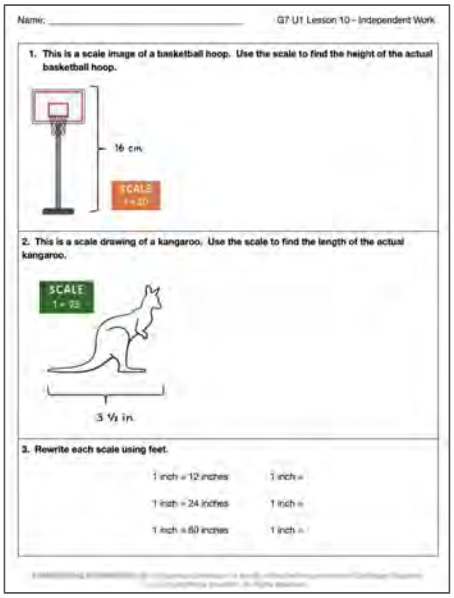
    1 cm = 100 cm   1 cm = ________ m

13. Use the rewritten scale to find the height of the house in meters.

14. Which method of finding the house in meters do you prefer? Why?

On your Own:

Now it's time to use different scales, with or without units, to describe the same drawings on your own.



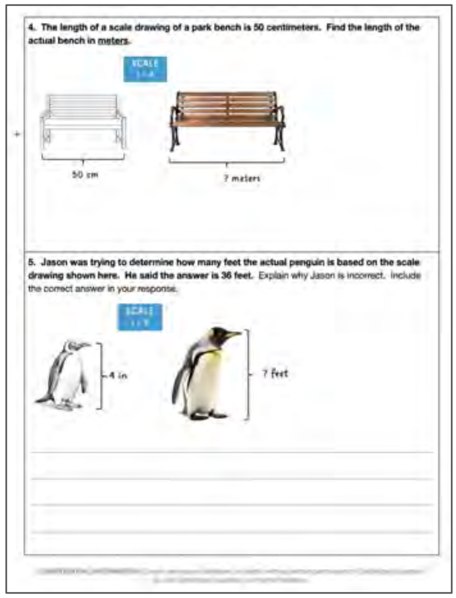
Name: ______________________ G7 U1 Lesson 10 - Independent Work

1. This is a scale image of a basketball hoop. Use the scale to find the height of the actual basketball hoop.

2. This is a scale drawing of a kangaroo. Use the scale to find the length of the actual kangaroo.

3. Rewrite each scale using feet.

1 inch = 12 inches	1 inch =
1 inch = 24 inches	1 inch =
1 inch = 60 inches	1 inch =

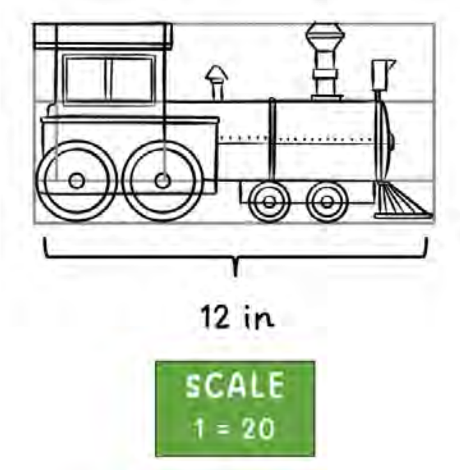


4. The length of a scale drawing of a park bench is 50 centimeters. Find the length of the actual bench in meters.

5. Jason was trying to determine how many feet the actual penguin is based on the scale drawing shown here. He said the answer is 36 feet. Explain why Jason is incorrect. Include the correct answer in your response.

Name: ____ G7 U1 Lesson 10 - Let's Try It

A scale drawing of a train engine is shown here.



1. Does the scale have units?
    a. no
    b. yes

2. When a scale does not have units, it means the units in the actual object are __________ the units in the drawing.
    a. the same as
    b. different from

3. Find the length of the actual train engine in inches.

4. One foot is __________ than one inch.
    a. larger
    b. smaller

5. It will take ________ feet to measure the train engine than inches.
    a. more
    b. fewer

6. How many inches are in 1 foot?

7. Find the length of the actual train engine in <u>feet</u> by converting the length of the actual train in inches into feet.

8. Find the length of the actual train engine in <u>yards</u>.

A scale drawing of a house is shown here.

9. Does the scale have units?
    a. no
    b. yes

10. Find the height of the actual house in centimeters.

11. Find the height of the actual house in <u>meters</u> by converting centimeters into meters.

Let's find the height of the actual house in meters another way.

12. Rewrite the scale using meters instead of centimeters.

1 cm = 100 cm   1 cm = __________ m

13. Use the rewritten scale to find the height of the house in meters.

14. Which method of finding the house in meters do you prefer? Why?

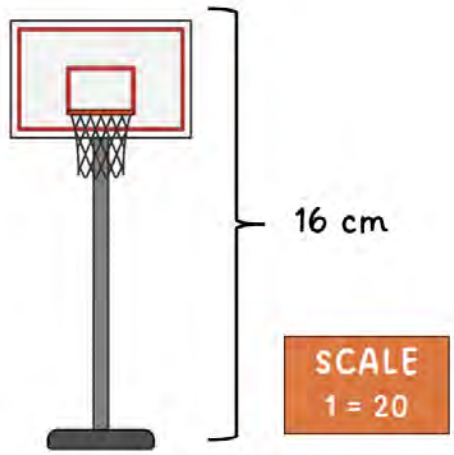
____

____

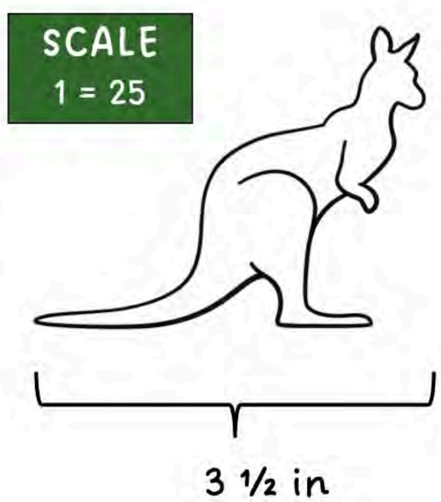
____

____

1. This is a scale image of a basketball hoop. Use the scale to find the height of the actual basketball hoop.



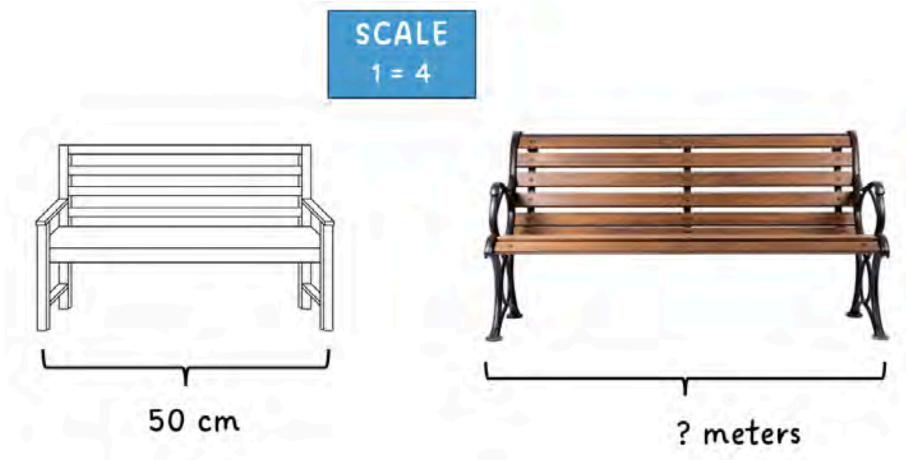
2. This is a scale drawing of a kangaroo. Use the scale to find the length of the actual kangaroo.



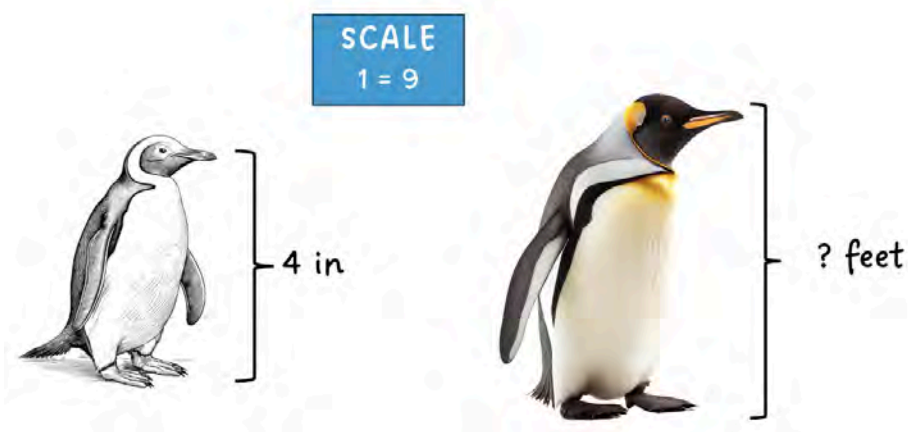
3. Rewrite each scale using feet.

1 inch = 12 inches	1 inch =
1 inch = 24 inches	1 inch =
1 inch = 60 inches	1 inch =

4. The length of a scale drawing of a park bench is 50 centimeters. Find the length of the actual bench in <u>meters</u>.

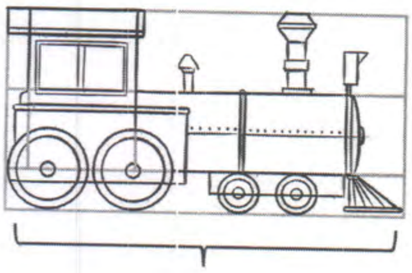


5. Jason was trying to determine how many feet the actual penguin is based on the scale drawing shown here. He said the answer is 36 feet. Explain why Jason is incorrect. Include the correct answer in your response.



Name: KEY

A scale drawing of a train engine is shown here.



12 in

SCALE
1 = 20

1. Does the scale have units?
   a. no
   b. yes

2. When a scale does not have units, it means the units in the actual object are ___________ the units in the drawing.
   a. the same as
   b. different from

3. Find the length of the actual train engine in inches.

   $12 \times 20 = 240$ 240 inches

4. One foot is ___________ than one inch.
   a. larger
   b. smaller

5. It will take __________ feet to measure the train engine than inches.
   a. more
   b. fewer

6. How many inches are in 1 foot?

   12 inches

7. Find the length of the actual train engine in feet by converting the length of the actual train in inches into feet.

   $240 \div 12 = 20$ 20 ft

8. Find the length of the actual train engine in yards.

   $20 \div 3 = \frac{20}{3} = 6\frac{2}{3}$ $6\frac{2}{3}$ yd

A scale drawing of a house is shown here.

9. Does the scale have units?
   a. no
   b. yes

10. Find the height of the actual house in centimeters.

$7 \times 100 = 700\text{ cm}$

11. Find the height of the actual house in <u>meters</u> by converting centimeters into meters.

$700 \div 100 = 7\text{ m}$

Let's find the height of the actual house in meters another way.

12. Rewrite the scale using meters instead of centimeters.

1 cm = 100 cm   1 cm = 1 m

13. Use the rewritten scale to find the height of the house in meters.

cm	m	
1	1	×1
7	?	×1

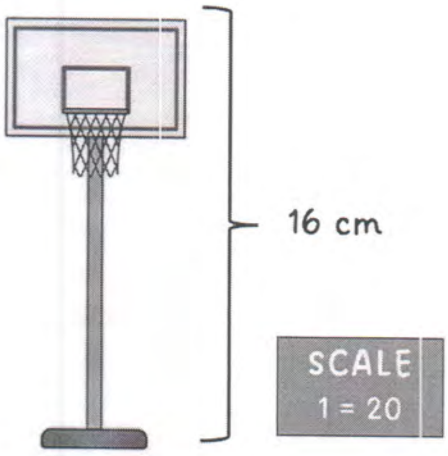
$7 \times 1 = 7$ 7 m

14. Which method of finding the house in meters do you prefer? Why? (answers can vary!)

It depends on the problem. In this example I prefer using the given scale and converting units last.

Name: KEY

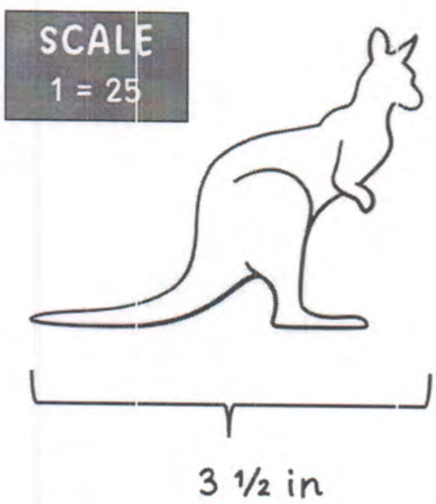
1. This is a scale image of a basketball hoop. Use the scale to find the height of the actual basketball hoop.



$16 \times 20 = ?$

320 cm

2. This is a scale drawing of a kangaroo. Use the scale to find the length of the actual kangaroo.



$3\frac{1}{2} \times 25$

$(25 \times 3) + (25 \times \frac{1}{2})$

$75 + 12\frac{1}{2}$

$87\frac{1}{2}$ in

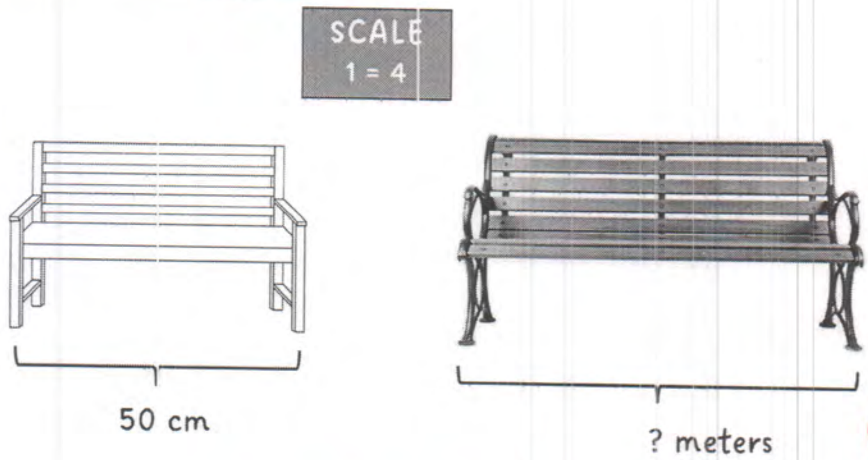
3. Rewrite each scale using feet.

1 inch = 12 inches   1 inch = 1 foot

1 inch = 24 inches   1 inch = 2 feet

1 inch = 60 inches   1 inch = 5 feet

4. The length of a scale drawing of a park bench is 50 centimeters. Find the length of the actual bench in meters.

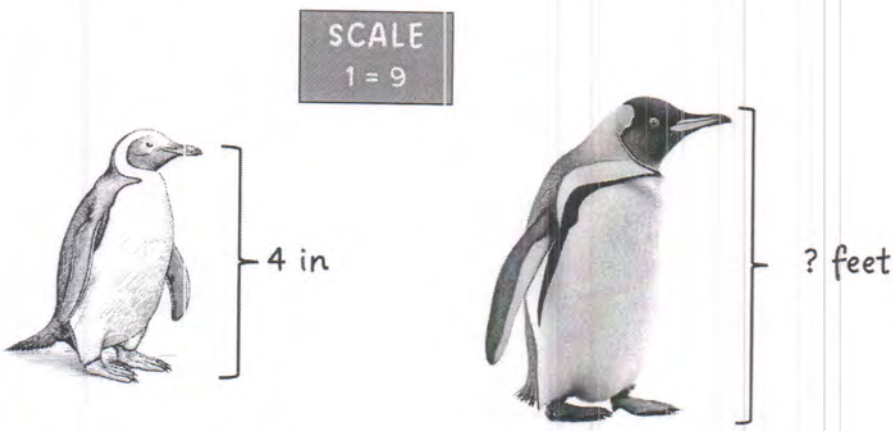


$50 \times 4 = 200$ cm

$200 \div 100 = 2$

2 m

5. Jason was trying to determine how many feet the actual penguin is based on the scale drawing shown here. He said the answer is 36 feet. Explain why Jason is incorrect. Include the correct answer in your response.



Jason did not pay attention to his units. A 36-foot penguin is unrealistic. He can use the 1 = 9 scale to find the penguin's height in inches ($4 \times 9 = 36$ in). Then he can convert inches to feet ($36 \div 12 = 3$). It is 3 feet tall.