CITYTUTOR DC

Eighth Grade Math Lesson Materials

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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;

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G8 Unit 2:

Dilations, Similarity, and Introducing Slope

G8 U2 Lesson 1
Dilate polygons given a scale factor and the origin as the center of dilation.

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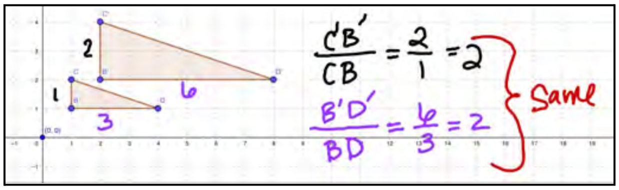
G8 U2 Lesson 1 - Dilate polygons given a scale factor and the origin as the center of dilation.

Warm Welcome (Slide 1): Tutor Choice

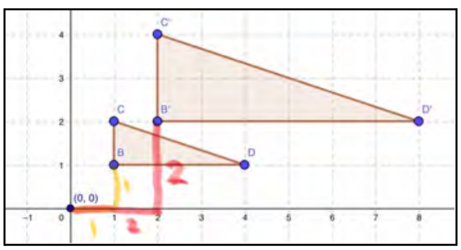
Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will dilate polygons given a scale factor and the origin as the center of dilation. Before that, let's think about 7th grade math. When you were 7th graders, you completed a unit on scale factors. Dilations combine properties of scale factors and some properties of rigid transformations.



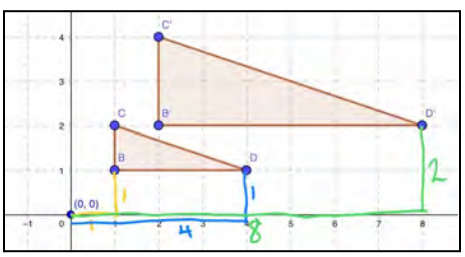
In particular, if an image is a dilation of an original polygon, then all of its side lengths will be proportional to the original polygon by the same factor.

Let's Talk (Slide 4): In addition, the distances from the center of dilation, in this case the origin of the grid (0,0), will be proportional based on the same scale factor. We already verified that the scale factor is 2. If the distance from the origin to point *B* is 1 unit to the right and 1 unit up, what should be the distances from the origin to the image of *B*, *B*'? Possible Students Answers, Key Points:

- The scale factor is 2 so the distances should be doubled in both directions.



You're all correct, since the distances have to use the same scale factor as the side lengths, we can multiply all of the distances from the origin to point *B* by 2 and then check on the grid to see if the distances from the origin to point *B'*, the image of *B*, is double the original. *(Draw and label the distances.)* In this case, the answer is yes.

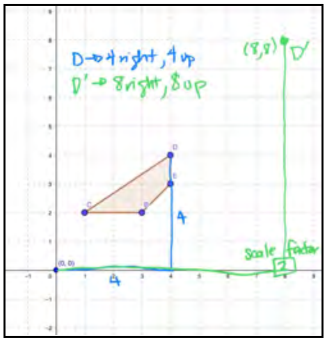


Let's go ahead and verify this for all of the points of the original polygon and image. How far away is D from the origin and then how far must its image, *D*', be from the origin? Possible Students Answers, Key Points:

- *D* is 4 units to the right and 1 unit up.
- *D*' should be 8 units to the right and 2 units up since the scale factor is 2.

You've got it! Trust me that the same is true for *C* and let's work on performing dilations given the center of dilation as the origin and some scale factor.

Let's Think (Slide 5): You may remember from 7th grade that anytime a scale factor is greater than 1, something is increasing in size. However, if the scale factor is less than 1, something is decreasing in size. Think about this in terms of your favorite dessert. If I multiply the size of your dessert by 1, nothing changes. You just get another of the exact same dessert. If I multiply the size of your desert by 2 or 3, your dessert will be double or triple its original size. However, if you take a factor less than 1, let's say ⅓, then you'll only get ⅓ of your original dessert, a small fraction of the dessert. Try to remember this dessert analogy so you can judge the reasonableness of your dilations in the future.



Let's start with a simple polygon *BCDE*. Let's dilate this polygon using a scale factor of 2 and the origin, (0,0), as the center of dilation. The simplest way to do this is to first identify the distance from the origin to each point on the original polygon. *(outline the number of units it takes to go right to D and up to D.)* Point *D* is 4 units to the right and 4 units up from the origin. Now that we have that, we'll use the scale factor of 2 and multiply both distances by 2 to get the image *D'* after a dilation by a scale factor of 2. *(Draw the distances that show double the original distances. Mark and label D' on the grid.) D*' will go to (8,8) because that is 8 units to the right and 8 units up.

Now, let's apply the same methods to plot the remaining points. Next, we'll find the image of *E*. Since *E* is 4 units to the right of the origin and 3 units up from the origin, using a scale factor of 2, *E*' should be double those distances. That is, *E*' will be 8 units to the right and 6 units up. It's new coordinates will be (8,6).

Point *B* is 3 units to the right of the origin and 2 units up. So its image, *B'*, will be double those distances: 6 units to the right and 4 units up. The new coordinates will be (6, 4).

Finally, point *C* is 1 unit to the right and 2 units up from the origin. Its image, *C*', will be double those distances because of the scale factor of 2. *C*' will be 2 units right and 4 units up from the original and have coordinates of (2,4).

The final image of the polygon is *B'C'D'E'*, a dilation with a center at the origin and a scale factor of 2.

Let's Try it (Slides 7-8): Let's work on dilating polygons given a scale factor and the center at the origin. We will work on this together. Remember, a dilation with a scale factor greater than 1 gets bigger and a dilation with a scale factor less than 1 gets smaller. All of the distances and side lengths should be proportional to each other by the same scale factor.

WARM WELCOME

Dilate polygons given a scale factor and the origin as the center of dilation.

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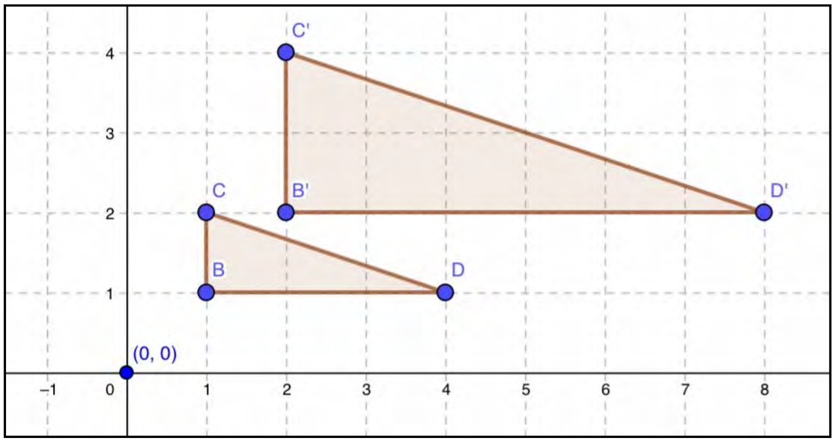
Let's Review:

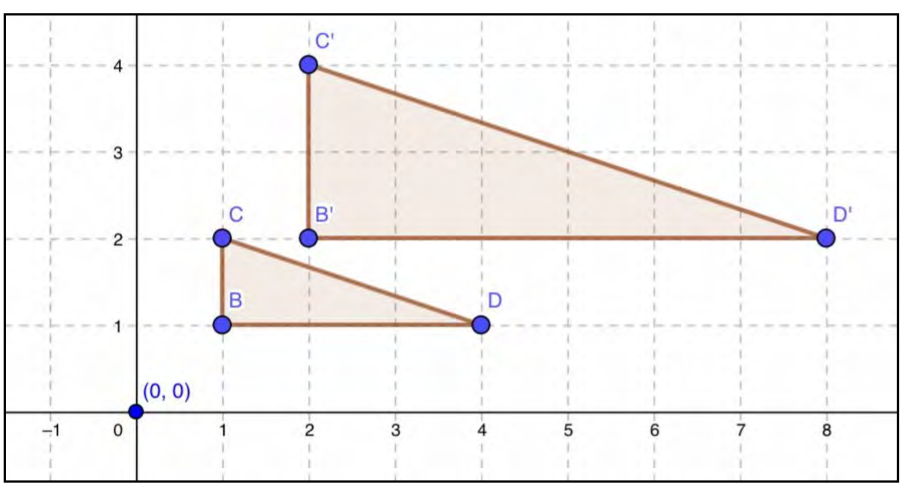
If an image is a dilation of an original polygon, all of its side lengths will be proportional to the original polygon by the same factor.



Let's Talk:

How do you dilate polygons given a scale factor and the center at the origin?

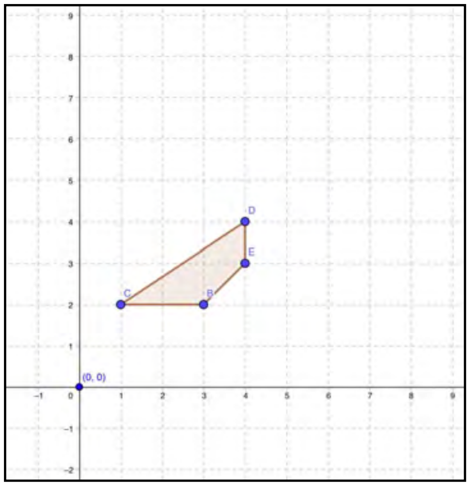
Verify that the distances from the origin to the vertices of the original polygon are proportional to the vertices of the image by 2.



Let’s Think:

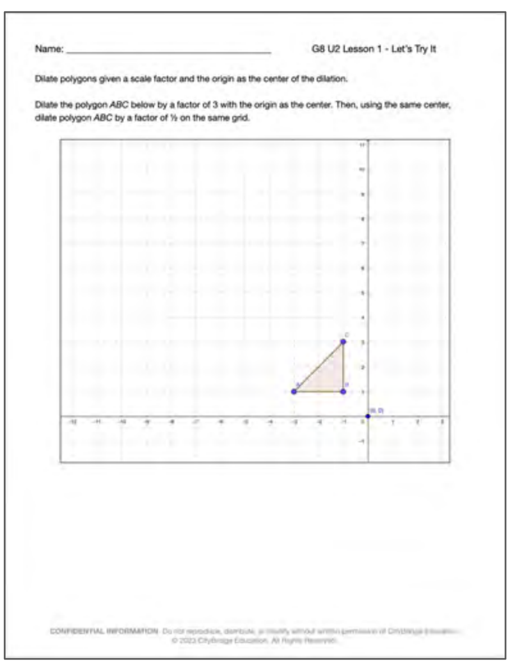
How do you dilate polygons given a scale factor and the center at the origin?

Perform a dilation with a scale factor of 2 and the center of dilation as the origin.



Let’s Try It:

Let’s practice dilating polygons given a scale factor and the center at the origin.



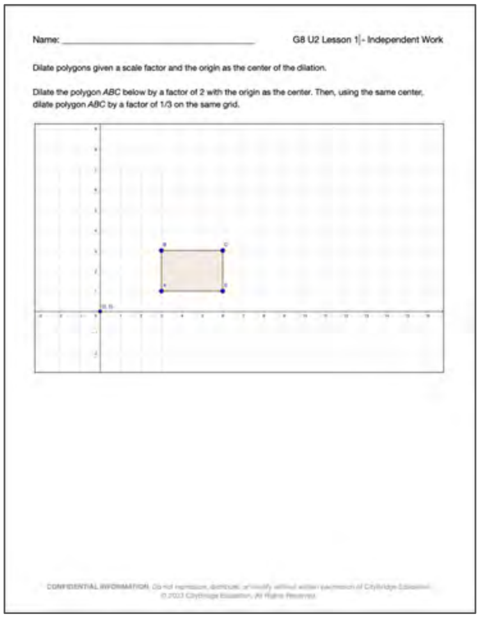
Name: ______________________ G8 U2 Lesson 1 - Let’s Try It

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 3 with the origin as the center. Then, using the same center, dilate polygon *ABC* by a factor of ½ on the same grid.

On your Own:

Now it’s time to dilate polygons given a scale factor and the center at the origin on your own.


Name: ______________________________ G8 U2 Lesson 1 - Independent Work

Dilate polygons given a scale factor and the origin as the center of the dilation.

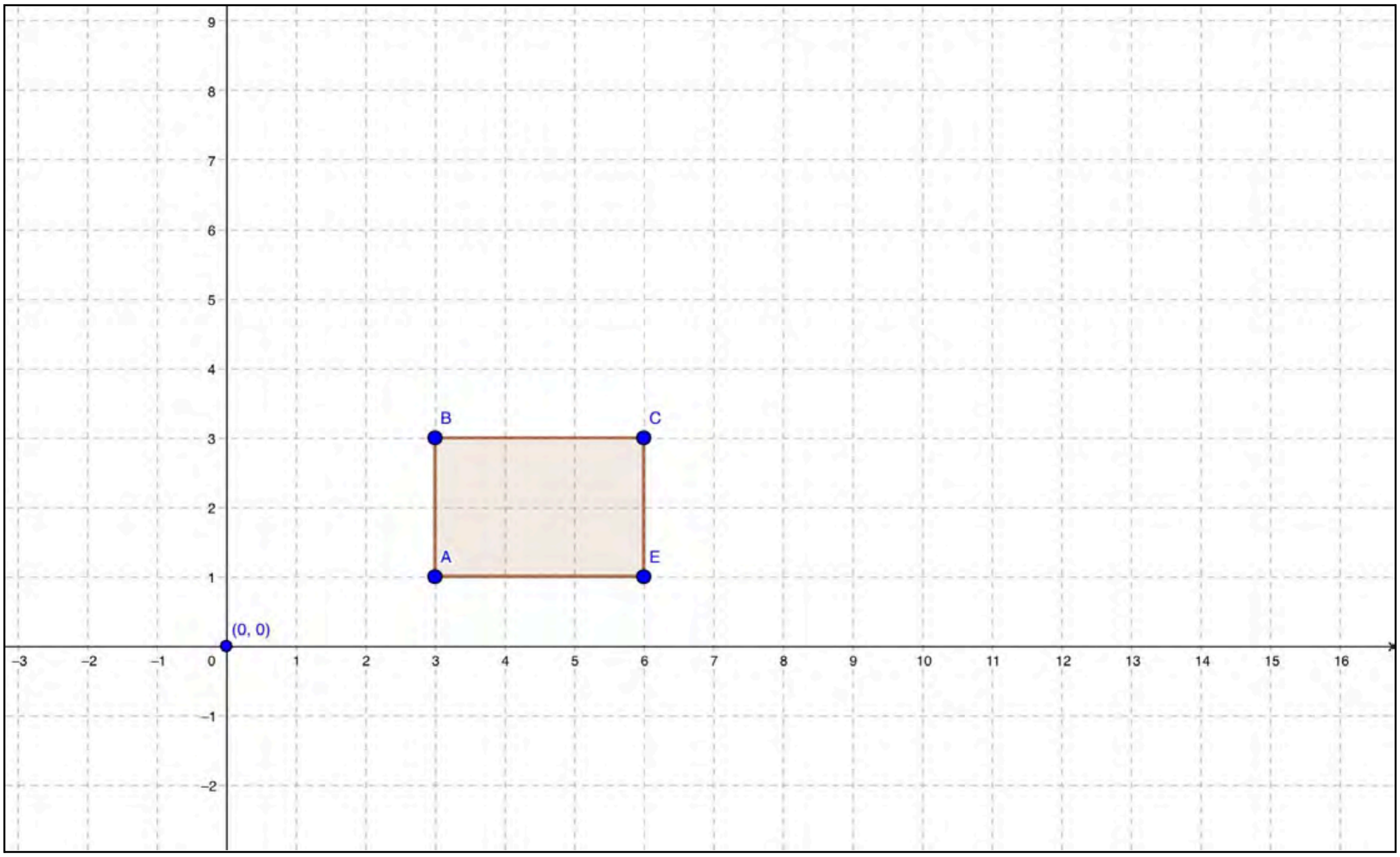
Dilate the polygon *ABC* below by a factor of 2 with the origin as the center. Then, using the same center, dilate polygon *ABC* by a factor of 1/3 on the same grid.

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 3 and a center of dilation at the origin. Then, using the same center, dilate polygon *ABC* by a factor of ½ on the same grid.

Dilate polygons given a scale factor and the origin as the center of the dilation.

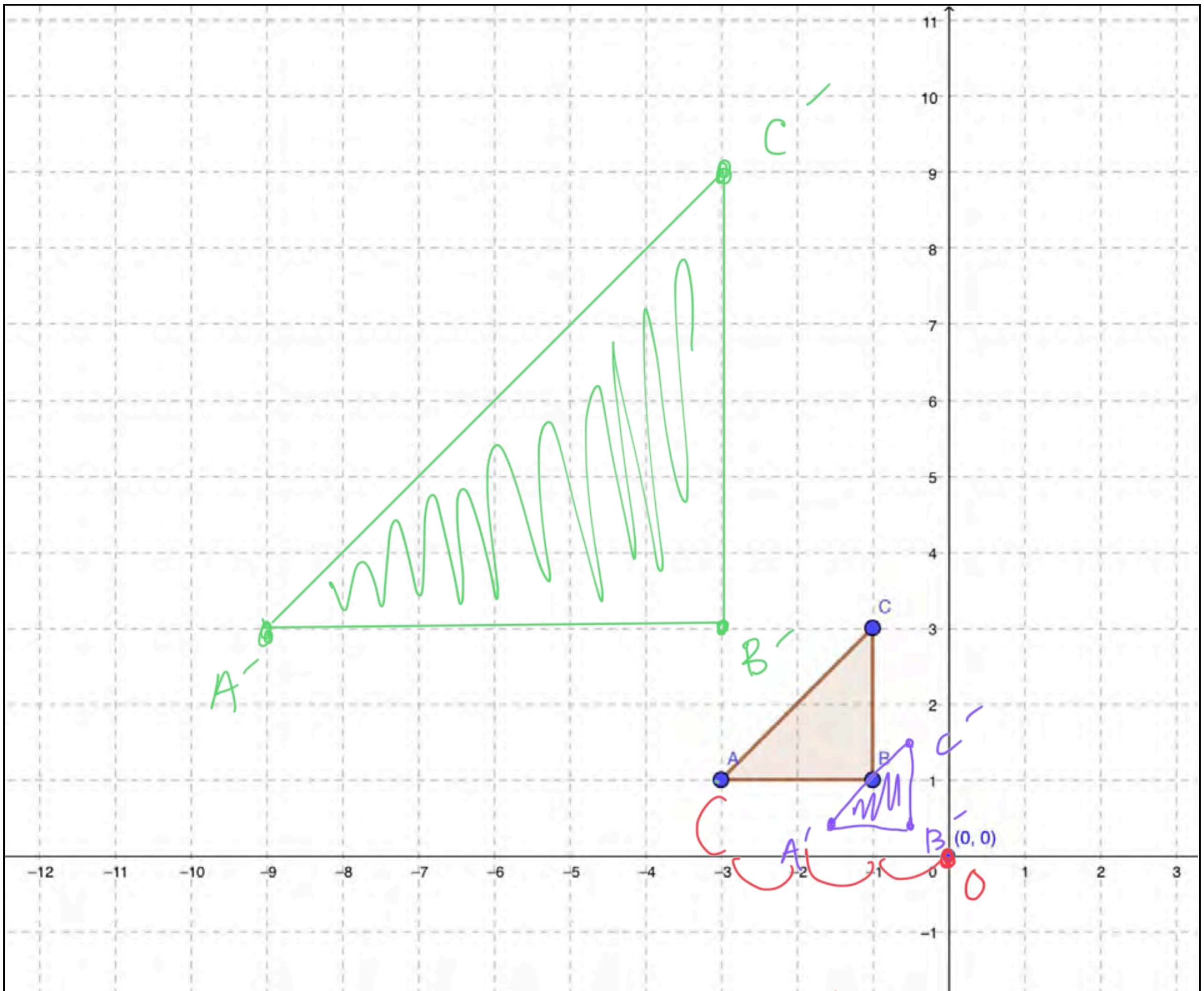
Dilate the polygon *ABCE* below by a factor of 2 and a center of dilation at the origin. Then, using the same center, dilate polygon *ABCE* by a factor of 1/3 on the same grid.



Name: Answer Key

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 3 and a center of dilation at the origin. Then, using the same center, dilate polygon *ABC* by a factor of ½ on the same grid.

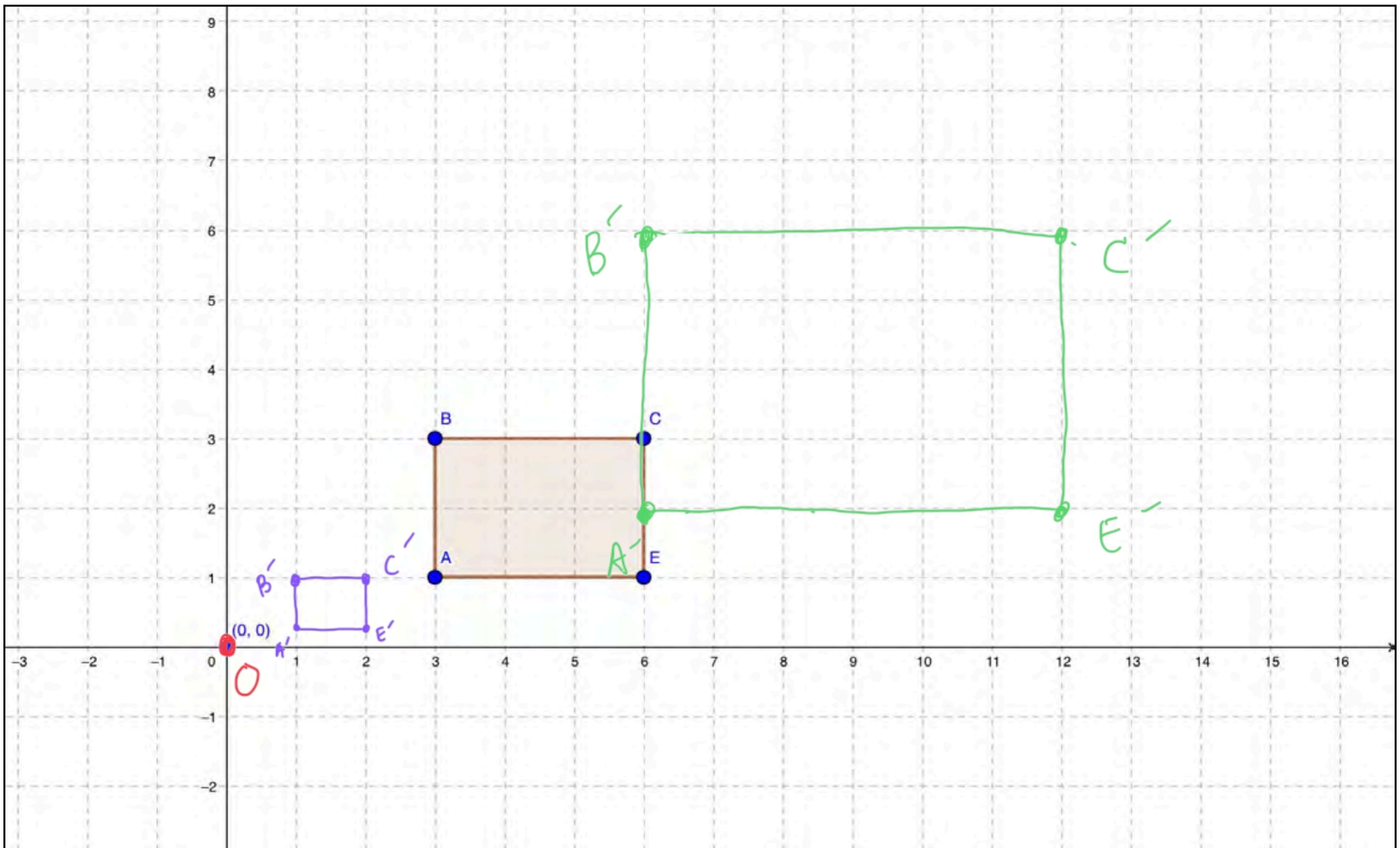


			× 3		× ½
A	3←, 1↑	A'	9←, 3↑	A''	1.5←, .5↑
B	1←, 1↑	B'	3←, 3↑	B''	.5←, .5↑
C	1←, 3↑	C'	3←, 9↑	C''	.5←, 1.5↑

Name: Answer Key

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABCE* below by a factor of 2 and a center of dilation at the origin. Then, using the same center, dilate polygon *ABCE* by a factor of 1/3 on the same grid.



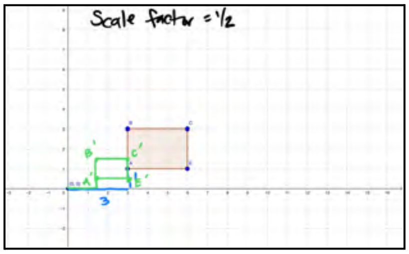
			×2		× 1/3
A	3→, 1↑	A'	6→, 2↑	A'	1→, 1/3↑
B	3→, 3↑	B'	6→, 6↑	B'	1→, 1↑
C	6→, 3↑	C'	12→, 6↑	C'	2→, 1↑
E	6→, 1↑	E'	12→, 2↑	E'	2→, 1/3↑

G8 U2 Lesson 2
Perform dilations given a scale factor and center of dilation that is not the origin.

G8 U2 Lesson 2 - Perform dilations given a scale factor and center of dilation that is not the origin.

Warm Welcome (Slide 1): Tutor Choice

Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will perform dilations given a scale factor and center of dilation that is not the origin. First, let's recall what we know about dilations. Dilations either increase the size of something or decrease the size. If the scale factor is greater than 1, a dilation will increase the size of a figure. If the scale factor is less than 1, a dilation will shrink the size of a figure.

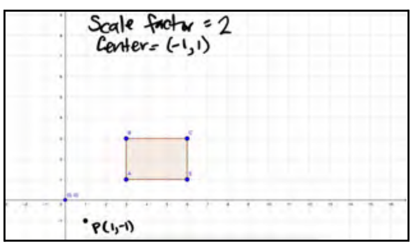


Let's take polygon *ABCE* that was dilated by a scale factor of ½ with a center at the origin. Since ½ is less than one, we knew the dilation would be smaller than the original polygon. We also knew that all of the distances from the center of dilation would be ½ of the original distances.

Let's Talk (Slide 4): Now, what will happen if we dilate a polygon by a scale factor with a center of dilation that is not the origin? Possible Students Answers, Key Points:

- The distances should still remain proportional from the center of dilation to the vertices of the original poly and from the center of dilation to the vertices of the image.

That's right, the rules are the same. So let's get right to it. We will dilate the same polygon, *ABCE*, but this time we'll use a scale factor of 2 and a center at P(1, -1).



First, we'll plot the center of dilation on the grid and call it point *P*. It's also important that we write down the given information so we don't get lost in the process. We are doubling this polygon so everything except for the angles will double.

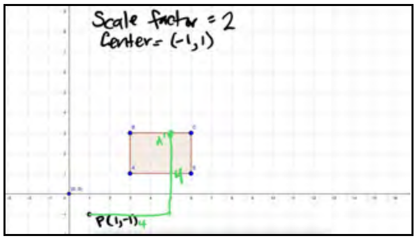
Now, let's find the distances from the center of dilation to each vertex of the original polygon. We'll use a table to help us keep track. Since our scale factor is 2, what does that tell us about the distances from the center of dilation to the image created? Possible Students Answers, Key Points:

- The distances should still remain proportional from the center of dilation to the vertices of the original polygon and from the center of dilation to the vertices of the image.

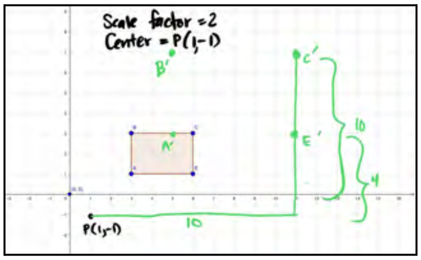
original	Distance from *P*, the center of dilation	Image	Image after a scale factor of 2: distance from *P*, the center of dilation
A	2 units right 2 units up	A'	4 units right 4 units up
B	2 units right 4 units up	B'	4 units right 8 units up
C	5 units right 4 units up	C'	10 units right 8 units up
E	5 units right 2 units up	E'	10 units right 4 units up

Let's use the table to fill in the distances. *(Walk the students through each cell of the table, first identifying the distances of the original vertices and then walking them through each one reminding them to multiply by the scale factor to get the distances from the center to the image.)*

Let's Think (Slide 5): Now, let's use the information in the table to graph the dilation of polygon *ABCE*.

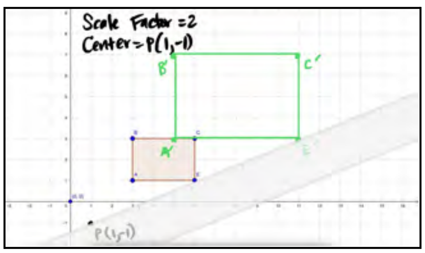


We'll start at the center of dilation and count the number of units in the table for *A'*. *(Show this on the grid and label A'.)*



Next, we'll do the same thing for the other three vertices.
Finally, we'll connect all of the image vertices to create the image, polygon *A'B'C'E'*. *(Draw the new vertices and show at least one set of legs where you count on the grid to mark the new vertex. Label the vertices.)*

You can use a ruler to check your dilations. If the rule forms a straight line through the center of dilation, the original vertex and its corresponding vertex on the image, then you have performed a successful dilation.



Let's try this with *E* and *E'*. *(Have the students use any version of a straight edge - index cards, post it notes, etc. Choose a different student to verify the straight line rule and share with their peers.)* Success! We have successfully performed a dilation with a center not at the origin.

Let's Try it (Slides 7-8): Let's work on dilating polygons given a scale factor and the center not at the origin. We will work on this together. Remember, a dilation with a scale factor greater than 1 gets bigger and a dilation with a scale factor less than 1 gets smaller. All of the distances and side lengths should be proportional to each other by the same scale factor.

WARM WELCOME

Perform dilations given a scale factor and a center of dilation that is not the origin.

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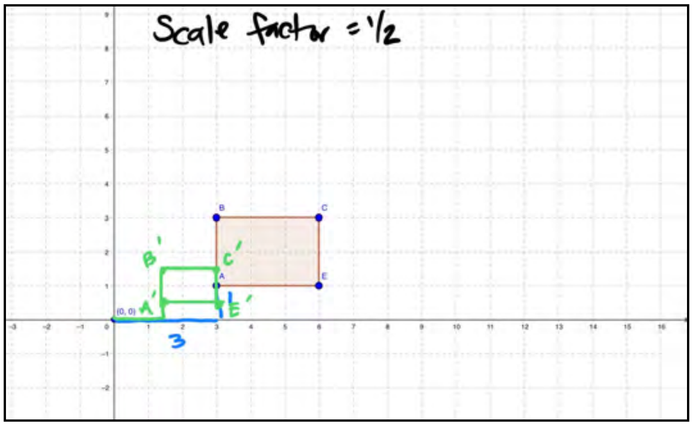
Let's Review:

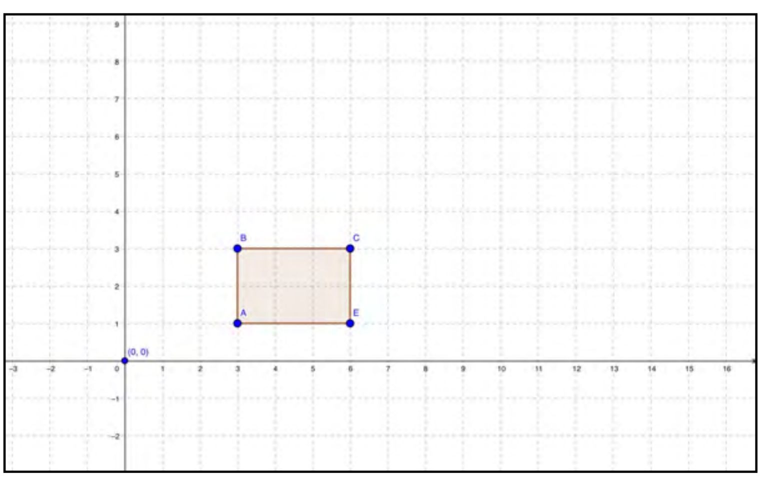
If the scale factor of a dilation is greater than 1, the polygon will increase in size. If the scale factor is less than 1, the polygon will shrink.



Let's Talk:

How do you dilate polygons given a scale factor and the center not at the origin?

Perform a dilation with a scale factor of 2 and the center of dilation at *P*(1, -1).



original	Distance from *P*, the center of dilation	Image	Image after a scale factor of 2: distance from *P*, the center of dilation
A		A'	
B		B'	
C		C'	
E		E'	

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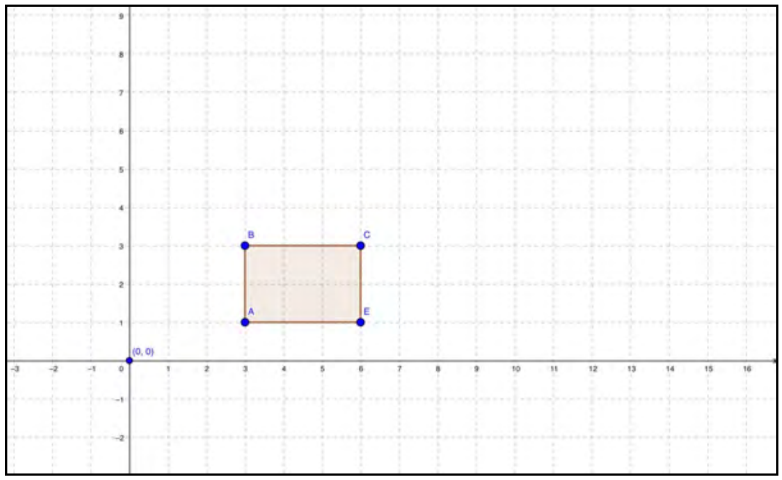
Let's Think:

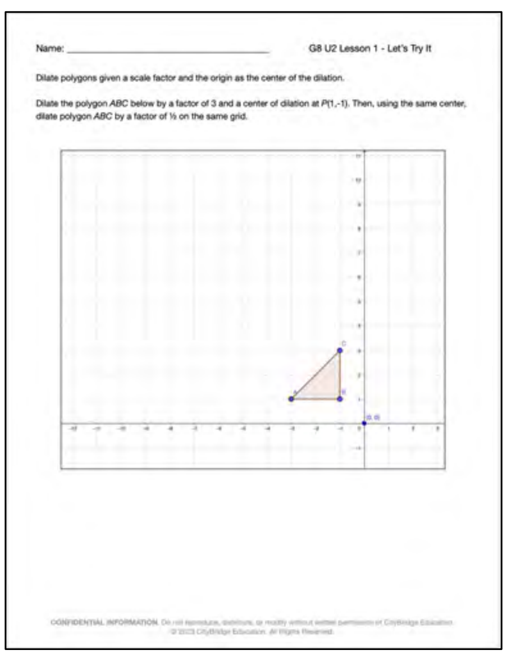
How do you dilate polygons given a scale factor and the center not at the origin?

Perform a dilation with a scale factor of 2 and the center of dilation at *P*(1, -1).



Let's Try It:

Let's practice dilating polygons given a scale factor and the center not at the origin.



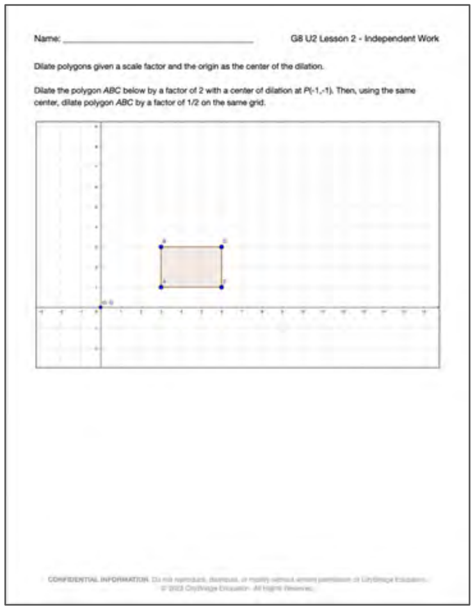
Name: ______________________ G8 U2 Lesson 1 - Let's Try It

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 3 and a center of dilation at *P*(1,-1). Then, using the same center, dilate polygon *ABC* by a factor of ½ on the same grid.

On your Own:

Now it’s time to dilate polygons given a scale factor and the center not at the origin on your own.



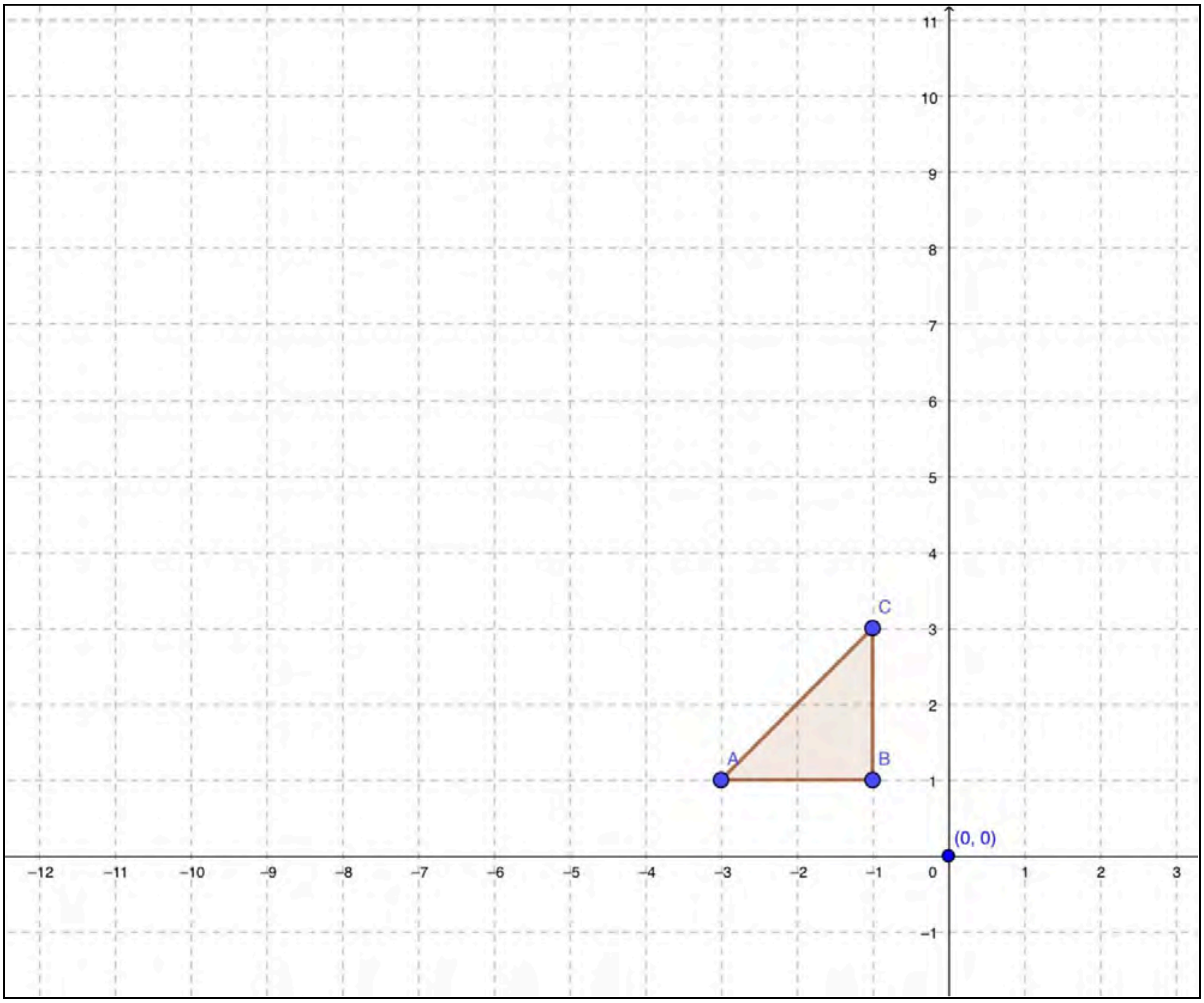
Name: ______________________ G8 U2 Lesson 2 - Independent Work

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 2 with a center of dilation at *P*(-1,-1). Then, using the same center, dilate polygon *ABC* by a factor of 1/2 on the same grid.

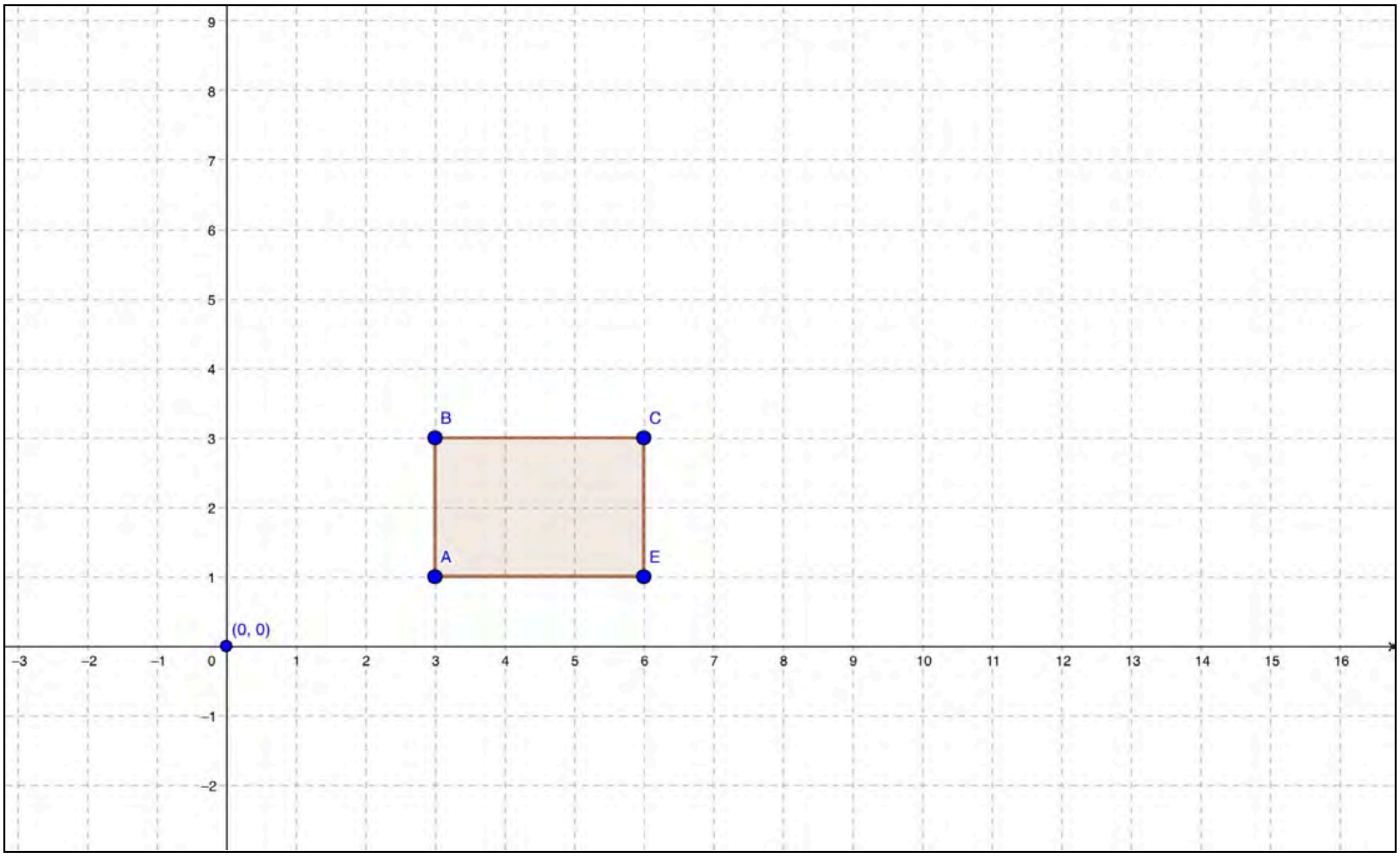
Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 3 and a center of dilation at *P*(1,-1). Then, using the same center, dilate polygon *ABC* by a factor of ½ on the same grid.



Dilate polygons given a scale factor and the origin as the center of the dilation.

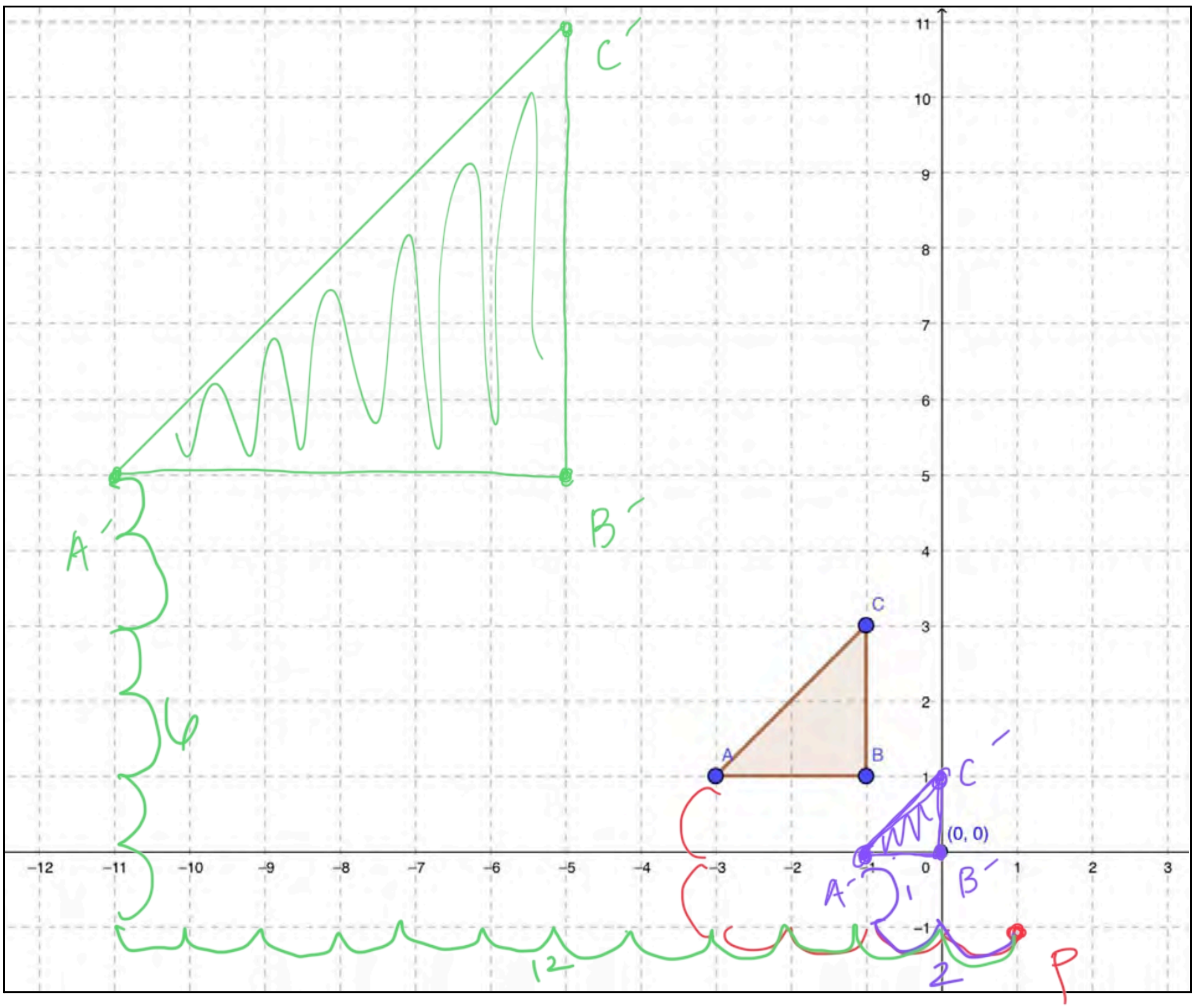
Dilate the polygon *ABC* below by a factor of 2 with a center of dilation at *P*(-1,-1). Then, using the same center, dilate polygon *ABC* by a factor of 1/2 on the same grid.



Name: Answer Key

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 3 and a center of dilation at *P*(1,-1). Then, using the same center, dilate polygon *ABC* by a factor of ½ on the same grid.

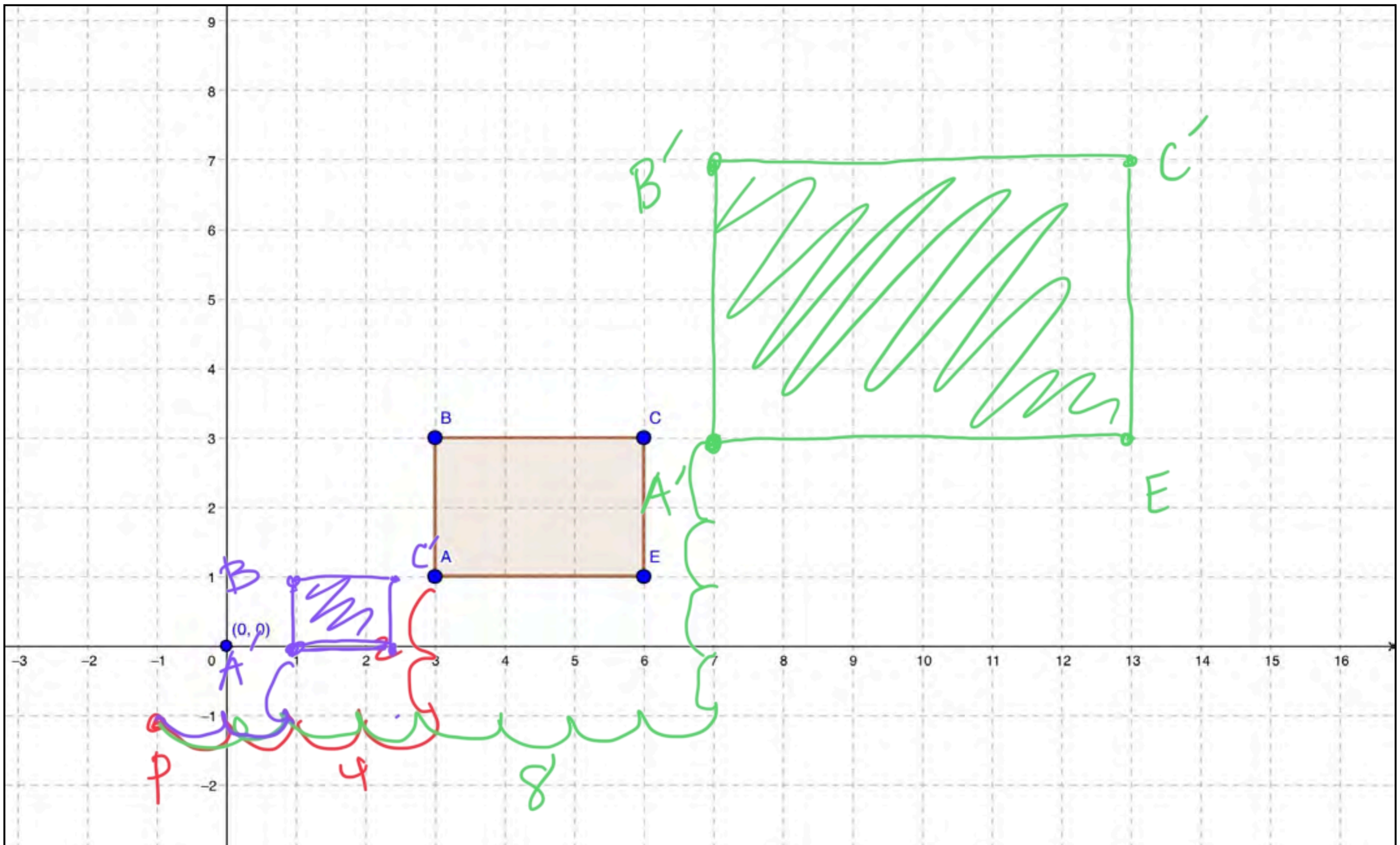


			×3		$\times\frac{1}{2}$
A	4←, 2↑	A'	12←, 6↑	A'	2←, 1↑
B	2←, 2↑	B'	6←, 6↑	B'	1←, 1↑
C	2←, 4↑	C'	6←, 12↑	C'	1←, 2↑

Name: Answer Key

Dilate polygons given a scale factor and the origin as the center of the dilation.

Dilate the polygon *ABC* below by a factor of 2 with a center of dilation at *P*(-1,-1). Then, using the same center, dilate polygon *ABC* by a factor of 1/2 on the same grid.



			x 2		x 1/2
A	4→, 2↑	A'	8→, 4↑	A'	2→, 1↑
B	4→, 4↑	B'	8→, 8↑	B'	2→, 2↑
C	7→, 4↑	C'	14→, 8↑	C'	3.5→, 2↑
E	7→, 2↑	E'	14→, 4↑	E	3.5→, 1↑

G8 U2 Lesson 3
Identify a sequence of transformations that takes one figure on top of another to explain why two figures are similar.

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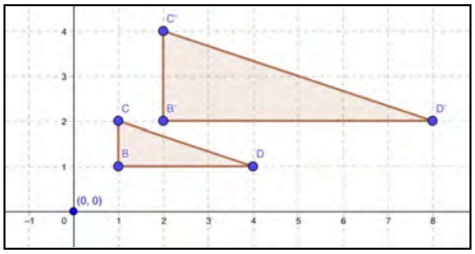
G8 U2 Lesson 3 - Identify a sequence of transformations that takes one figure on top of another to explain why two figures are similar.

Warm Welcome (Slide 1): Tutor Choice

Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will apply a sequence of transformations to a figure to explain why two figures are similar. Similarity is different from congruence. When figures are congruent, all corresponding parts have the same measures. When figures are similar, however, only their angles have to be the same.



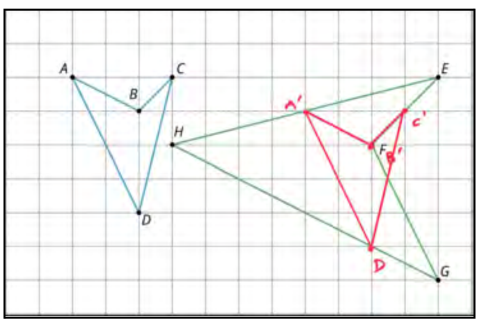
For example, triangle *B'C'D'* is the image of triangle *BCD* after a dilation with a scale factor of 2. The side lengths are proportional, though not the same. So these figures are not congruent. However, if I apply a dilation using a scale factor of ½ to triangle *B'C'D'*, it will lie directly on top of triangle *BCD*. This means that the figures are similar.

Let's explore this some more by considering a sequence of transformations.

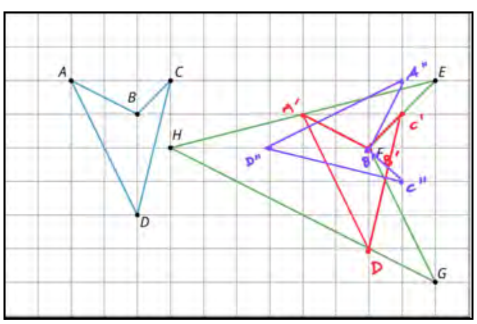
Let's Talk (Slide 4): Quadrilateral *ABCD* and quadrilateral *EFGH* are similar. What sequence of transformations could we use to show this? Possible Students Answers, Key Points:

- There are multiple possible sequences. Use the one below to demonstrate.

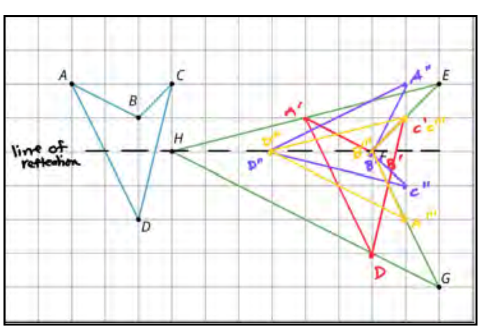
Let's Think (Slide 5): There are multiple sequences we can use. Let's try this one.



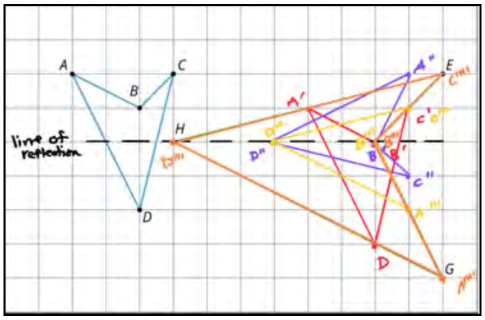
First, we'll translate all vertices 7 units right and then 1 unit down so that the image of *B* lands on top of the *F*.



Next, let's rotate *A'B'C'D'* 90 degrees around point *F*.



Then, we'll draw a line of reflection through points *H* and *F* to reflect *A''B''C''D''over that line.*



Finally, we'll dilate *A'''B'''C'''D'''* using *F* as the center with a scale factor of 2.

We've just proved that quadrilateral *ABCD* and quadrilateral *EFGH* are similar because we verified a sequence of transformations that takes one figure onto the other one.

Let's Try it (Slides 7-8): Let's work on identifying a sequence of transformations that takes one figure on top of the other to verify that the figures are similar. Remember, figures are similar if you can map one figure onto the other using a sequence of translations, reflections, dilations and/or rotations. Figures are congruent if there is no change in size.

WARM WELCOME

Identify a sequence of transformations that takes on figure on top of another to explain why two figures are similar.

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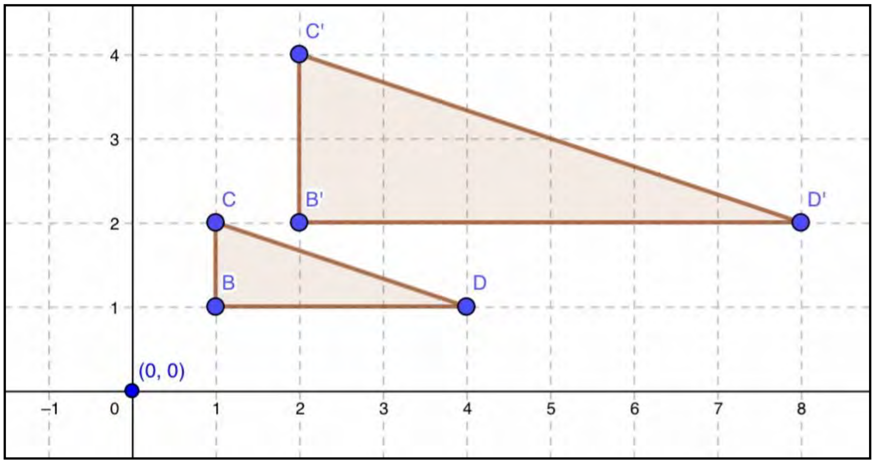
Let's Review:

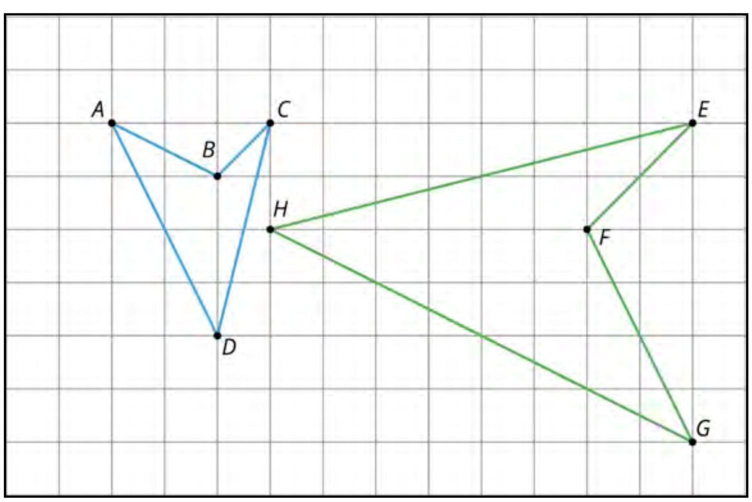
When figures are similar, only their angles have to be the same.



Let's Talk:

How can a sequence of transformations help us to identify similar figures?

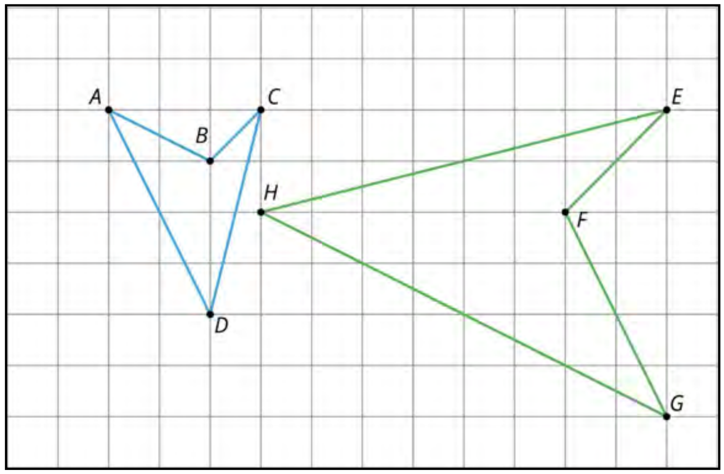
Quadrilateral *ABCD* and quadrilateral *EFGH* are similar. What sequence of transformations could we use to show this?



Let's Think:

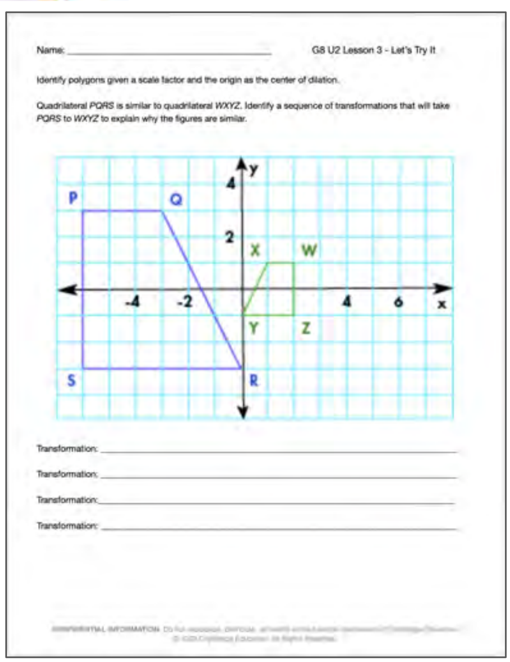
How do you dilate polygons given a scale factor and the center not at the origin?

Apply a sequence of transformations to quadrilateral *ABCD* to show that it is similar to quadrilateral *EFGH.*



Let's Try It:

Let's practice dilating polygons given a scale factor and the center not at the origin.



Name: ______________________ G8 U2 Lesson 3 - Let's Try It

Identify polygons given a scale factor and the origin as the center of dilation.

Quadrilateral *PQRS* is similar to quadrilateral *WXYZ*. Identify a sequence of transformations that will take *PQRS* to *WXYZ* to explain why the figures are similar.

Transformation: ______________________

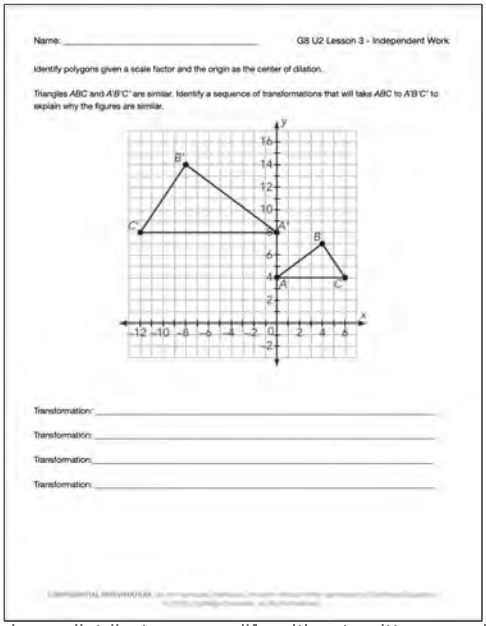
Transformation: ______________________

Transformation: ______________________

Transformation: ______________________

On your Own:

Now it's time to dilate polygons given a scale factor and the center not at the origin on your own.



Name: ______________________________ G8 U2 Lesson 3 - Independent Work

Identify polygons given a scale factor and the origin as the center of dilation.

Triangles *ABC* and *A'B'C'* are similar. Identify a sequence of transformations that will take *ABC* to *A'B'C'* to explain why the figures are similar.

Transformation: ______________________________

Transformation: ______________________________

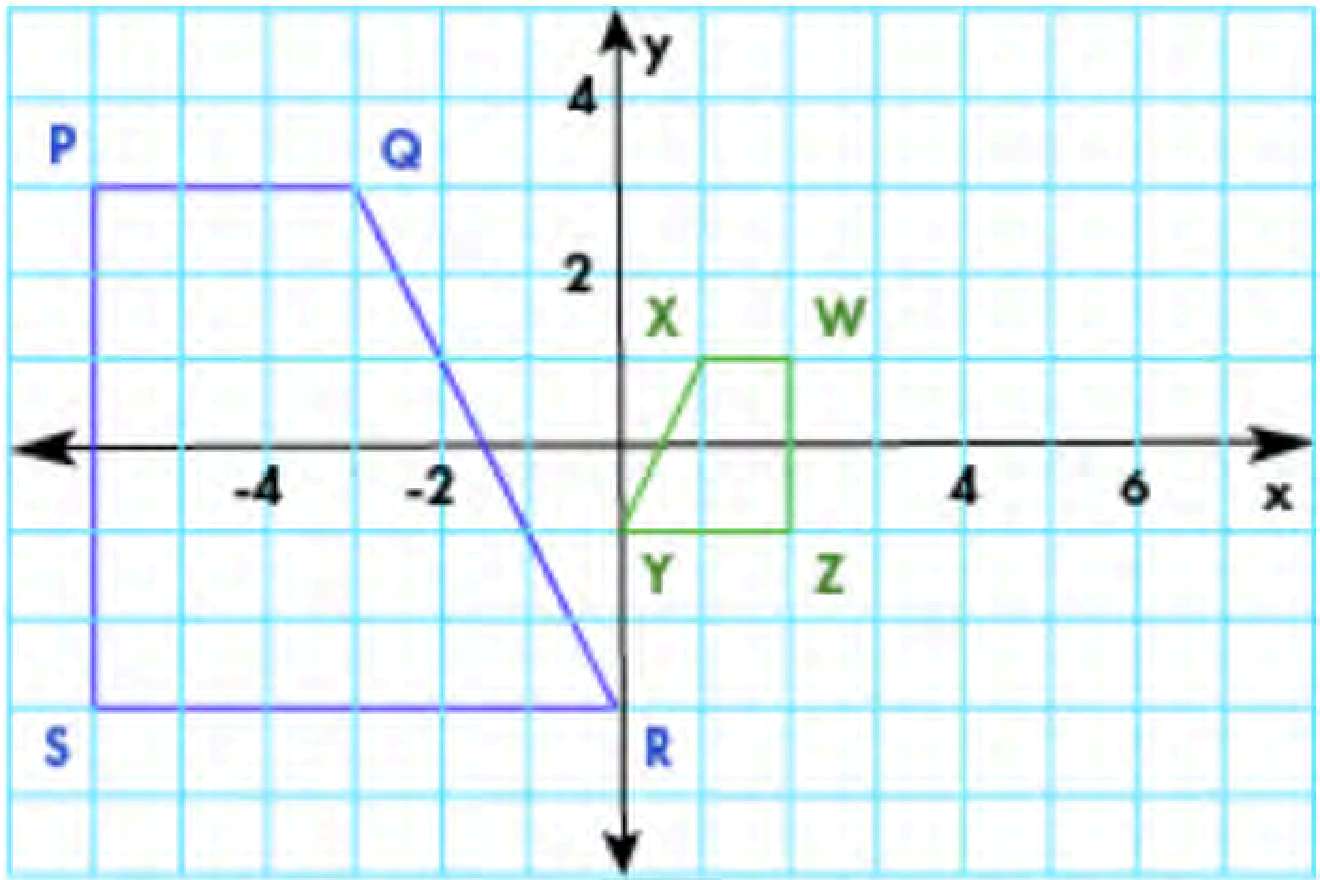
Transformation: ______________________________

Transformation: ______________________________

Name: ___________________________________ G8 U2 Lesson 3 - Let's Try It

Identify a sequence of transformations that takes one figure on top of another to explain why two figures are similar.

Quadrilateral *PQRS* is similar to quadrilateral *WXYZ*. Identify a sequence of transformations that will take *PQRS* to *WXYZ* to explain why the figures are similar.



Transformation: ___________________________________

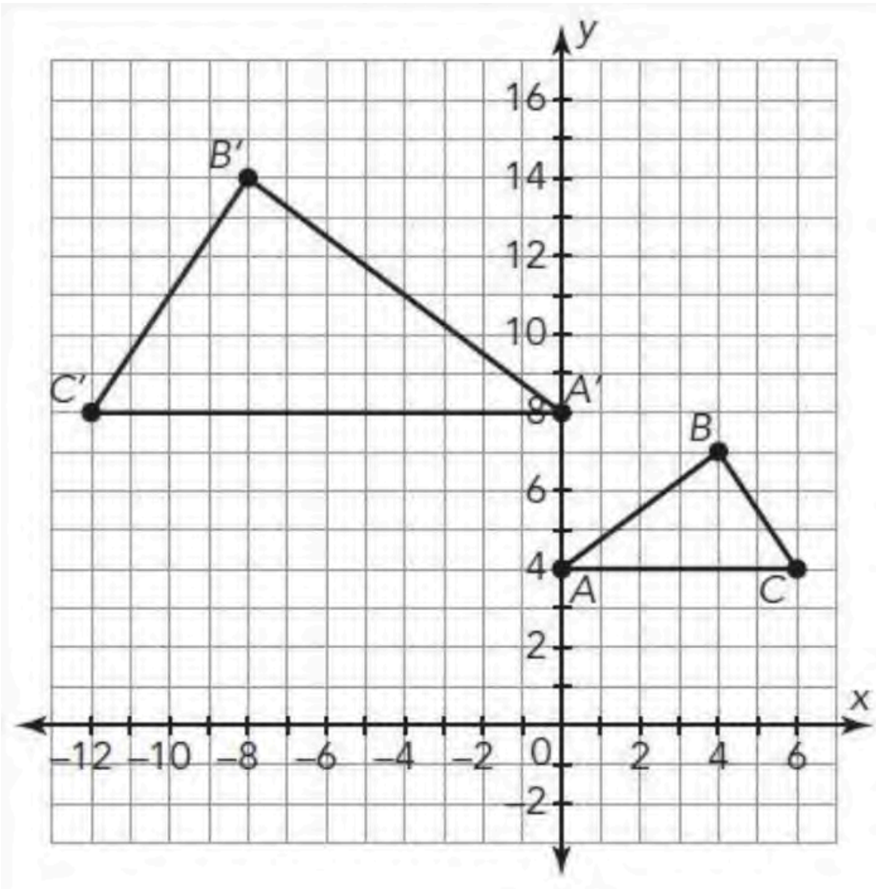
Transformation: ___________________________________

Transformation:___________________________________

Transformation: ___________________________________

Identify a sequence of transformations that takes one figure on top of another to explain why two figures are similar.

Triangles *ABC* and *A'B'C'* are similar. Identify a sequence of transformations that will take *ABC* to *A'B'C'* to explain why the figures are similar.



Transformation: ____

Transformation: ____

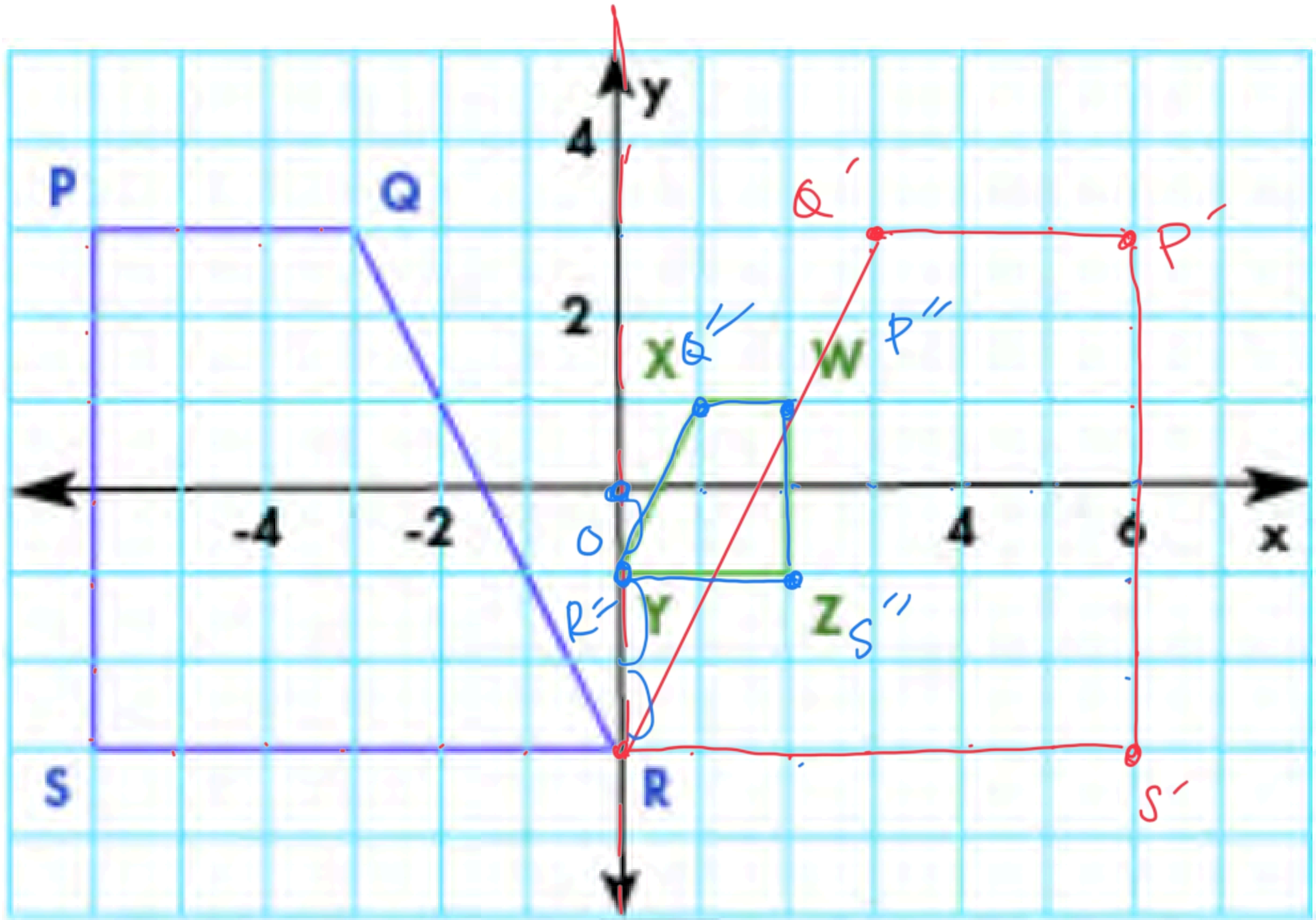
Transformation: ____

Transformation: ____

Name: Answer Key

Identify a sequence of transformations that takes one figure on top of another to explain why two figures are similar.

Quadrilateral *PQRS* is similar to quadrilateral *WXYZ*. Identify a sequence of transformations that will take *PQRS* to *WXYZ* to explain why the figures are similar.



Transformation: reflection over the y-axis

Transformation: dilation, scale factor $\frac{1}{3}$, center: origin

Transformation: ____________

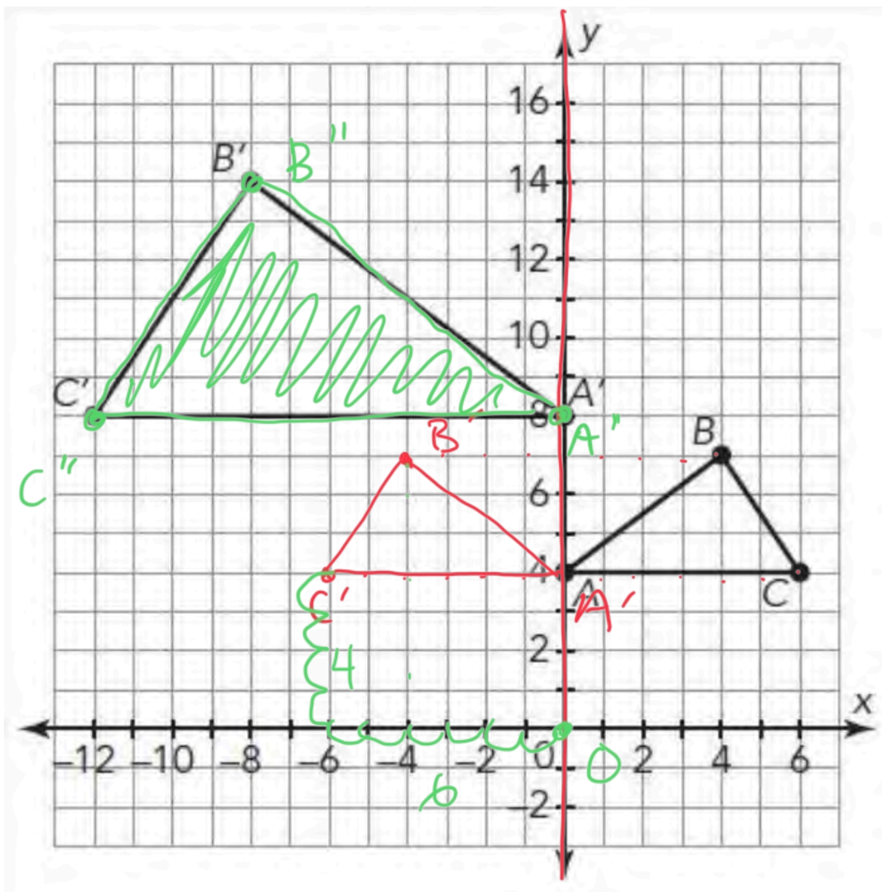
Transformation: ____________

		× $\frac{1}{3}$
R'	0, 3↓	0, 1↓
Q'	3↑, 3→	1↑, 1→
S'	6→, 3↓	2→, 1↓
P'	6→, 3↑	2→, 1↑

Name: Answer Key

Identify polygons given a scale factor and the origin as the center of dilation.

Triangles *ABC* and *A'B'C'* are similar. Identify a sequence of transformations that will take *ABC* to *A'B'C'* to explain why the figures are similar.



Transformation: reflection ove y-axis

Transformation: dilation, sale factor 2, center = origin

Transformation:

Transformation:

x2

A'	0, 4↑	A''	0, 8↑
B'	4←, 7↑	B''	8←, 14↑
C'	6←, 4↑	C''	12←, 8↑

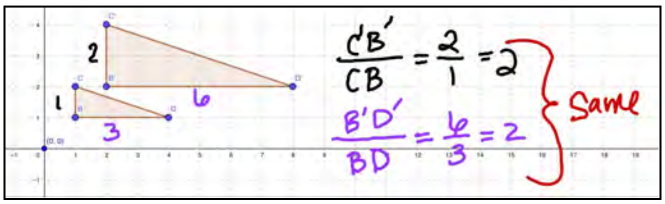
The figures are similar because a sequence of transformations takes one to the other.

G8 U2 Lesson 4
Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

G8 U2 Lesson 4 - Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

Warm Welcome (Slide 1): Tutor Choice

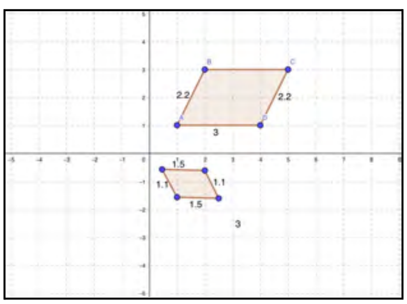
Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will demonstrate our understanding that similar polygons have congruent corresponding angles and proportional side lengths. You might have learned that some shapes can be congruent - that means all of their corresponding angles and sides are equal in measure. Rigid Transformations produce congruent figures. Dilations, however, produce similar shapes. If you remember, when you dilate a shape the corresponding angles are congruent but their side lengths are not. Instead, in similar figures, the corresponding side lengths are proportional to each other while the corresponding angles are congruent. Remember, if two shapes are similar, you can use a sequence of transformations to take one polygon to the other. Figures that are similar but have not undergone a dilation, are also congruent.



In this example of two triangles, notice that the side lengths are proportional by a scale factor of 2. The polygons are not the same size but we know from a previous lesson that these triangles are dilations of each other which means we can use what we know about rigid transformations to confirm that the shapes are similar.

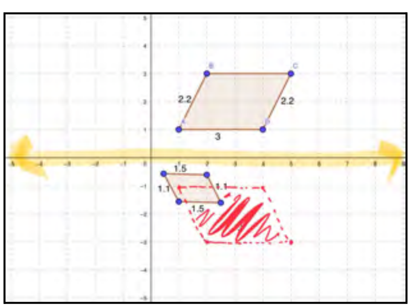
Let's Talk (Slide 4): Let's look at two more polygons that are similar. Based on what you see, how could you verify that these polygons are similar? Possible Students Answers, Key Points:

- We need to determine if one was created from the other by a sequence of transformations.



That's right! We don't need to draw this out but we can start to consider if there is a sequence of rigid transformations and/or dilations that will take one shape onto the other. What do you think may have happened? Possible Students Answers, Key Points:

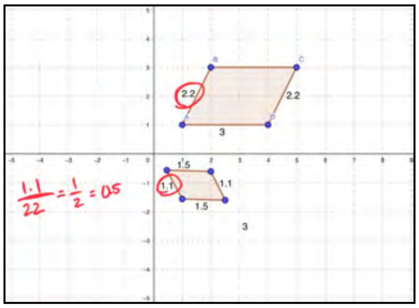
- A reflection over the *x*-axis.
- A dilation by a scale factor of 2.



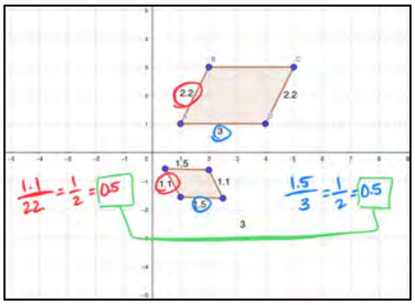
That's right. We can see that a reflection must have occurred first. *(If students are struggling, draw the line of reflection and a quick sketch of what this image will look like after a reflection.)* After the reflection, using the origin as the center and a scale factor of .5, we can take the larger polygon onto the smaller one.

Let's Think (Slide 5): Now, how did we know the side lengths were proportional by a factor of ½ or 0.5? Let's explore to better understand.

First, we'll compare the corresponding side lengths of each polygon to see if they are all proportional. If the proportion is the same for all sides of the polygons, then we have confirmed by sequence of transformations that the polygons are similar.



We will start with the smaller shape since we're considering it as the image. This also works in reverse, if needed. *(Show the work of dividing 1.1 by 2.2.)* Notice that two sets of corresponding sides share a ratio of 0.5 because 1.1 divided by 2.2 is ½ or 0.5.



In addition, since 1.5 divided by 3 is ½ or 0.5, the next two sets of corresponding sides are also proportional with a scale factor of 0.5. *(Show the math on the side of the grid.)*

We did it! We've verified if two shapes are similar, in addition to their other properties, their corresponding side lengths are proportional.

Let's Try it (Slides 7-8): Let's demonstrate our understanding that similar polygons have congruent corresponding angles and proportional corresponding sides. We will work on this page together. Remember, you can verify that figures are similar if you can identify a sequence of transformations that takes one figure onto the other. Also remember that similar figures have congruent corresponding angles and proportional corresponding side lengths.

WARM WELCOME

Understand that similar polygons have congruent angles and proportional corresponding sides.

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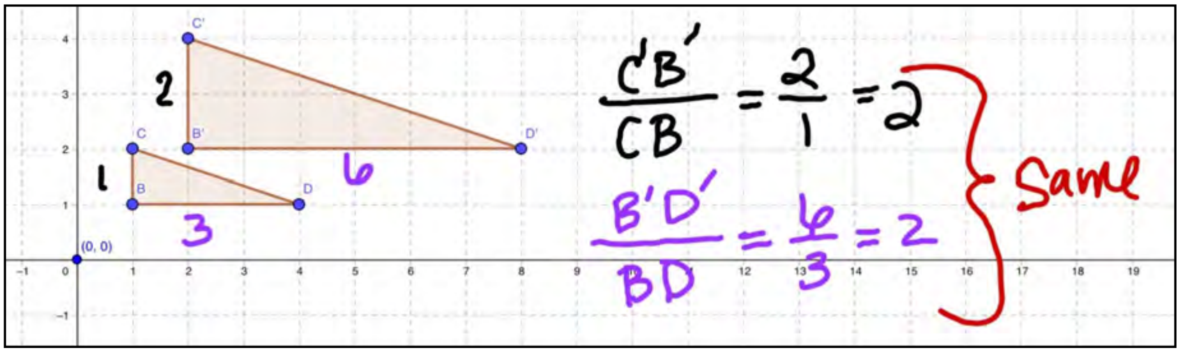
Let's Review:

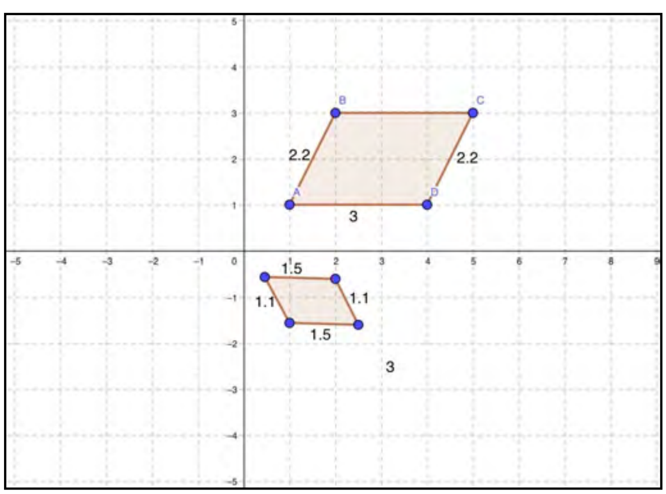
If two shapes are similar, you can use a sequences of transformations to take one polygon to the other.



Let's Talk:

How do we verify that similar polygons have congruent corresponding angles and proportional corresponding sides?

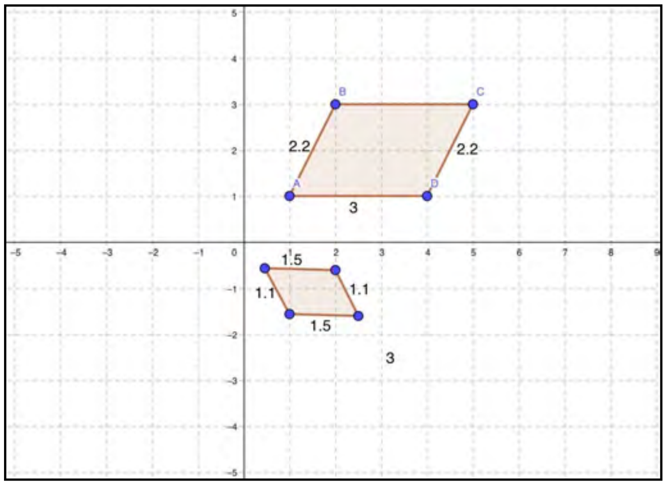
These polygons are similar. How can we verify that they are similar?



Let's Think:

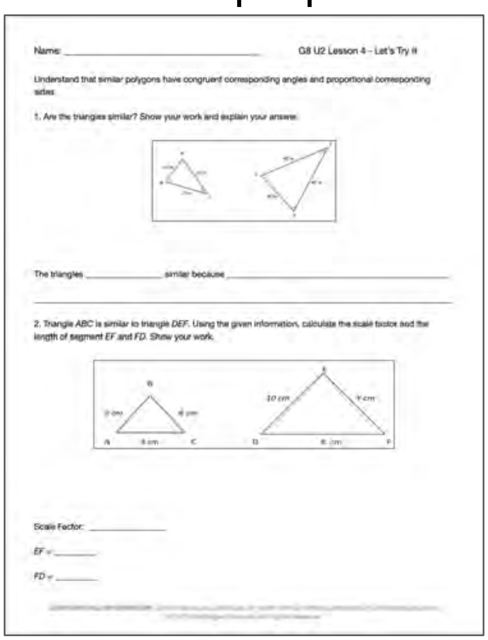
How do we verify that similar polygons have congruent corresponding angles and proportional corresponding sides?

How do we know if the side lengths of similar figures are proportional?



Let's Try It:

Let's practice verifying that similar polygons have congruent corresponding angles and proportional sides.



Name: ____________________ G8 U2 Lesson 4 – Let's Try It

Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

1. Are the triangles similar? Show your work and explain your answer.

The triangles ____________ similar because ____________________

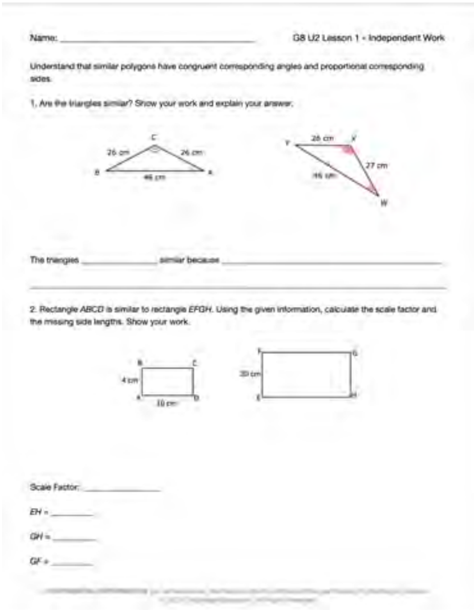
2. Triangle *ABC* is similar to triangle *DEF*. Using the given information, calculate the scale factor and the length of segment *EF* and *FD*. Show your work.

Scale Factor: ____________

EF = ________

FD = ________

On your Own:



Name: ______________________ G8 U2 Lesson 1 • Independent Work

Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

1. Are the triangles similar? Show your work and explain your answer.

C, 26 cm, 26 cm, B, 46 cm, A

Y, 26 cm, V, 27 cm, 46 cm, W

The triangles ____________ similar because ______________________

____

2. Rectangle *ABCD* is similar to rectangle *EFGH*. Using the given information, calculate the scale factor and the missing side lengths. Show your work.

B, C, 4 cm, A, 10 cm, D

F, G, 20 cm, E, H

Scale Factor: ____________

EH = ________

GH = ________

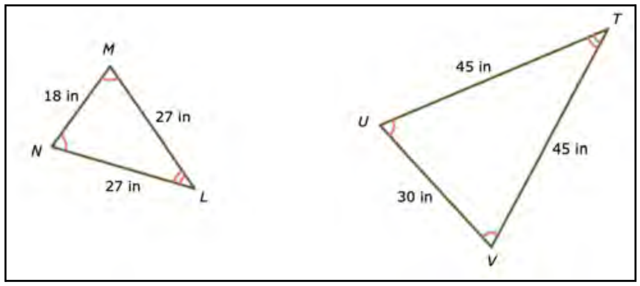
GF = ________

Now it's time to verify that similar polygons have congruent corresponding angles and proportional corresponding sides on your own.

Name: ______________________________________ G8 U2 Lesson 4 - Let's Try It

Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

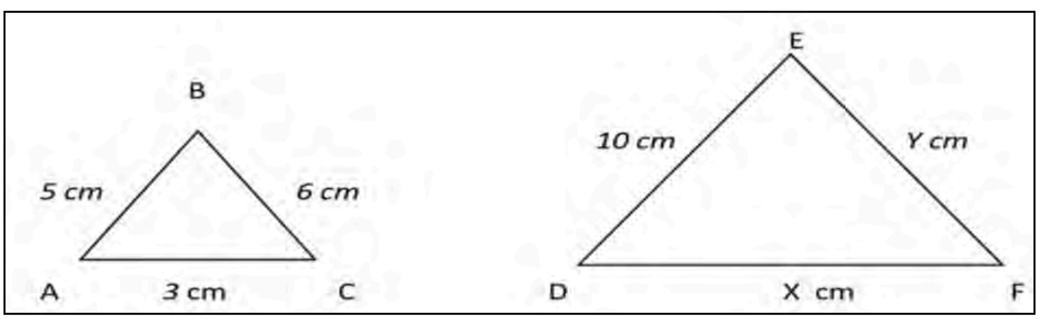
1. Are the triangles similar? Show your work and explain your answer.



The triangles ________________ similar because ____

____

2. Triangle *ABC* is similar to triangle *DEF*. Using the given information, calculate the scale factor and the length of segment *EF* and *FD*. Show your work.



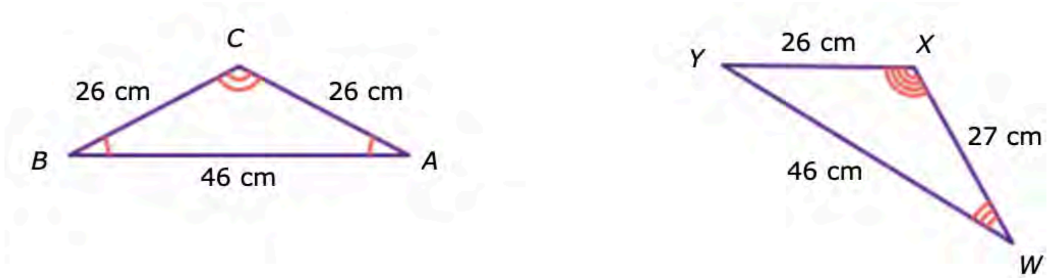
Scale Factor: ________________

EF = _________

FD = _________

Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

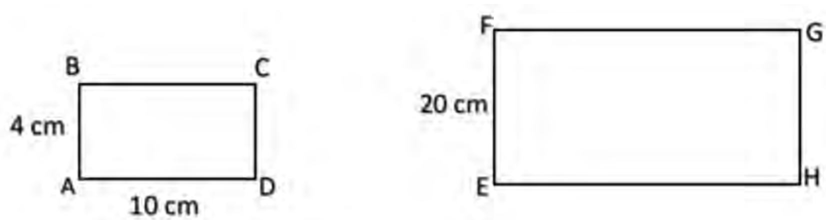
1. Are the triangles similar? Show your work and explain your answer.



The triangles ________________ similar because ____

____

2. Rectangle *ABCD* is similar to rectangle *EFGH*. Using the given information, calculate the scale factor and the missing side lengths. Show your work.



Scale Factor: ________________

EH = _________

GH = _________

GF = _________

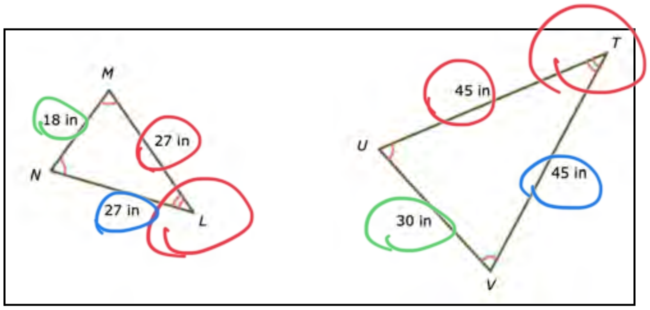
Name: Answer Key G8 U2 Lesson 4 - Let's Try It

Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

1. Are the triangles similar? Show your work and explain your answer.

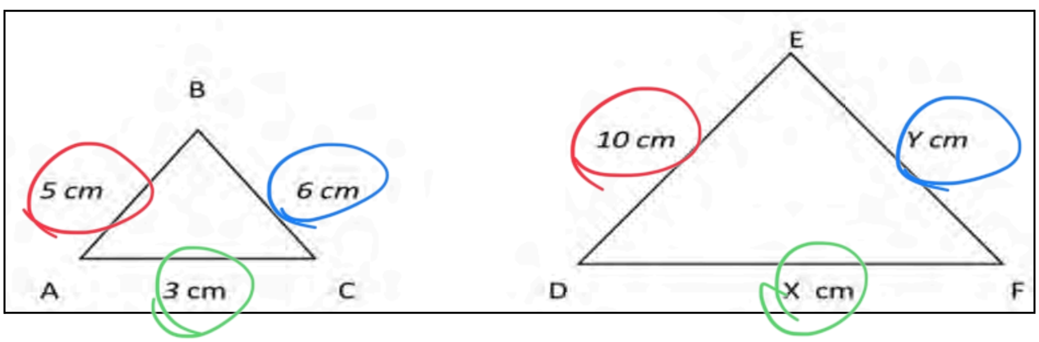
$\frac{45}{27} = \frac{5}{3}$ $\frac{30}{18} = \frac{5}{3}$

$\frac{45}{27} = \frac{5}{3}$



The triangles are similar because the corresponding ∡s are congruent and the corresponding sides are proportional.

2. Triangle *ABC* is similar to triangle *DEF*. Using the given information, calculate the scale factor and the length of segment *EF* and *FD*. Show your work.



$\frac{BIG}{Small} = \frac{10}{5} = 2$

$\frac{y}{6} = 2 \Rightarrow y = 12$

Scale Factor: 2

EF = 12cm

FD = 6cm

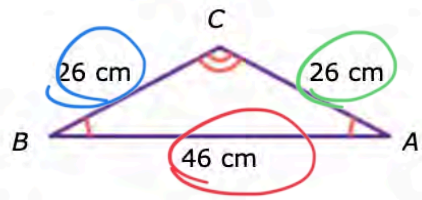
Name: Answer Key

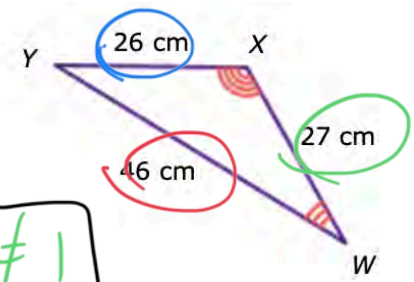
Understand that similar polygons have congruent corresponding angles and proportional corresponding sides.

1. Are the triangles similar? Show your work and explain your answer.

$\frac{46}{46} = 1$

$\frac{26}{26} = 1$



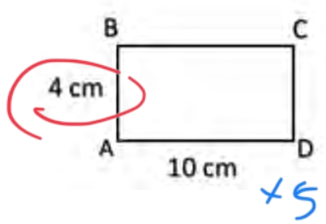


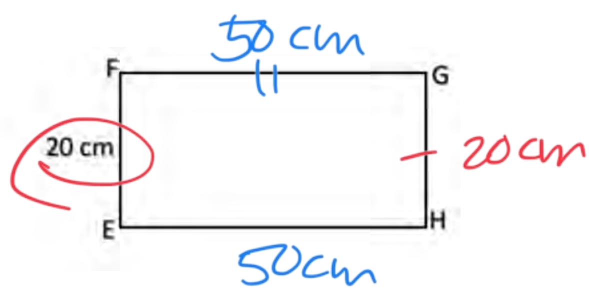
$\frac{27}{26} \neq 1$

The triangles are not similar because all corresponding sides are not proportional by the same scale factor.

2. Rectangle *ABCD* is similar to rectangle *EFGH*. Using the given information, calculate the scale factor and the missing side lengths. Show your work.

$\frac{\text{BIG}}{\text{small}} = \frac{20}{4} = 5$





Scale Factor: 5

EH = 50 cm

GH = 20 cm

GF = 50 cm

* opposite sides of a parallelogram are congruent. A rectangle is a parallelogram.

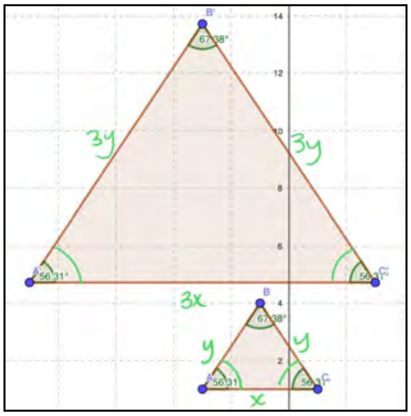
G8 U2 Lesson 5
Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

CITYTUTOR DC

G8 U2 Lesson 5 - Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

Warm Welcome (Slide 1): Tutor Choice

Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will determine that two triangles are similar by checking that two pairs of corresponding angles are congruent. In a previous lesson, you learned that figures are similar if their corresponding angles are congruent and if their corresponding side lengths are proportional.

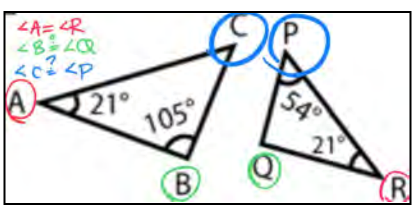


In this example, notice that the corresponding angles are congruent. *(draw an additional angle arc the base angles in each triangle and simply point out that the top angle is congruent to the corresponding top angle in the other triangle.)* Also notice that the corresponding sides are proportional - in this case the scale factor is 3.

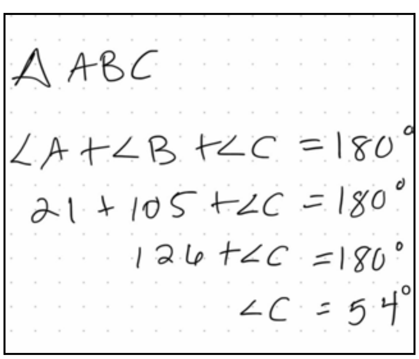
Let's Talk (Slide 4): Let's look at two similar triangles. We have some information but not all of the information we need. Based on what you can see, how do you think we could use the angles to determine if the triangles are similar? Possible Students Answers, Key Points:

- We can check to see if all of the angles are congruent/equal.
- We can use the Triangle Sum Theorem to find the missing angle. Then, we'll know if the corresponding angles are congruent.
- Misconception: They are not similar because the given angles are not the same.

Let's Think (Slide 5):



Let's first start by identifying what we believe the corresponding angles are in each triangle. I will use colors to match them up.



Next, let's use the triangle sum theorem on one triangle to find the missing angle measure. Let's choose triangle *ABC*. If the $\angle C = 54°$, then the triangles are similar because that means that $\angle Q = 105°$. *(Write the formula for the triangle sum theorem and use it to solve for angle C.)*

Finally, now that we know that $\angle C = 54°$, we also know that $\angle Q = 105°$. Since all corresponding angles are congruent, triangle *ABC* and triangle *RQP* are similar. *(Point out that the order of the letters is important when referencing congruence and similarity because they are associated with the corresponding parts.)* What we've just shown is known as angle angle similarity. The rationale is that if you know two pairs of corresponding angles are congruent then you also know that the third pair is congruent.

Let's Try it (Slides 7-8): Let's determine that two triangles are similar by checking that two pairs of corresponding angles are congruent. Remember, triangles are similar is all of their corresponding angles are congruent but you only need to check for two to verify similarity. This is known as angle angle similarity.

WARM WELCOME

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

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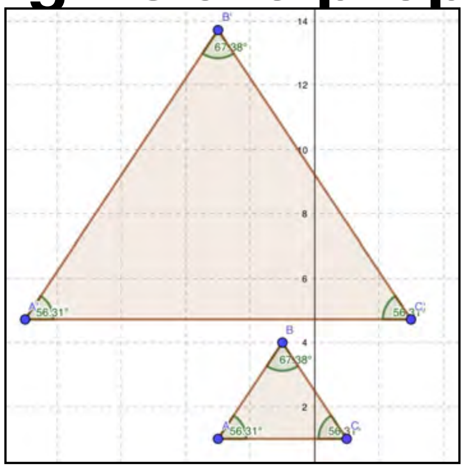
Let's Review:

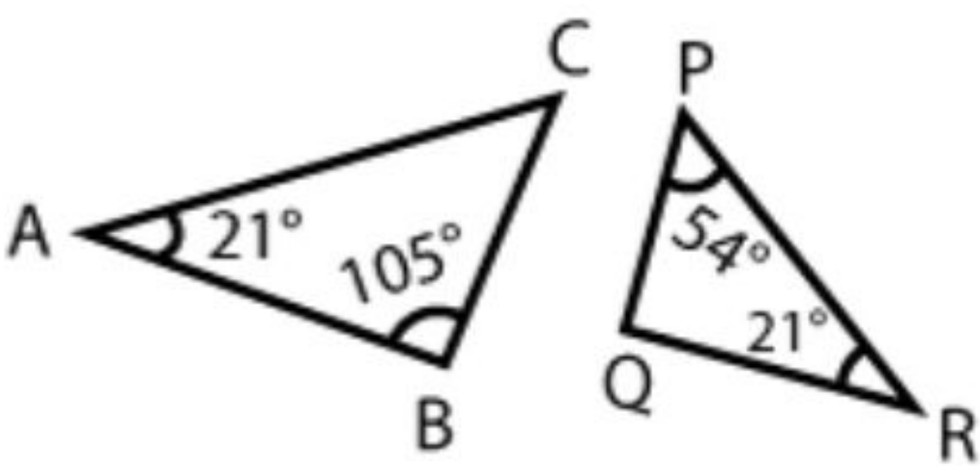
Figures are similar if their corresponding angles are congruent and their corresponding side lengths are proportional.



Let's Talk:

How do we determine if two triangles are similar using two pairs of corresponding angles?

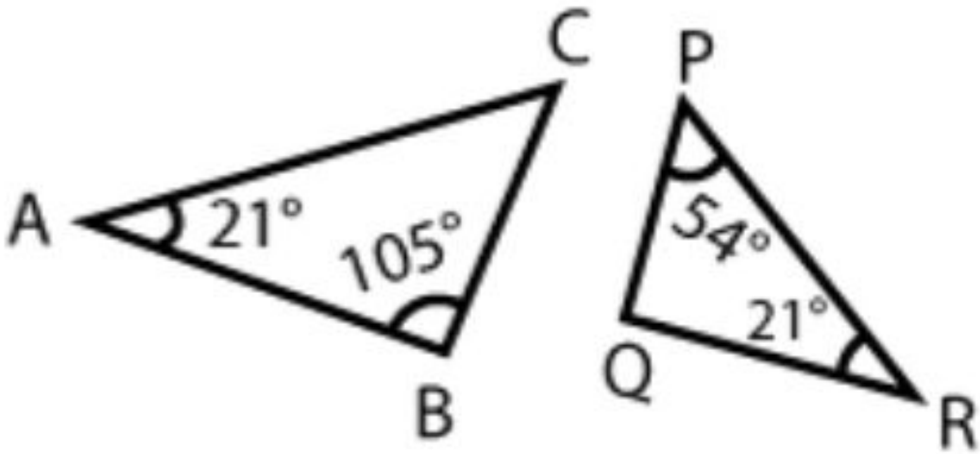
How can we verify that these triangles are similar?



Let's Think:

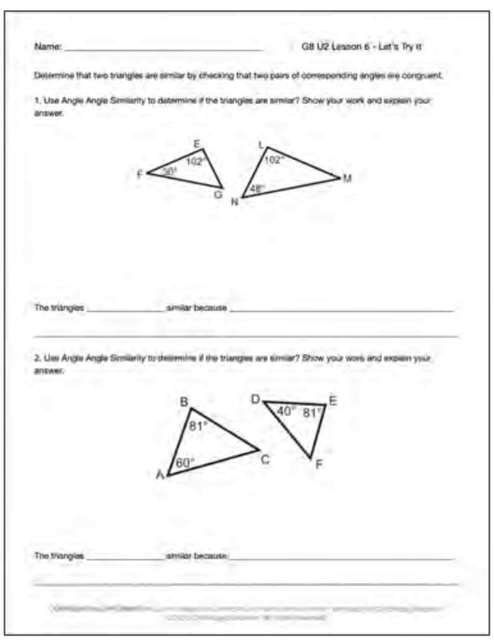
How do we determine if two triangles are similar using two pairs of corresponding angles?

How can we verify that these triangles are similar?



Let's Try It:

Let's practice determining that two triangles are similar by checking that two pairs of corresponding angles are congruent.



Name: ______________________ G8 U2 Lesson 6 - Let's Try It

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

1. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

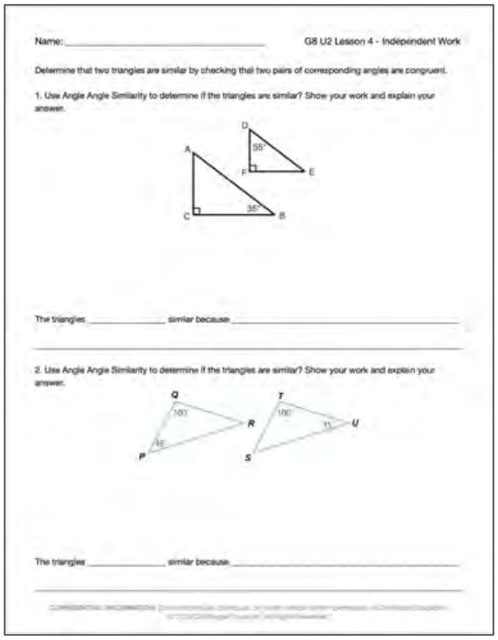
The triangles ____________ similar because ______________________

2. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

The triangles ____________ similar because ______________________

On your Own:

Now it's time to determine that two triangles are similar by checking that two pairs of corresponding angles are congruent on your own.


Name: ______________________ G8 U2 Lesson 4 - Independent Work

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

1. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

The triangles __________ similar because ______________________________

____

2. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

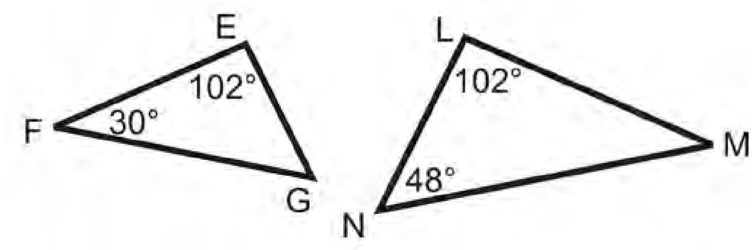
The triangles __________ similar because ______________________________

____

Name: ______________________________________ G8 U2 Lesson 5 - Let's Try It

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

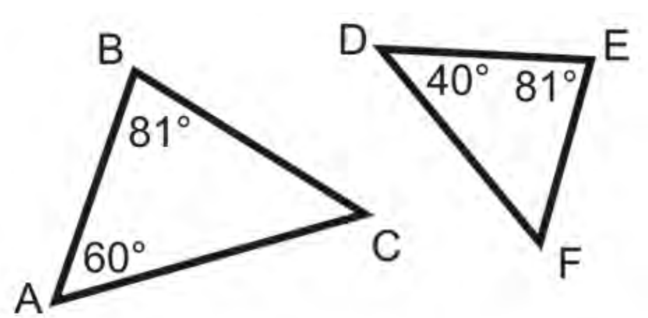
1. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.



The triangles ________________ similar because ____

____

2. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

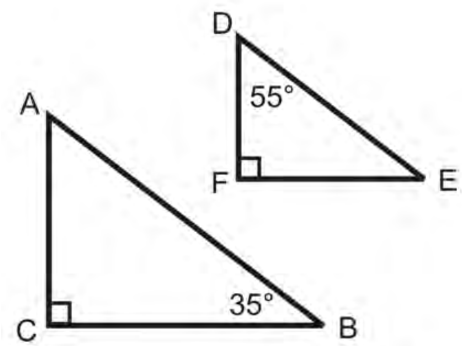


The triangles ________________ similar because ____

____

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

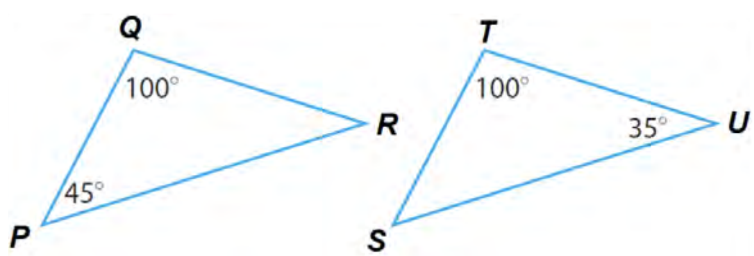
1. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.



The triangles ______________ similar because ____

____

2. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.



The triangles ______________ similar because ____

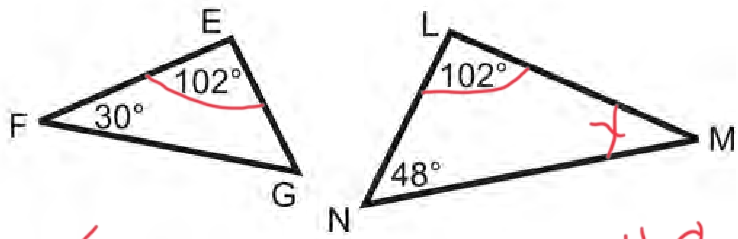
____

Name: Answer Key

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

1. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

$\triangle FEG \approx \triangle MLN$?



$\angle E = \angle L$ ✓

$\angle F = \angle M$ ✓

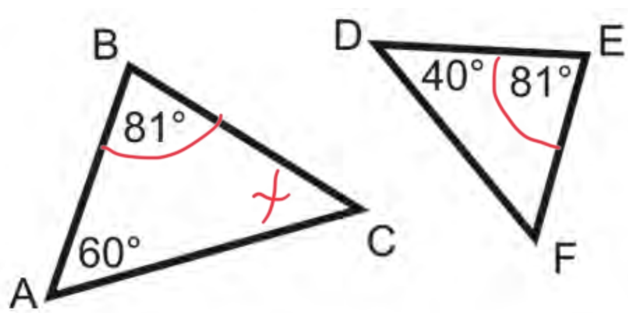
$48 + 102 + x = 180$

$150 + x = 180$

$x = 30$

The triangles are similar because at least two pairs of corresponding ∡s are NOT congruent.

2. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.



$60 + 81 + x = 180$

$141 + x = 180$

$x = 39$

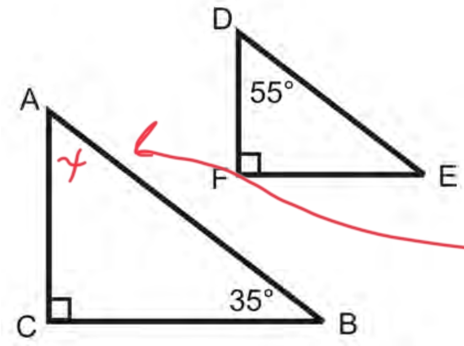
The triangles are not similar because at least two pairs of corresponding ∡s are NOT congruent.

Name: Answer Key

Determine that two triangles are similar by checking that two pairs of corresponding angles are congruent.

1. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

∠A = ∠D ✓
∠C = ∠F ✓

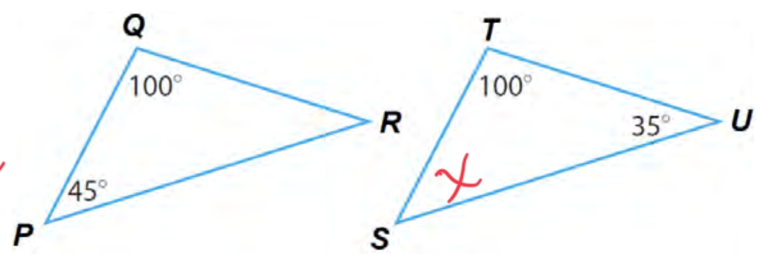


$90 + 35 + x = 180$
$125 + x = 180$
$x = 55°$

The triangles are similar because at least two pairs corresponding ∡s are congruent

2. Use Angle Angle Similarity to determine if the triangles are similar? Show your work and explain your answer.

∠Q = ∠T ✓
∠P = ∠S ✓



$35 + 100 + x = 180$
$135 + x = 180$
$x = 45$

The triangles are similar because at least two pair of corresponding ∡s are congruent.

G8 U2 Lesson 6
Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

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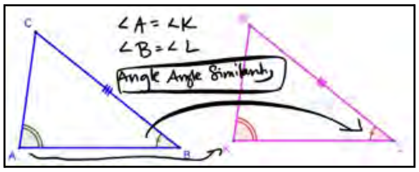
G8 U2 Lesson 6 - Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

Warm Welcome (Slide 1): Tutor Choice

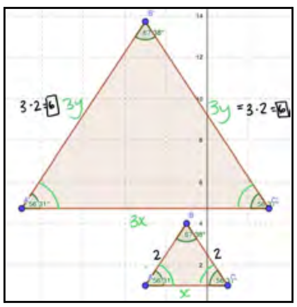
Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will calculate unknown side lengths in similar triangles using the scale factor between similar triangles.



You've learned that you can verify if two triangles are similar using angle angle similarity - that simply means you only need to know that two pairs of corresponding congruent angles in a triangle are congruent to determine if the triangles are similar. But, what about the sides of triangles?

Let's Talk (Slide 4): You also know that corresponding sides of similar figures are proportional. So what if you only know one or two sets of corresponding sides? How do you think we may find the missing sides?
Possible Students Answers, Key Points:

- We can find the scale factor of the other sides first.

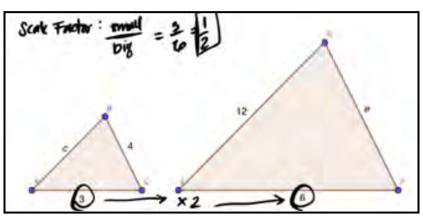


That's right. Let's consider triangle *ABC* and its image. We already know that the scale factor is 3. What if the value of *y* is 2. What is the value of the corresponding sides to *AB* and *BC*? Possible Students Answers, Key Points:

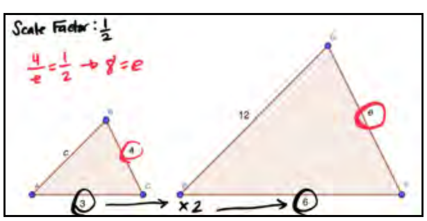
- Since the scale factor is 3, the two corresponding sides will be 6, because that's 3 x 2.

Great job! Yes - since we already knew the scale factor, we can say that the corresponding sides to side length *y* are 3 x 2 =6. *(Show you work.)*

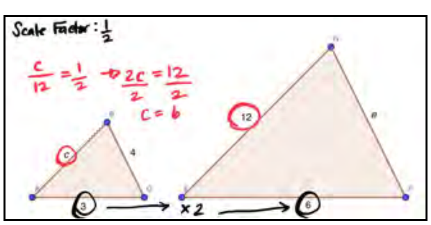
Let's Think (Slide 5): Now, let's consider a case of similar triangles where we don't know the scale factor for some missing sides. What will we do? First, we'll start by calculating the scale factor for at least one pair of corresponding sides. If we already know the triangles are similar, we don't need to verify more than one pair of sides.



In this pair of similar triangles, we know that segment AC is 3 and its corresponding segment is 6. The scale factor between those two, if we go from small to big, is ½. *(Show your work.)*



Now that we know the scale factor from the smaller triangle to the bigger triangle, we can calculate the measure of side *e*, the corresponding side to side *BC* which equals 4.



Finally, we can determine the value of *c* by using what we know about its corresponding side, *EG*, which equals 12.

Let's Try it (Slides 7-8): Let's calculate unknown side lengths in similar triangles using the scale factor between similar triangles. Remember, find the scale factor using two given corresponding sides of similar triangles first. Then you can use that scale factor to find the remaining sides.

WARM WELCOME

Calculate unknown side lengths in similar triangles using the scale factor between similar triangles

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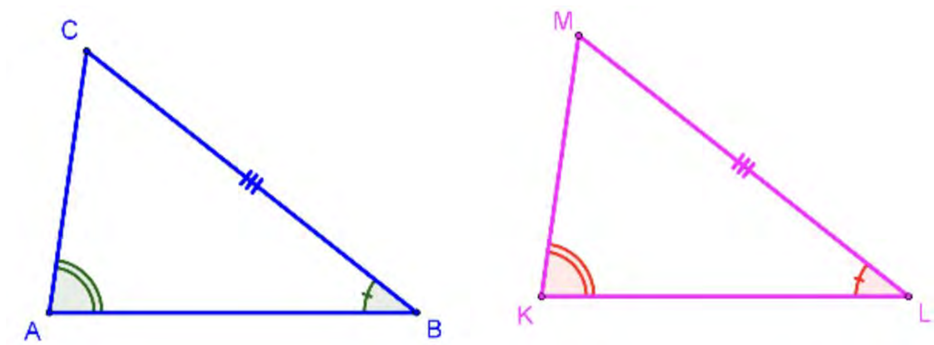
Let's Review:

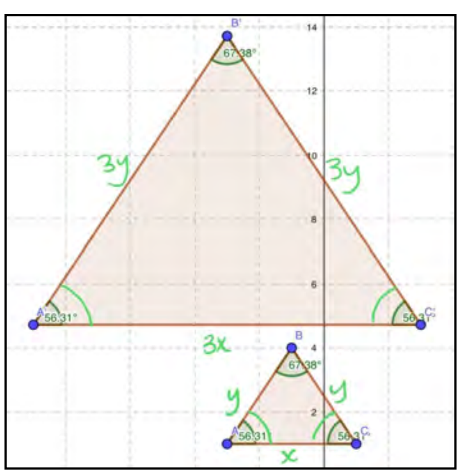
You can use Angle Angle Similarity to verify that two triangles are similar.



Let's Talk:

How do we calculate unknown side lengths in similar triangles using the scale factor between similar triangles?

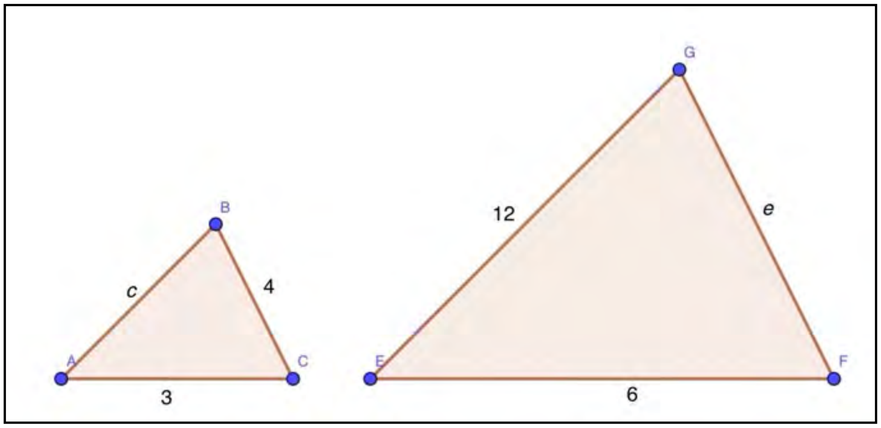
How can we verify that these triangles are similar?



Let's Think:

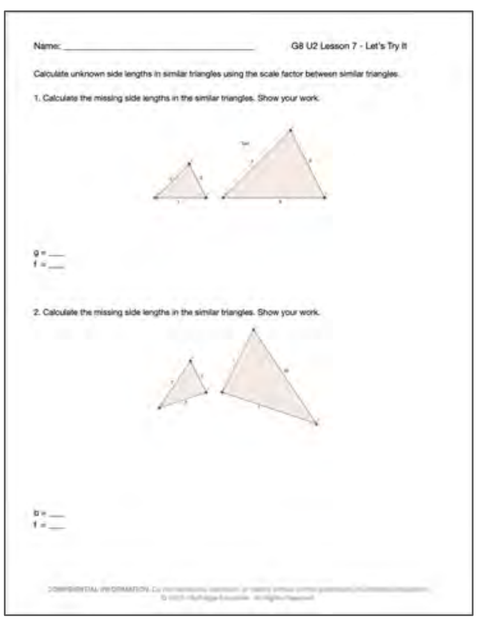
How do we calculate unknown side lengths in similar triangles using the scale factor between similar triangles?

Let's calculate the missing side length in these similar triangles.



Let's Try It:

Let's practice calculating unknown side lengths in similar triangles using the scale factor between similar triangles.



Name: ______________ G8 U2 Lesson 7 - Let's Try It

Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

1. Calculate the missing side lengths in the similar triangles. Show your work.

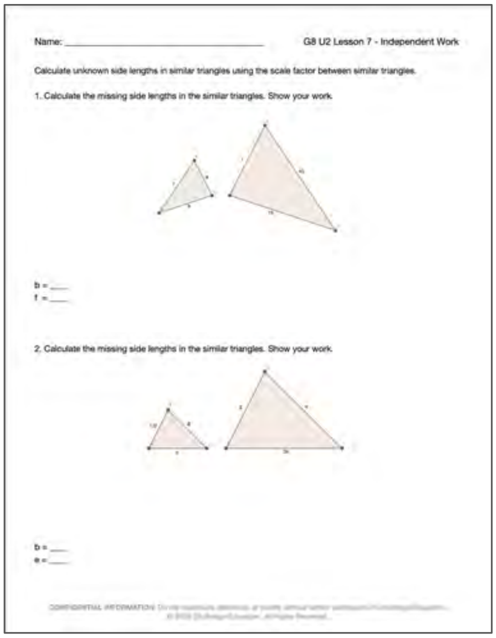
g = ___
f = ___

2. Calculate the missing side lengths in the similar triangles. Show your work.

b = ___
f = ___

On your Own:

Now it’s time to calculate unknown side lengths in similar triangle using hte scale factor between similar triangles on your own.


Name: ______________________ G8 U2 Lesson 7 - Independent Work

Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

1. Calculate the missing side lengths in the similar triangles. Show your work.

b = ____
f = ____

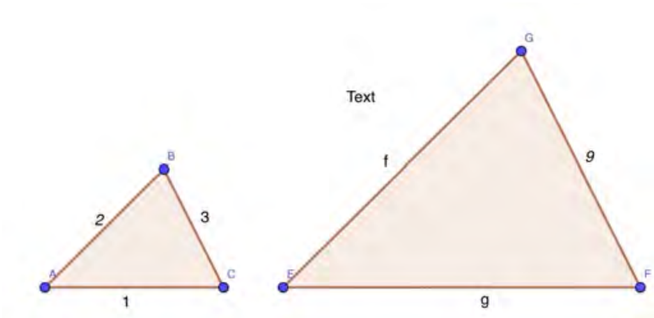
2. Calculate the missing side lengths in the similar triangles. Show your work.

b = ____
e = ____

Name: ____ G8 U2 Lesson 6 - Let's Try It

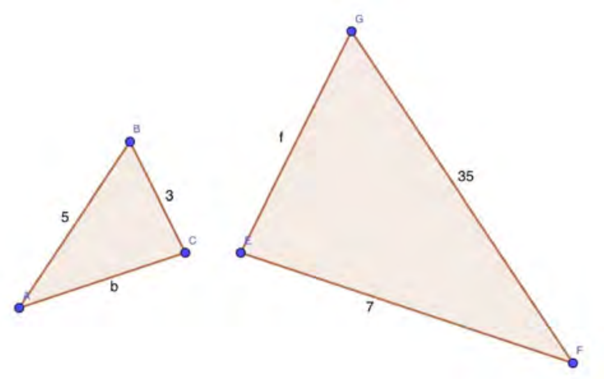
Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

1. Calculate the missing side lengths in the similar triangles. Show your work.



g = ____
f = ____

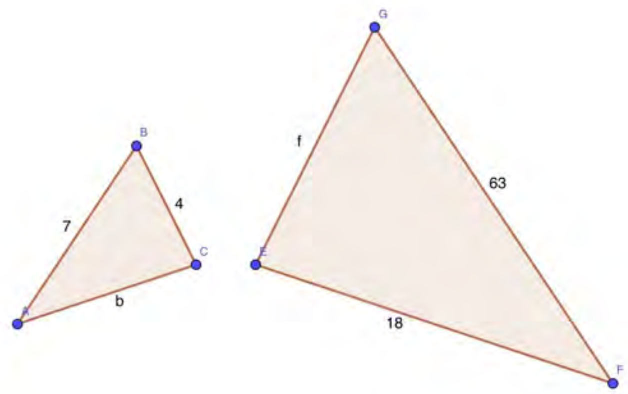
2. Calculate the missing side lengths in the similar triangles. Show your work.



b = ____
f = ____

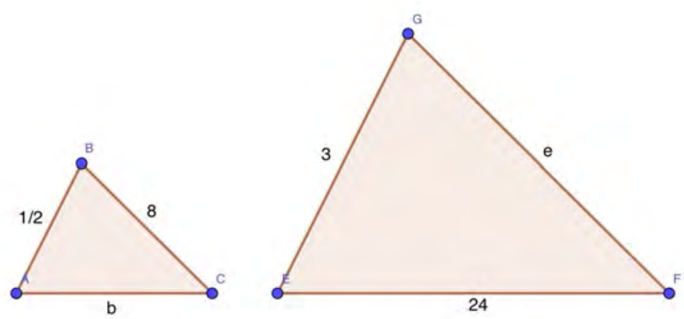
Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

1. Calculate the missing side lengths in the similar triangles. Show your work.



b = ____
f = ____

2. Calculate the missing side lengths in the similar triangles. Show your work.



b = ____
e = ____

Name: Answer Key

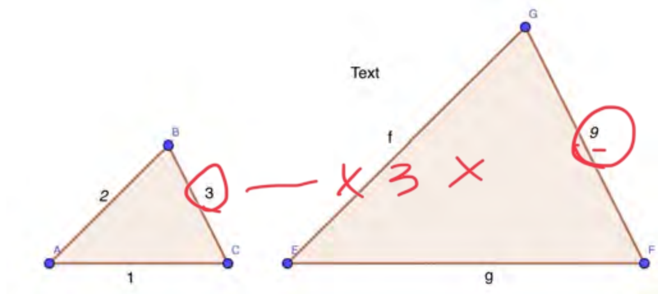
Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

1. Calculate the missing side lengths in the similar triangles. Show your work.

Scale Factor

$\frac{\text{small}}{\text{big}} = \frac{3}{9} = \frac{1}{3}$

$\frac{\text{big}}{\text{small}} = \frac{9}{3} = 3$



g = 3

f = 6

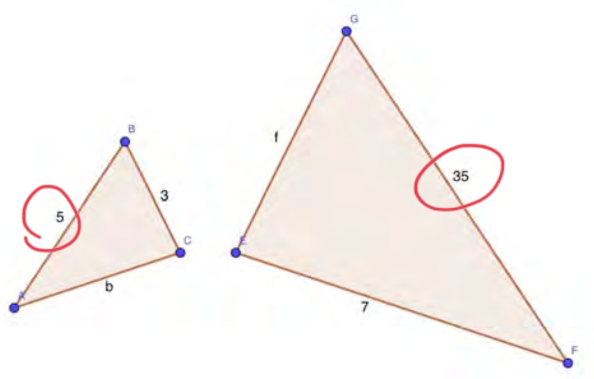
$1 \times 3 = g$

$2 \times 3 = f$

2. Calculate the missing side lengths in the similar triangles. Show your work.

$\frac{\text{small}}{\text{big}} = \frac{5}{35} = \frac{1}{7}$

$\frac{\text{big}}{\text{small}} = \frac{35}{5} = 7$



$b \times 7 = 7$

$b = 1$

$3 \times 7 = f$

$21 = f$

b = 1

f = 21

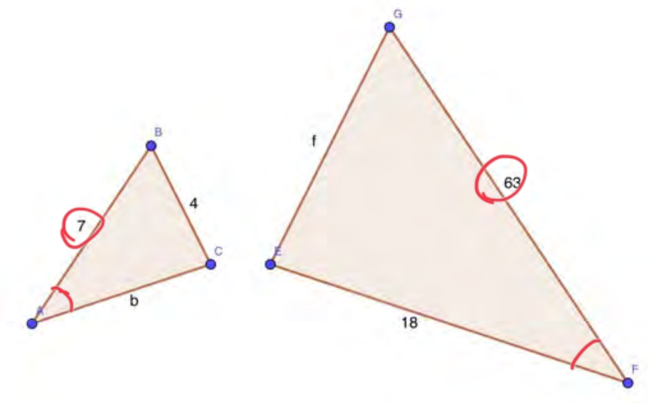
Name: Answer Key

Calculate unknown side lengths in similar triangles using the scale factor between similar triangles.

1. Calculate the missing side lengths in the similar triangles. Show your work.

$\frac{\text{small}}{\text{big}} = \frac{7}{63} = \frac{1}{9}$

$\frac{\text{big}}{\text{small}} = \frac{63}{7} = 9$



$b \times 9 = 18$

$b = 2$

$4 \times 9 = f$

$36 = f$

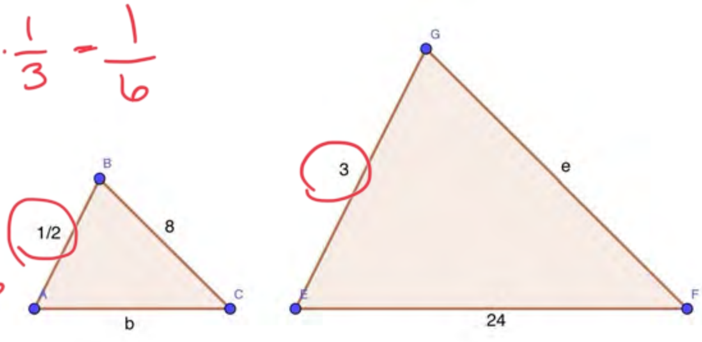
b = 2

f = 36

2. Calculate the missing side lengths in the similar triangles. Show your work.

$\frac{\text{small}}{\text{big}} = \frac{\frac{1}{2}}{3} = \frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$

$\frac{\text{big}}{\text{small}} = \frac{3}{\frac{1}{2}} = 3 \cdot \frac{2}{1} = 6$



$b \times 6 = 24$

$b = 4$

$8 \times 6 = e$

$48 = e$

b = 4

e = 48

G8 U2 Lesson 7
Understand that the quotients of pairs of side lengths in similar triangles are equal.

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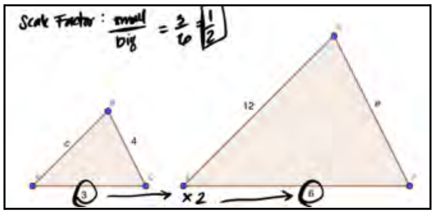
G8 U2 Lesson 7 - Understand that quotients of pairs of side lengths in similar triangles are equal.

Warm Welcome (Slide 1): Tutor Choice

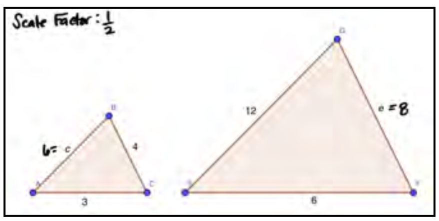
Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will demonstrate our understanding that quotients of pairs of side lengths in similar triangles are equal.



In our last lesson, we calculated a scale factor and used that scale factor to find the missing sides of similar triangles. What about quotients from the same triangle? We'll look at some triangles that we've already seen and use the measures we calculated to make a determination about their quotients.

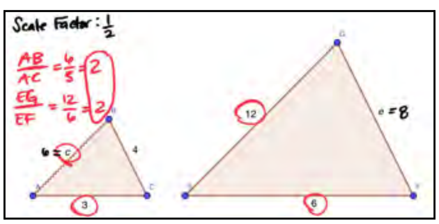
Let's Talk (Slide 4): Consider the same set of triangles. First let's find the side lengths again. If the scale factor is ½, what the value of *c* and *e*? Possible Students Answers, Key Points:

- c = 6 because 6 is half of 12.
- e = 8 because half of 8 is 4.

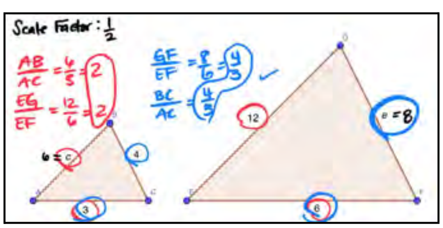


That's right! C = 6 and e = 8. Using a scale factor of 1/2, we determined the value of the missing side lengths in two pairs of triangles. *(Write the scale factor and the value of the missing sides that your students shared.)*

Let's Think (Slide 5): Now, let's use the values in the same triangle. There is something true about how the sides in each individual triangle relate to each other as compared to the same set of sides in the other triangle.



First, let's calculate the quotient of AB/AC and the corresponding sides EG/EF. *(Write the quotients and fill in their values.)* We know that 6/3 is 2 and 12/6 is 2. So the quotients of these corresponding sides is equal. Hmmm… Let's check that with a different set, just to be sure.



Let's calculate the quotients of GF/EF and BC/AC. 8/6 is 4/3 and the smaller triangle is already simplified as 4/3. Success!

Let's Try it (Slides 7-8): Let's demonstrate our understanding that the quotients of pairs of side lengths in similar triangles are equal. Remember, make sure you set up your quotes big over big or small over small since we're comparing the quotients of side lengths in one triangle to a triangle in which it is similar.

WARM WELCOME

Understand that the quotients of pairs of side lengths in similar triangles are equal.

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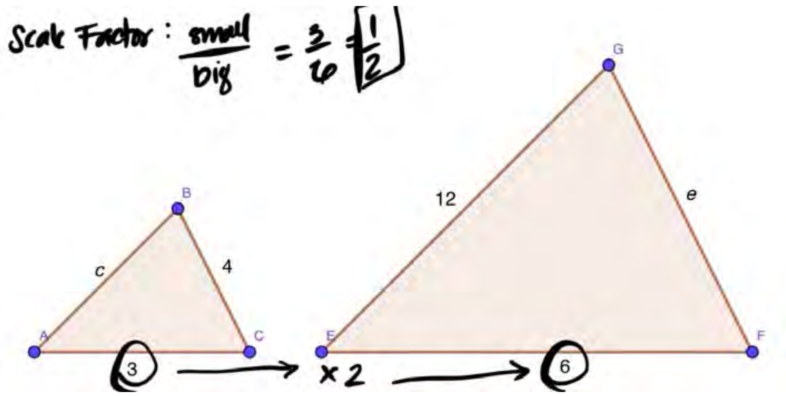
Let's Review:

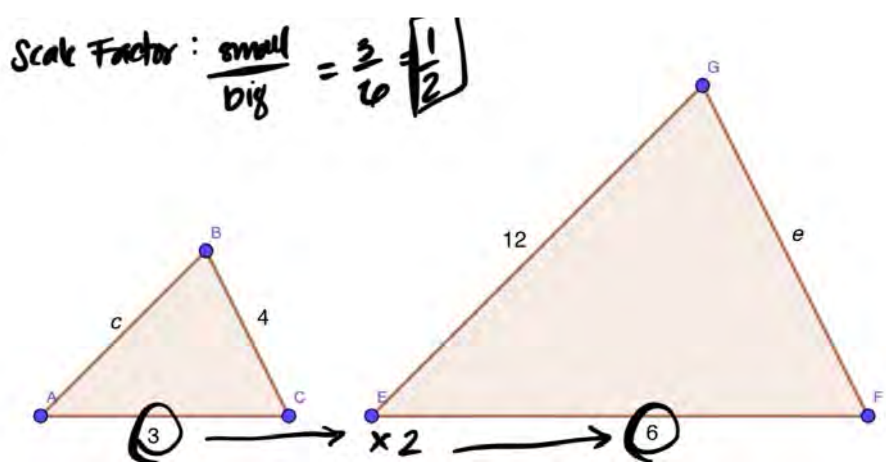
You can use a scale factor to determine the missing sides of similar triangles.



Let's Talk:

What is true about the quotients of pairs of side lengths in similar triangles?

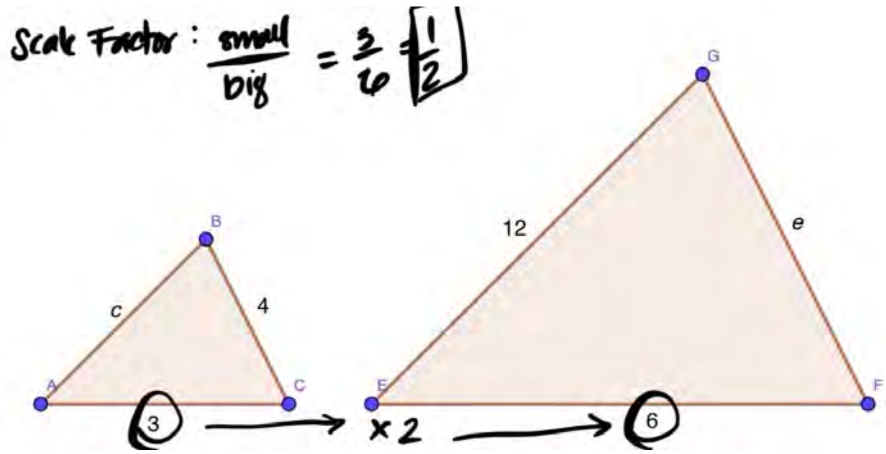
What are the side lengths of the missing sides?



Let's Think:

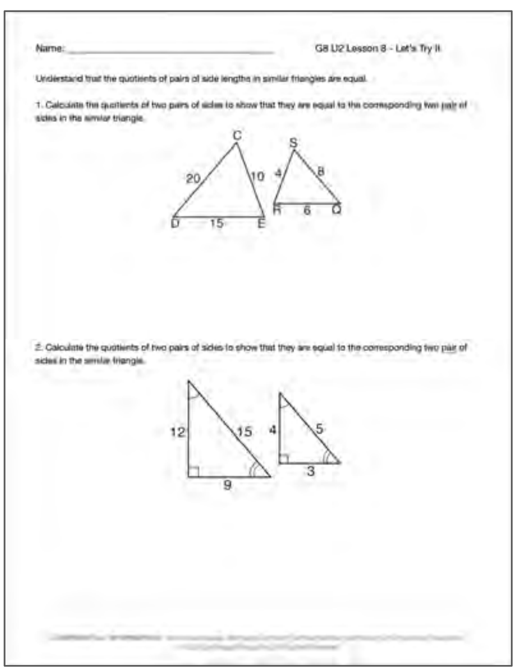
What is true about the quotients of pairs of side lengths in similar triangles?

Calculate the quotients of pairs of side lengths in similar triangles. What do you notice?



Let's Try It:

Let's practice demonstrating our understanding that quotients of pairs of side lengths in similar triangles are equal.



Name: ____________________ G8 U2 Lesson 8 - Let's Try It

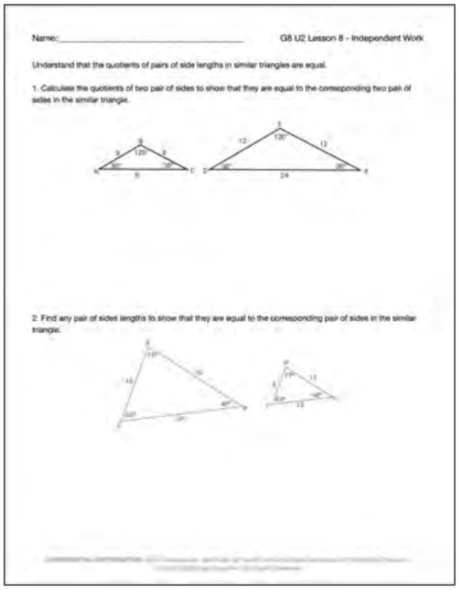
Understand that the quotients of pairs of side lengths in similar triangles are equal.

1. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pair of sides in the similar triangle.

2. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pair of sides in the similar triangle.

On your Own:

Now it’s time to demonstrate our your understanding that hte quotients of pairs of side lengths in similar triangles are equal on your own.


Name:________________________ G8 U2 Lesson 8 - Independent Work

Understand that the quotients of pairs of side lengths in similar triangles are equal.

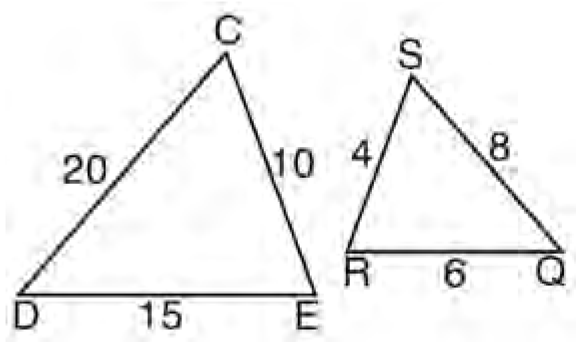
1. Calculate the quotients of two pair of sides to show that they are equal to the corresponding two pair of sides in the similar triangle.

2. Find any pair of sides lengths to show that they are equal to the corresponding pair of sides in the similar triangle.

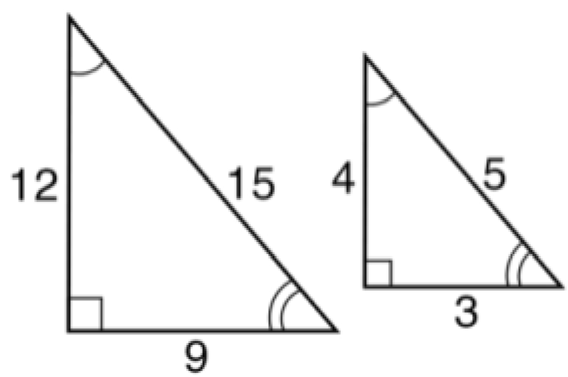
Name: ____ G8 U2 Lesson 7 - Let's Try It

Understand that the quotients of pairs of side lengths in similar triangles are equal.

1. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.

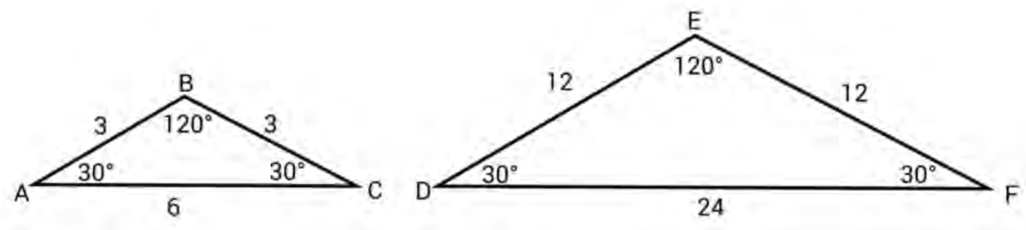


2. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.

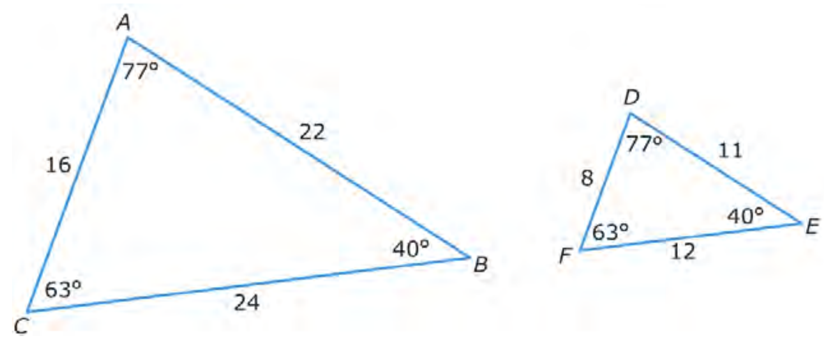


Understand that the quotients of pairs of side lengths in similar triangles are equal.

1. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.



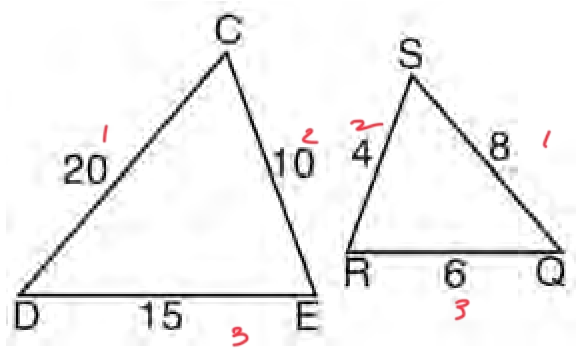
2. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.



Name: Answer Key

Understand that the quotients of pairs of side lengths in similar triangles are equal.

1. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.



$\frac{CD}{CE} = \frac{20}{10} = 2$ ✓

$\frac{SQ}{SR} = \frac{8}{4} = 2$ ✓

$\frac{DE}{CE} = \frac{15}{10} = \frac{3}{2}$ ✓

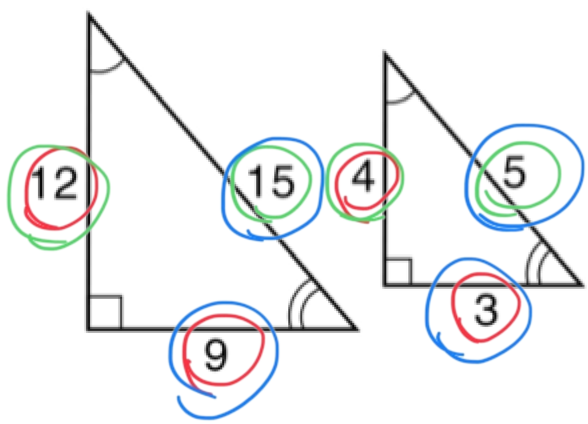
$\frac{QR}{SR} = \frac{6}{4} = \frac{3}{2}$ ✓

*Third Set

$\frac{DE}{CD} = \frac{15}{20} = \frac{3}{4}$ ✓

$\frac{QR}{SQ} = \frac{6}{8} = \frac{3}{4}$ ✓

2. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.



$\frac{12}{9} = \frac{4}{3}$ ✓

$\frac{4}{3}$ ✓

$\frac{12}{15} = \frac{4}{5}$ ✓

$\frac{4}{5}$ ✓

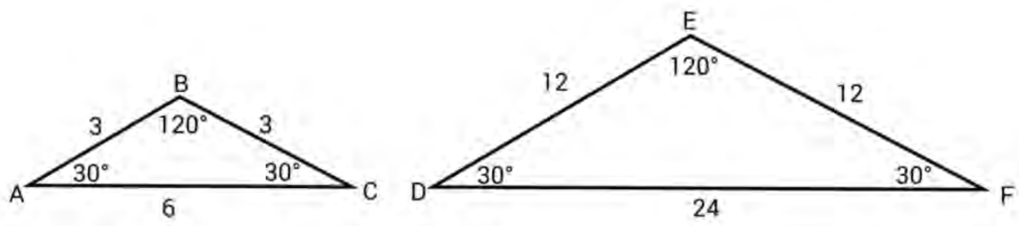
$\frac{9}{15} = \frac{3}{5}$ ✓

$\frac{3}{5}$ ✓

Name: Answer Key

Understand that the quotients of pairs of side lengths in similar triangles are equal.

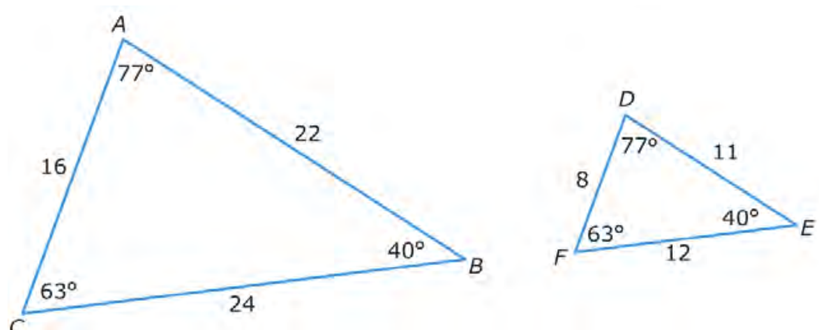
1. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.



$\frac{AB}{BC} = \frac{3}{3} = 1$ ✓ | $\frac{BC}{AC} = \frac{3}{6} = \frac{1}{2}$ ✓ | $\frac{AC}{AB} = \frac{6}{3} = 2$ ✓

$\frac{DE}{EF} = \frac{12}{12} = 1$ ✓ | $\frac{EF}{DF} = \frac{12}{24} = \frac{1}{2}$ ✓ | $\frac{DF}{DE} = \frac{24}{12} = 2$ ✓

2. Calculate the quotients of two pairs of sides to show that they are equal to the corresponding two pairs of sides in the similar triangle.



$\frac{AC}{AB} = \frac{16}{22} = \frac{8}{11}$ ✓ | $\frac{AB}{BC} = \frac{22}{24} = \frac{11}{12}$ ✓ | $\frac{BC}{AC} = \frac{24}{16} = \frac{3}{2}$ ✓

$\frac{DF}{DE} = \frac{8}{11}$ ✓ | $\frac{DE}{EF} = \frac{11}{12}$ ✓ | $\frac{EF}{DF} = \frac{12}{8} = \frac{3}{2}$ ✓

G8 U2 Lesson 8
Find the slope of a line on a grid using properties of slope triangles.

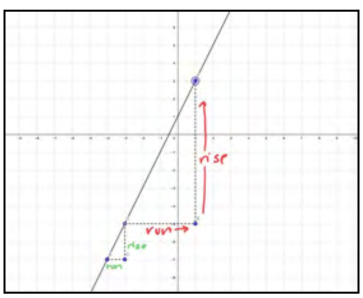
G8 U2 Lesson 9 - Find the slope of a line on a grid using properties of slope triangles.

Warm Welcome (Slide 1): Tutor Choice

Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will use what we know about triangles to help us to calculate the slope of a line. First, think about when you've heard about the word slope in real life. If you've ever gone snowboarding, you've likely heard someone say, "go up the hill" or "go down the hill." At many ski resorts where they teach you to ski, they'll instead say, "let's hit the slopes."

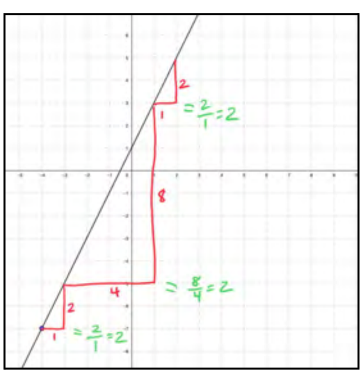
A slope is another word to identify how much something rises over a particular distance or how much something declines over a particular distance, like any hill you might use to have your winter fun. *(Draw the run/distance, decline arrow, and slope to show students the relationship between skiing and the concept of slope.)*

Let's Talk (Slide 4): Let's consider the slope of a line on a grid. How do you think we can calculate the slope?
Possible Students Answers, Key Points:
- We can use rise over run.



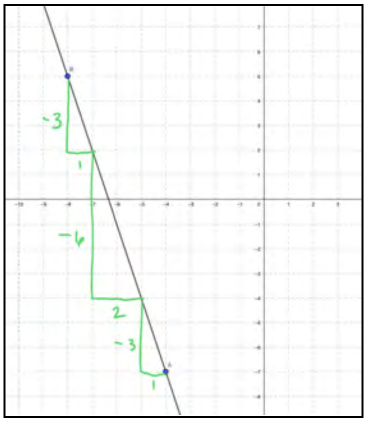
Yes. Rise over run is a trick we often learn to remember how to calculate the slope of a line on a grid. But did you know that the reason that works is because the rise and the run create multiple similar triangles. And what we know about similar triangles is that their corresponding side lengths are proportional. Remember that the quotients of pairs of sides on similar triangles are equal. *(Draw some similar triangles that you can connect to the line and show the quotient of the sides so students can see that they are similar.)*

Let's Think (Slide 5): Now, take the line of $y = 2x + 1$ for example. Let's use slope triangles to calculate the slope of the line.

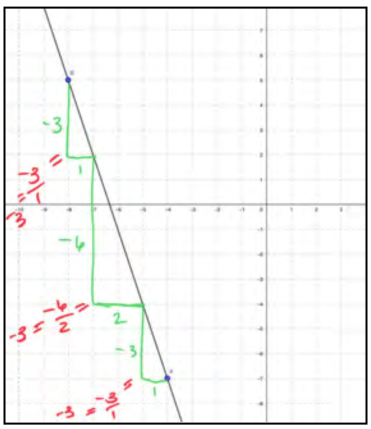


Let's first identify the rise and run in each triangle. In this case, the slope is increasing so we know it's a rise instead of a decline. *(Draw the slope triangles - try to vary the sizes - and label the number of units across and up.)* That's it - it's that simple. The slope of this line is 2 and we use quotients of similar triangles and slope triangles to figure it out.

Let's Think (Slide 6): Let's try again but with a line that is declining.



Like before, let's start by drawing triangles to identify the decline. In this case, because there is a decline rather than a rise, I am writing the numbers as negative to show that direction. *(Draw the triangles and label the sides.)*



Now, like in the previous example, we'll calculate the quotient of the sides of our similar triangles to determine the quotient. That quotient is the slope/

Let's Try it (Slides 7): Let's work on using what we know about slope triangles to calculate the slope of lines. Remember, you can either rise or decline but the run or distance across will always be positive and go from left to right.

WARM WELCOME

Find the slope of a line on a grid using properties of slope triangles.

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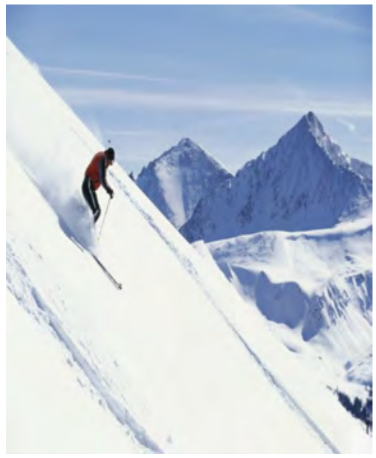
Let's Review:

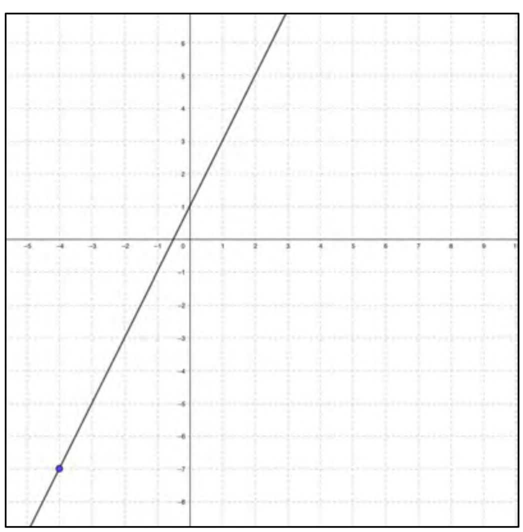
A slope is another word to identify how much something rises over a particular distance or how much something declines over a particular distance.



Let's Talk:

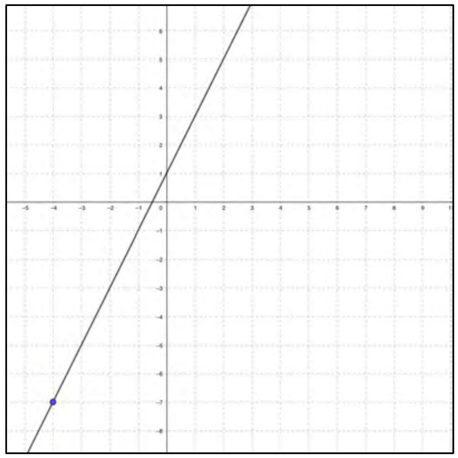
How do slope triangles help us to calculate the slope of a line?

Identify the rise and run of the line by creating multiple similar triangles.



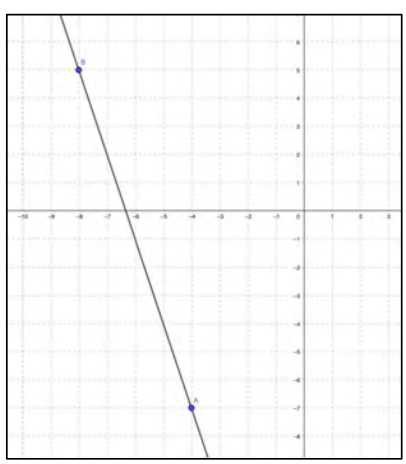
Let's Think: **How do slope triangles help us to calculate the slope of a line?**

Use the similar triangles and the quotients of their side lengths to calculate the slope of each line.



Let's Think: **How do slope triangles help us to calculate the slope of a line?**

Use the similar triangles and the quotients of their side lengths to calculate the slope of each line.



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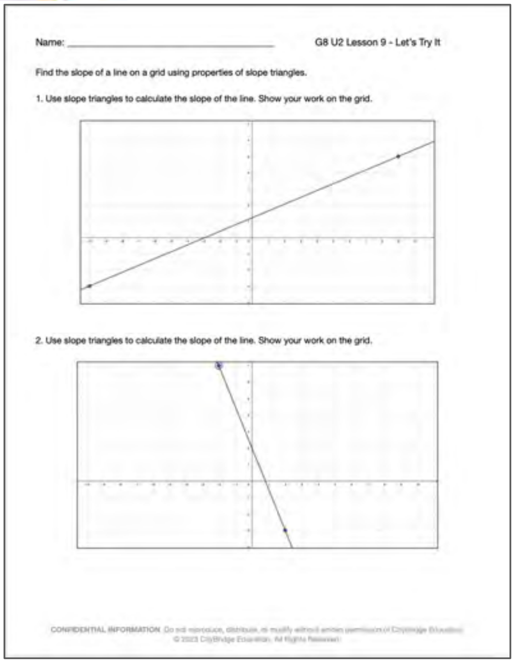
Let's Try It:

Let's practice using slope triangles to calculate the slope of lines.


Name: ______________________________ G8 U2 Lesson 9 - Let's Try It

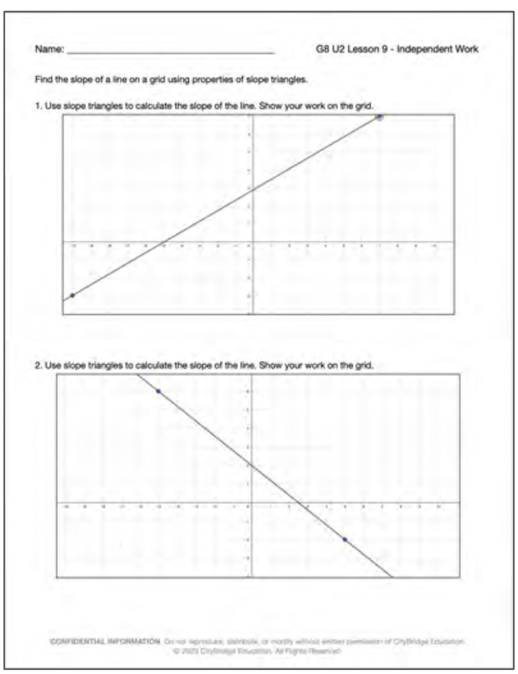
Find the slope of a line on a grid using properties of slope triangles.

1. Use slope triangles to calculate the slope of the line. Show your work on the grid.

2. Use slope triangles to calculate the slope of the line. Show your work on the grid.

On your Own:

Now it's time to practice using slope triangles to calculate the slope of a line on your own.


Name: ______________________________ G8 U2 Lesson 9 - Independent Work

Find the slope of a line on a grid using properties of slope triangles.

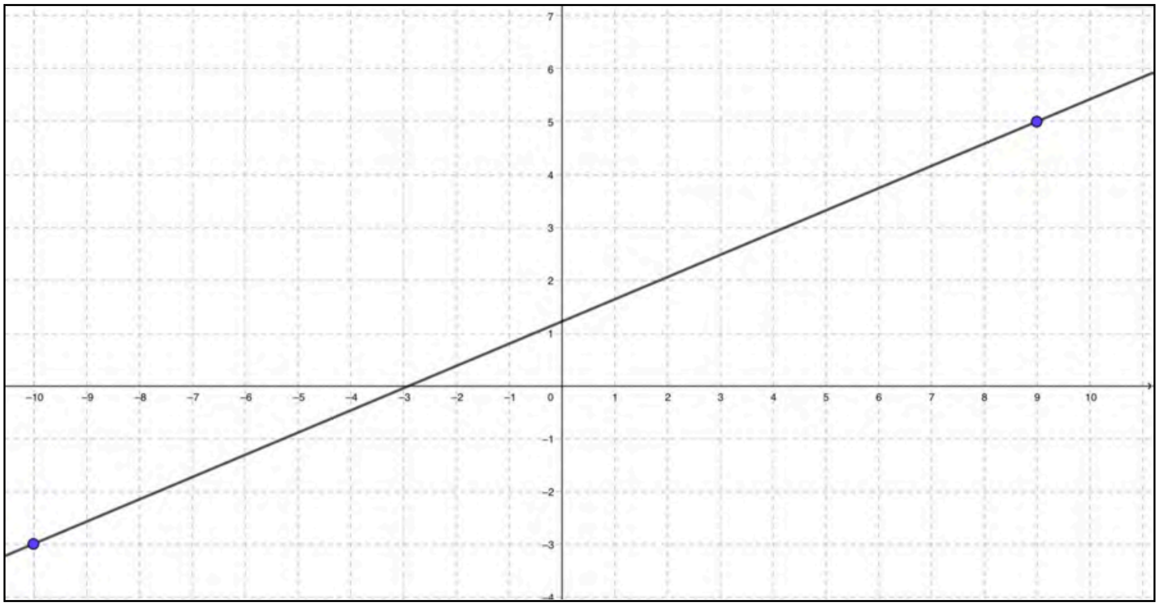
1. Use slope triangles to calculate the slope of the line. Show your work on the grid.

2. Use slope triangles to calculate the slope of the line. Show your work on the grid.

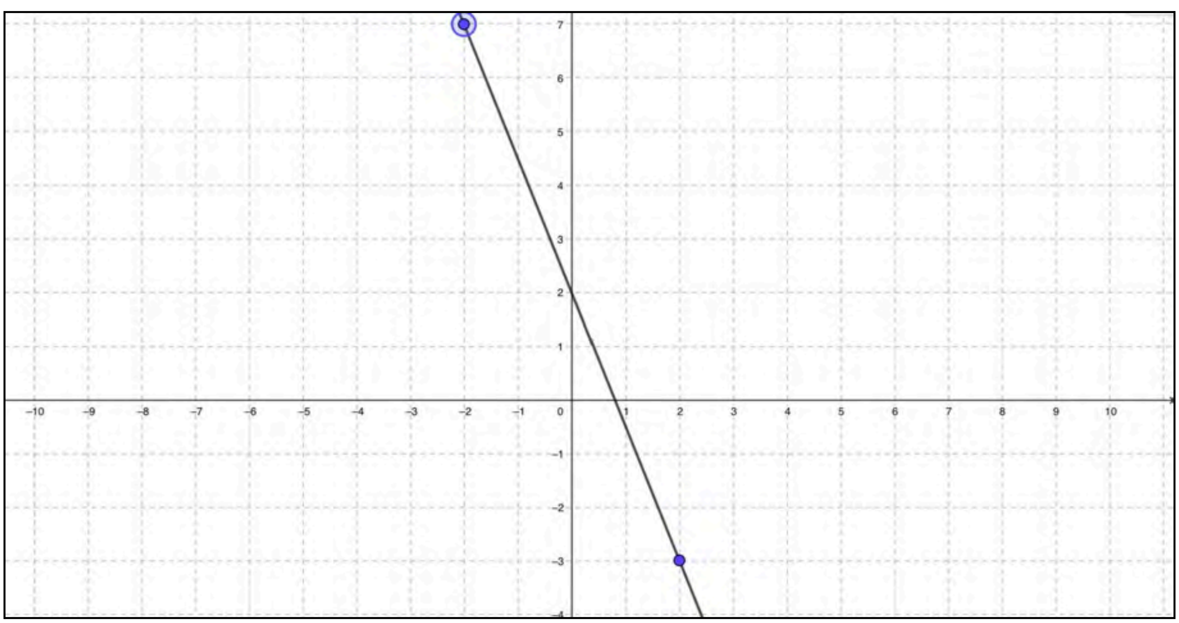
Name: ____ G8 U2 Lesson 8 - Let's Try It

Find the slope of a line on a grid using properties of slope triangles.

1. Use slope triangles to calculate the slope of the line. Show your work on the grid.

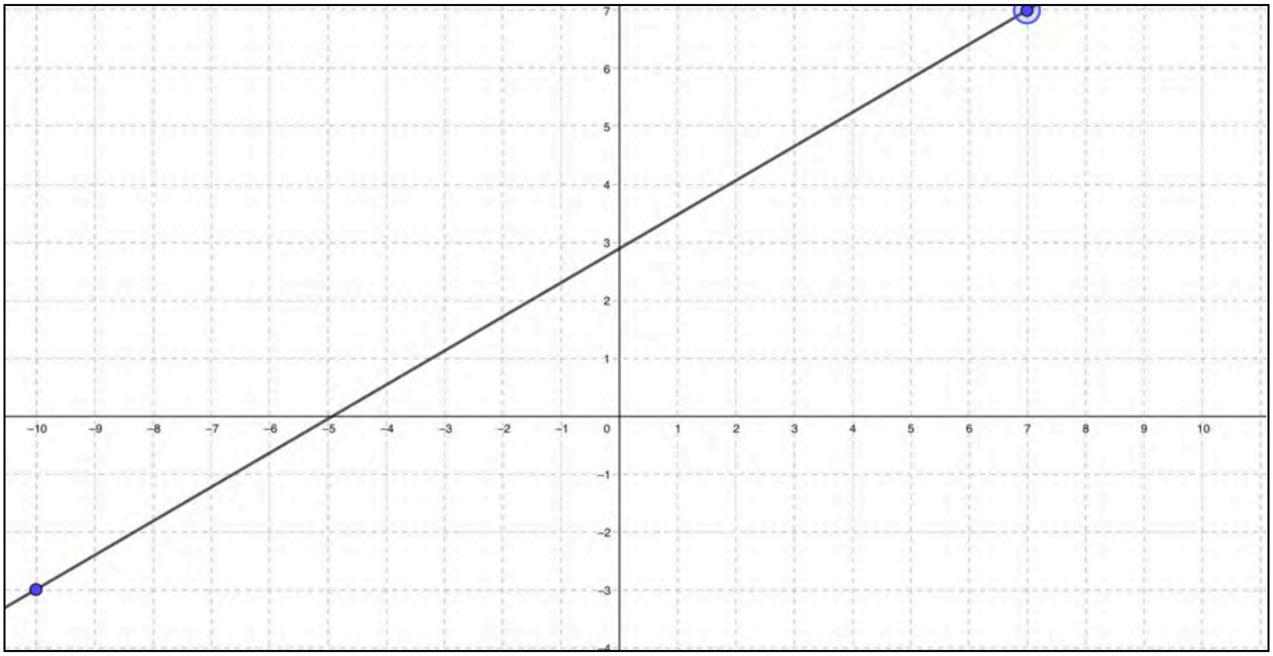


2. Use slope triangles to calculate the slope of the line. Show your work on the grid.

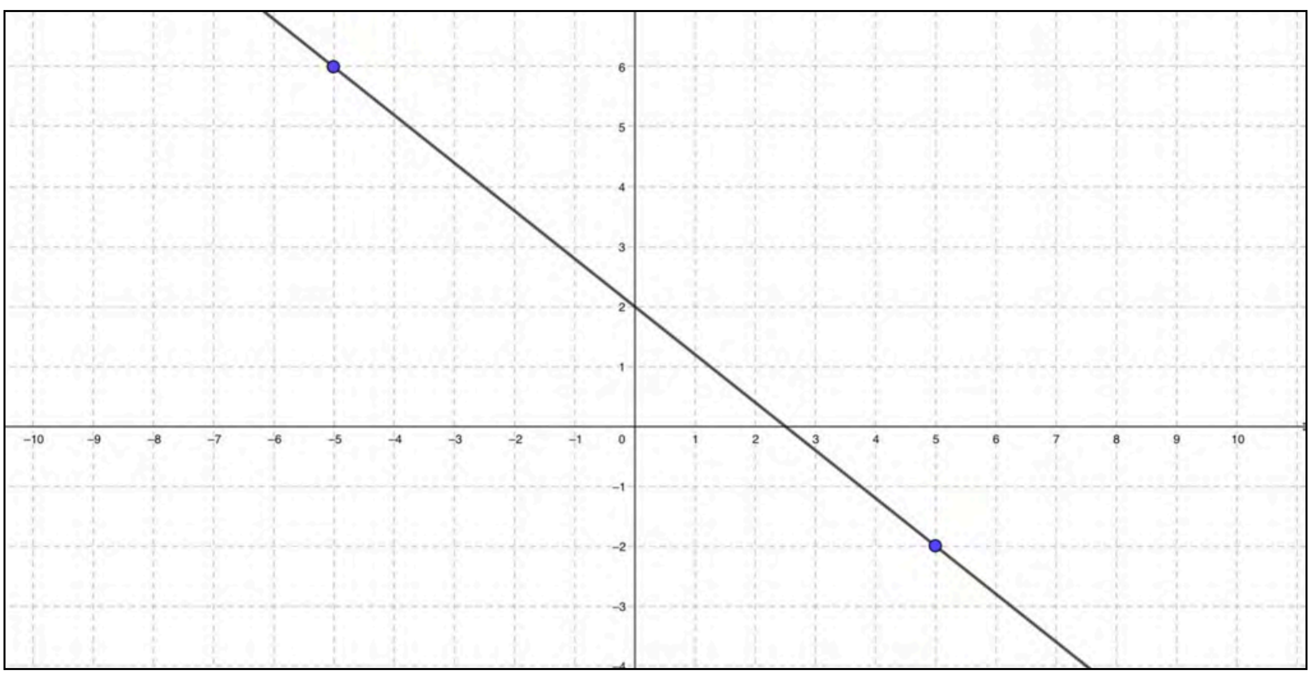


Find the slope of a line on a grid using properties of slope triangles.

1. Use slope triangles to calculate the slope of the line. Show your work on the grid.



2. Use slope triangles to calculate the slope of the line. Show your work on the grid.

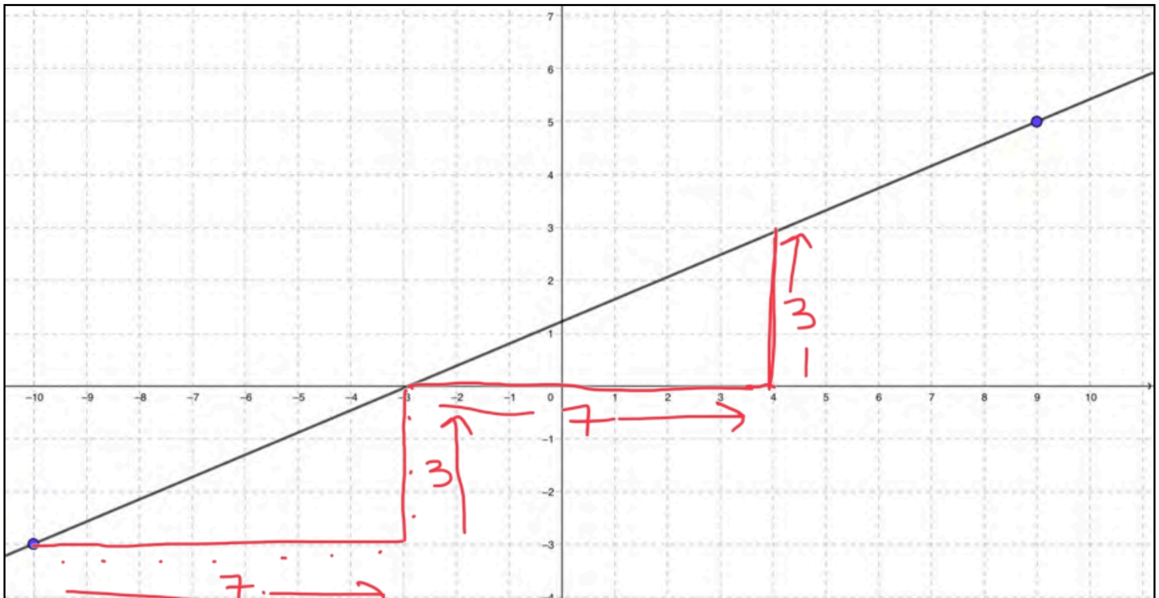


Name: Answer Key

G8 U2 Lesson 8 - Let's Try It

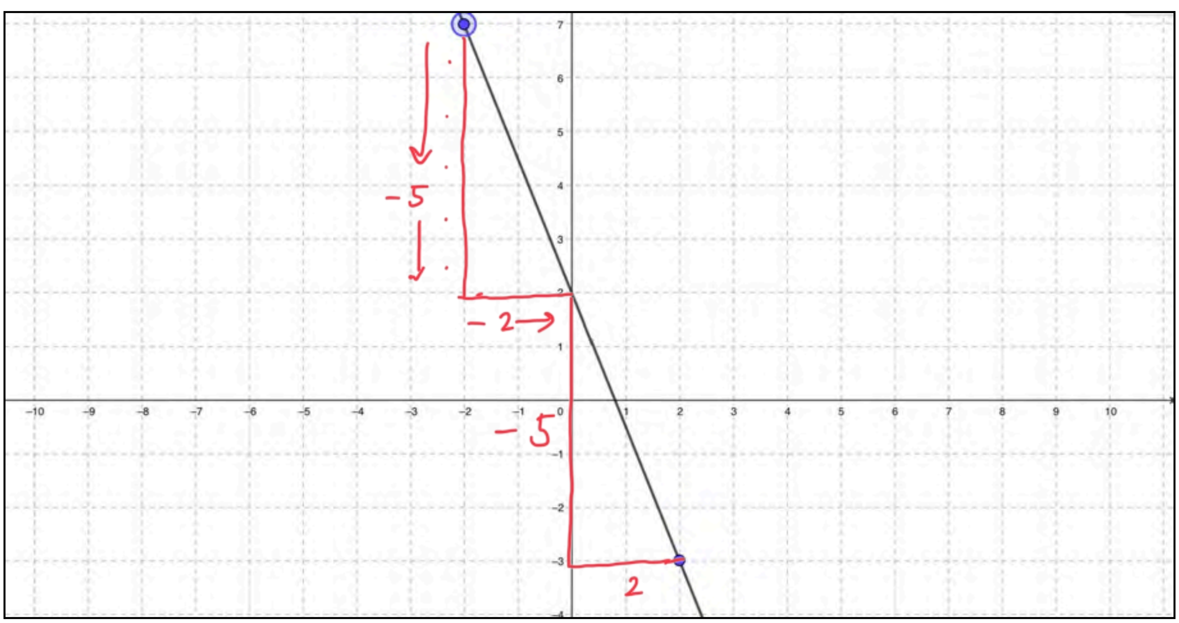
Find the slope of a line on a grid using properties of slope triangles.

1. Use slope triangles to calculate the slope of the line. Show your work on the grid.



slope $= \frac{\text{rise}}{\text{run}} = \frac{3}{7}$

2. Use slope triangles to calculate the slope of the line. Show your work on the grid.



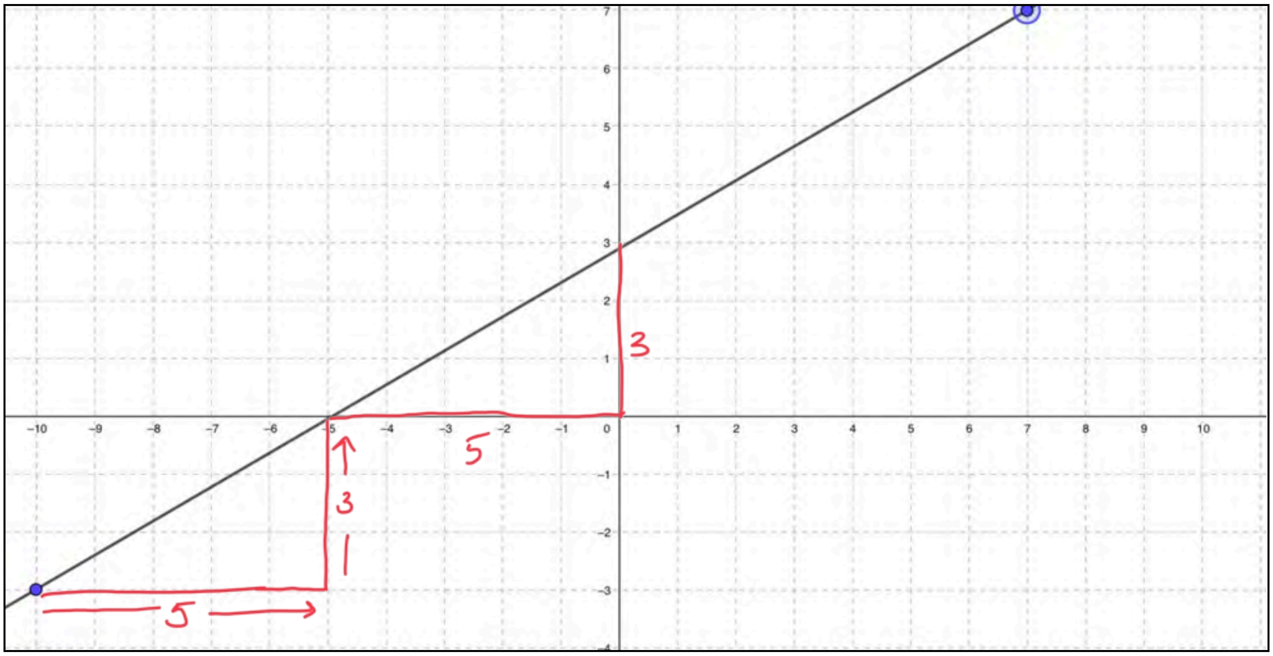
slope $= \frac{\text{rise}}{\text{run}} = -\frac{5}{2}$

Name: Answer Key

G8 U2 Lesson 8 - Independent Work

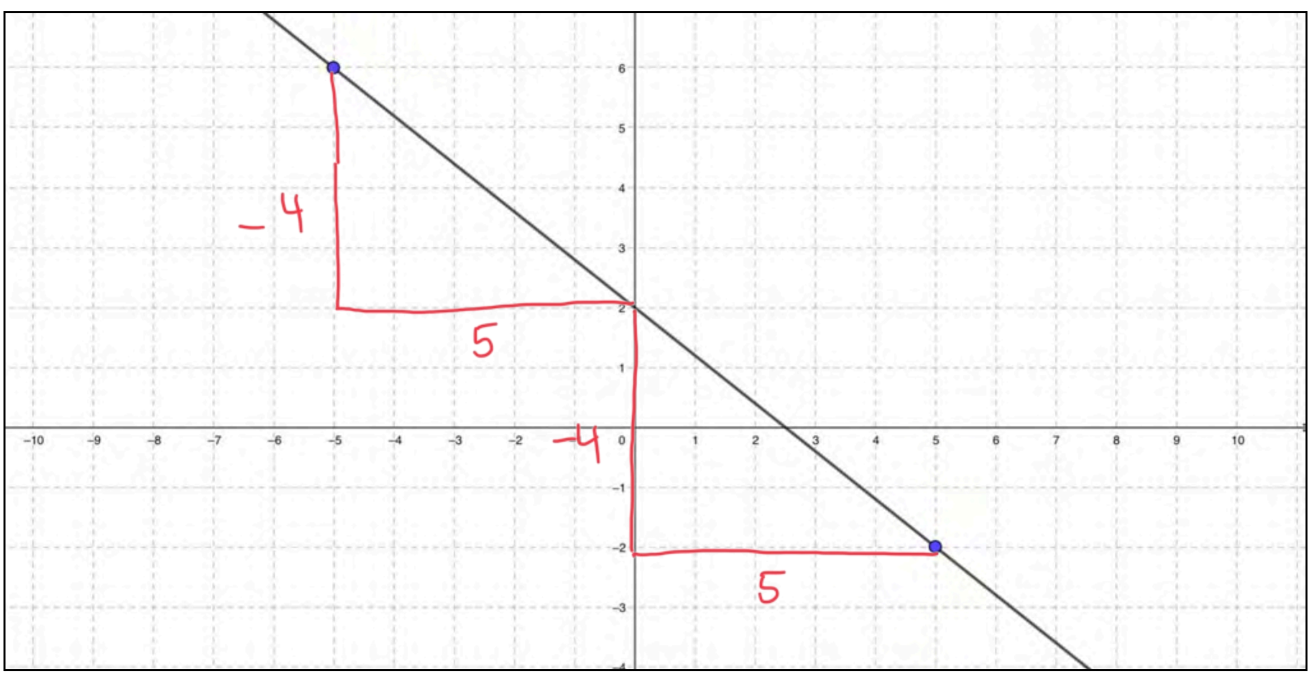
Find the slope of a line on a grid using properties of slope triangles.

1. Use slope triangles to calculate the slope of the line. Show your work on the grid.



slope = $\frac{3}{5}$

2. Use slope triangles to calculate the slope of the line. Show your work on the grid.



slope = $\frac{-4}{5}$

G8 U2 Lesson 9
Write an equation for a line.

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G8 U2 Lesson 9 - Write an equation for a line.

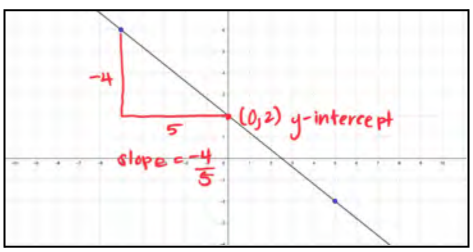
Warm Welcome (Slide 1): Tutor Choice

Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will write equations of lines.

Remember from the last time, a slope is another word to identify how much something rises over a particular distance or how much something declines over a particular distance, like any hill you might use to have your winter fun. *(Draw the run/distance, decline arrow, and slope to show students the relationship between skiing and the concept of slope.)*

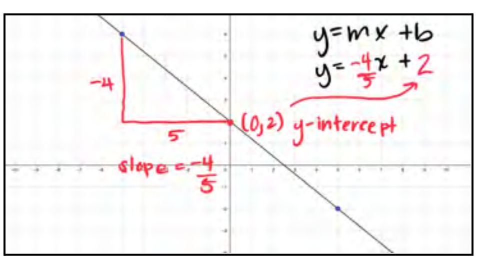
Let's Talk (Slide 4): In order to write an equation for a line, we need to know its slope and its *y*-intercept. Doe you know what a *y*-intercept is? Even if you don't, think about what the word intercept might mean and think about what that might mean in the case of a line? Possible Students Answers, Key Points:

- The *y*-intercept is where the line crosses the *y*-axis.
- When you intercept something you cross it or block it.



That's right. So, in this case. We want to find the place where the line crosses the *y*-axis. We will also use our slope triangles to find the slope so we can write a final equation. *(Put a point on the y-intercept and label its coordinates. Use slop triangles to identify the slope.)*

Let's Think (Slide 5): The formula to find the equation of a line from a graph is $y = mx + b$ where m is the slope and b is the y-intercept. So just by knowing those two things, we can simply write the equation of a line. Let's try it.



We already identified the slope is $-\frac{4}{5}$ and we know the *y*-intercept is 2. I know it's 2 because the 0 in the coordinate set represents the *x*-coordinate. *(Write the formula to write the equation for the line and substitute the slope and the y-intercept.)* Success!!

Let's Try it (Slides 7): Let's work on using what we know about slope triangles to calculate the slope of lines. Remember, you can either rise or decline but the run or distance across will always be positive and go from left to right.

WARM WELCOME

Write an equation for a line.

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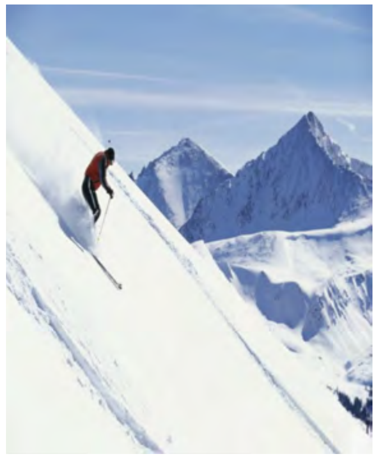
Let's Review:

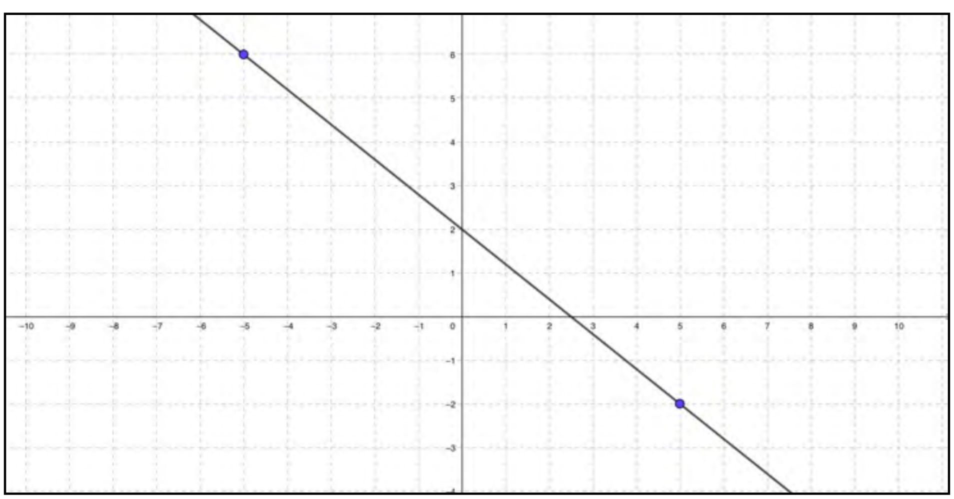
A slope is another word to identify how much something rises over a particular distance or how much something declines over a particular distance.



Let's Talk:

How do you use slope and y-intercepts to write the equation for a line?

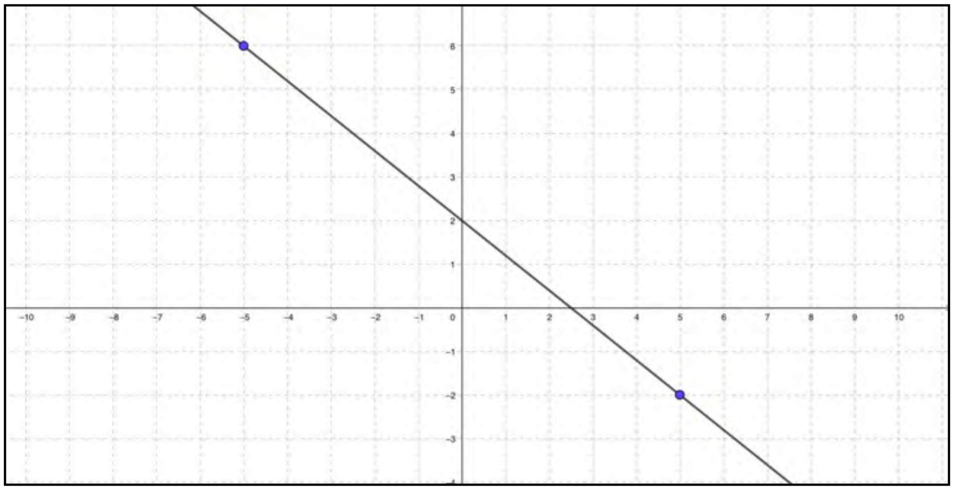
Identify the slope and *y*-intercept.



Let's Think:

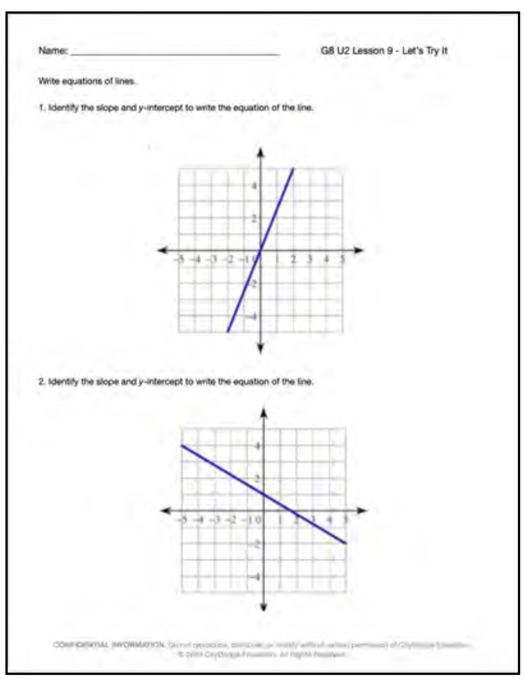
How do you use slope and y-intercepts to write the equation for a line?

Write the equation of a line using slope-intercept form, y=mx + b.



Let's Try It:

Let's practice writing equations of lines.



Name: ____________________ G8 U2 Lesson 9 - Let's Try It

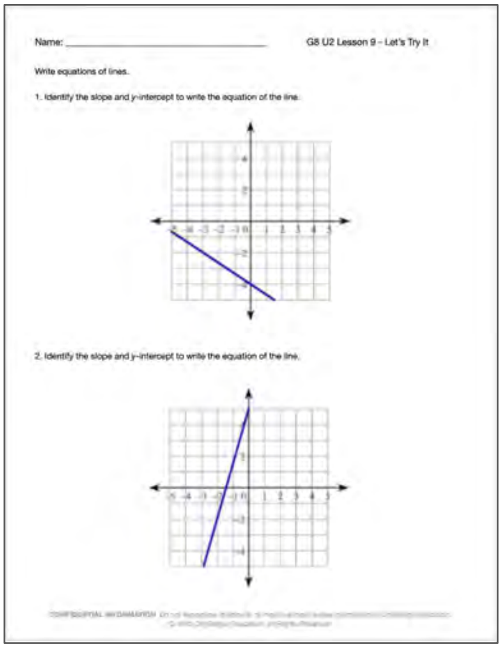
Write equations of lines.

1. Identify the slope and y-intercept to write the equation of the line.

2. Identify the slope and y-intercept to write the equation of the line.

On your Own:

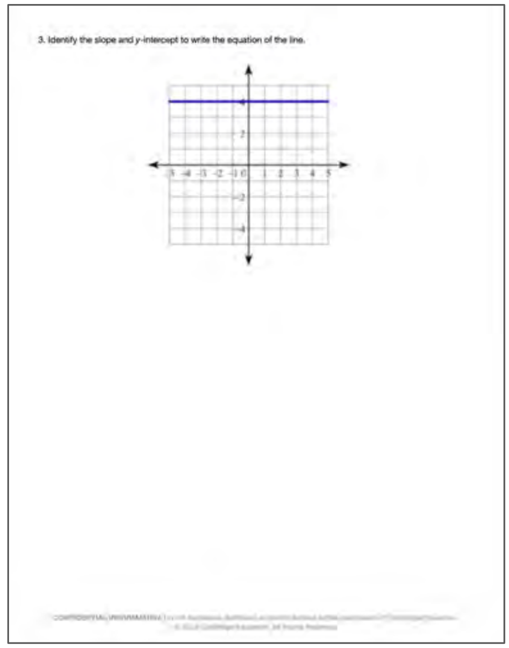
Now it's time to practice writing equations of lines on your own.


Name: ______________________ G8 U2 Lesson 9 – Let's Try It

Write equations of lines.

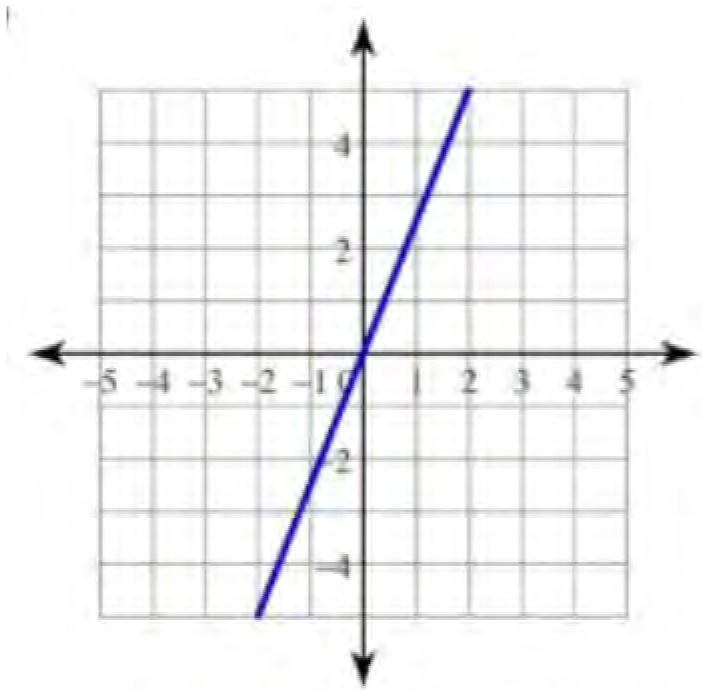
1. Identify the slope and y-intercept to write the equation of the line.

2. Identify the slope and y-intercept to write the equation of the line.

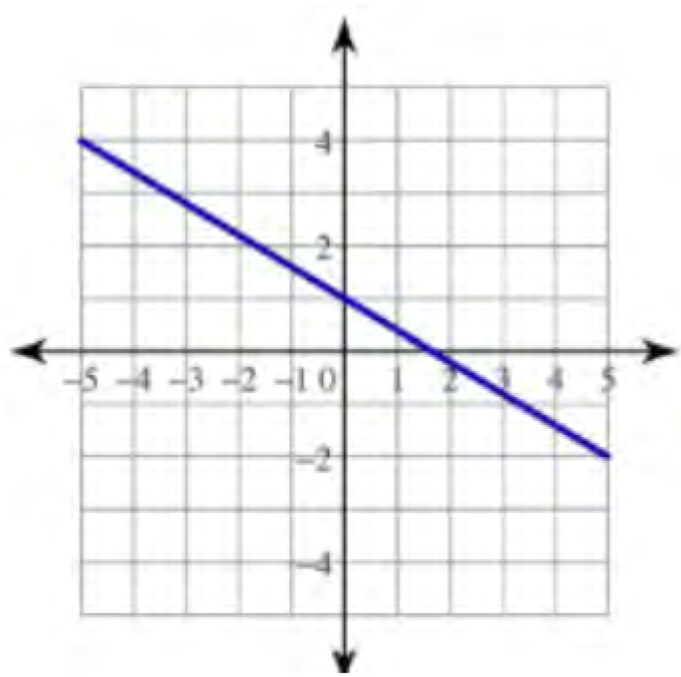

3. Identify the slope and y-intercept to write the equation of the line.

Write equations of lines.

1. Identify the slope and *y*-intercept to write the equation of the line.

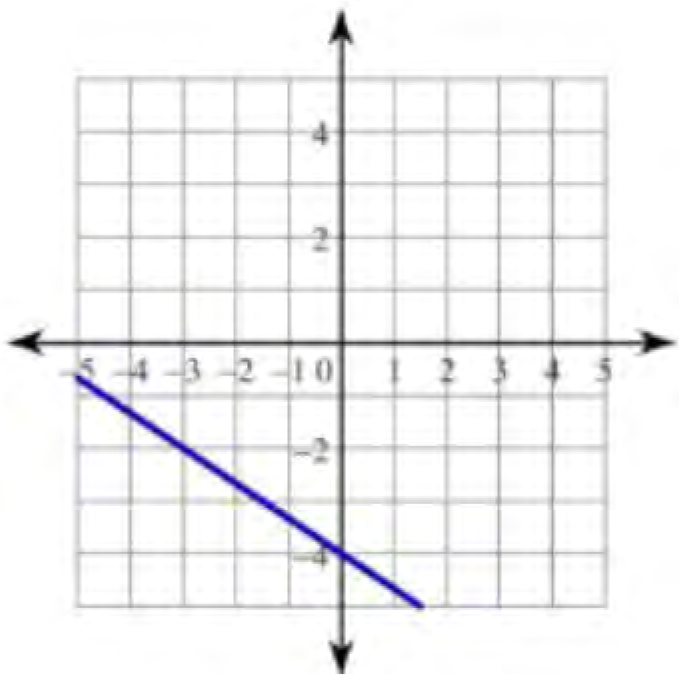


2. Identify the slope and *y*-intercept to write the equation of the line.



Write equations of lines.

1. Identify the slope and y-intercept to write the equation of the line.



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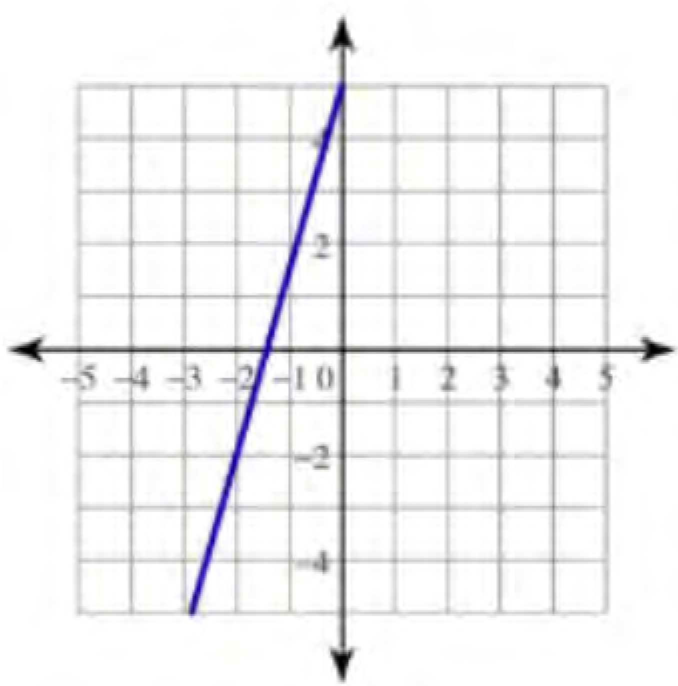

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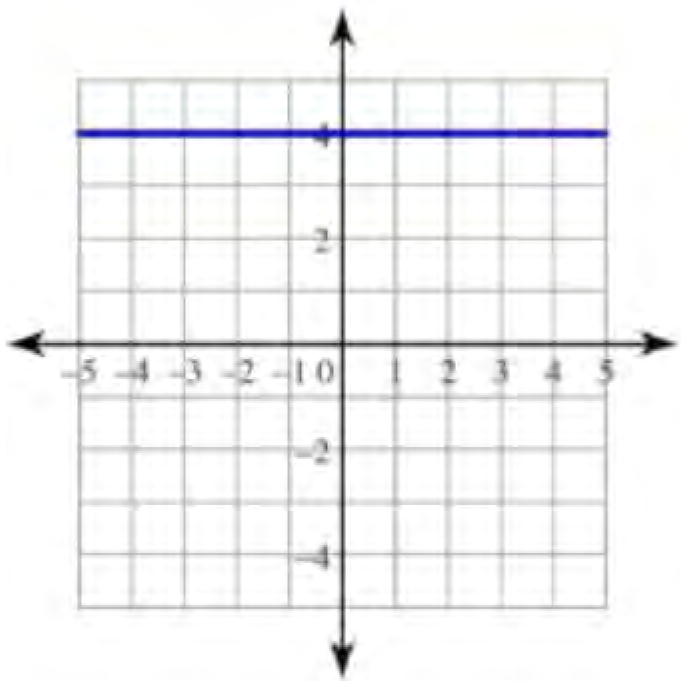
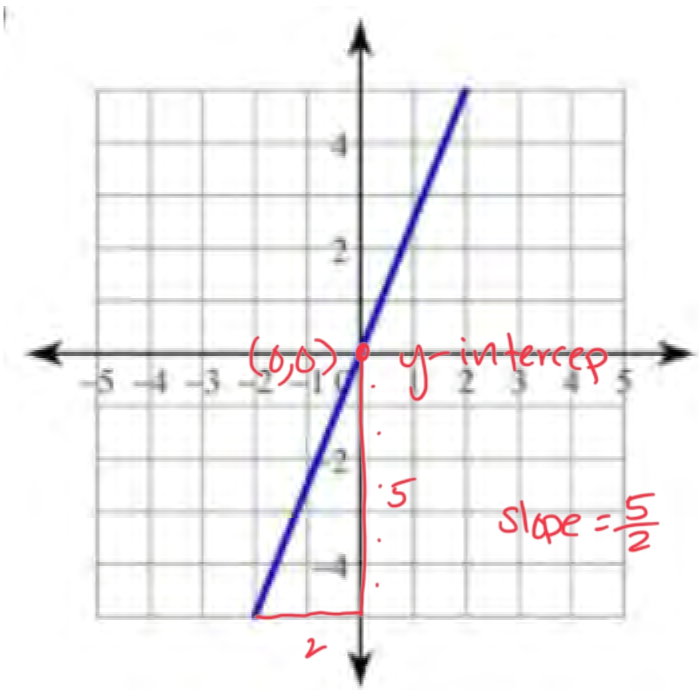


Name: Answer Key

Write equations of lines.

1. Identify the slope and *y*-intercept to write the equation of the line.

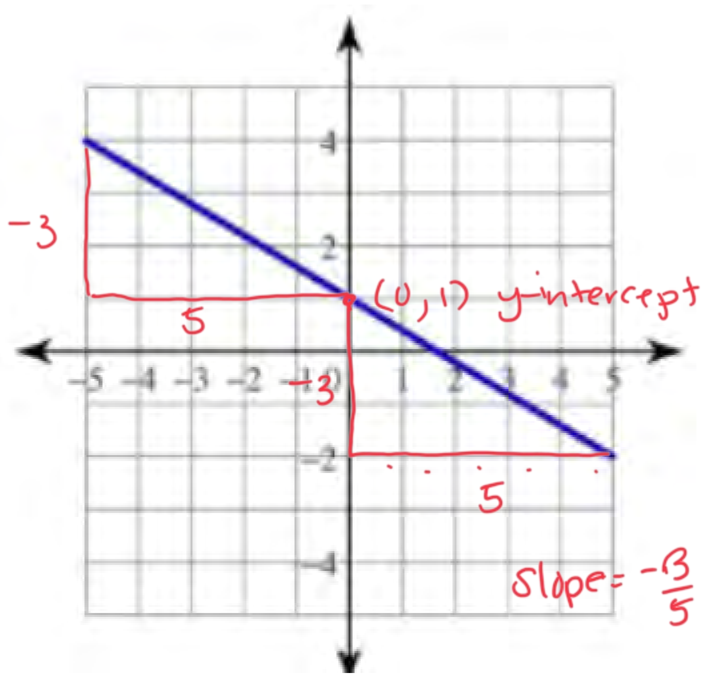


$y = mx + b$

$y = \frac{5}{2}x + 0$

$y = \frac{5}{2}x$

2. Identify the slope and *y*-intercept to write the equation of the line.



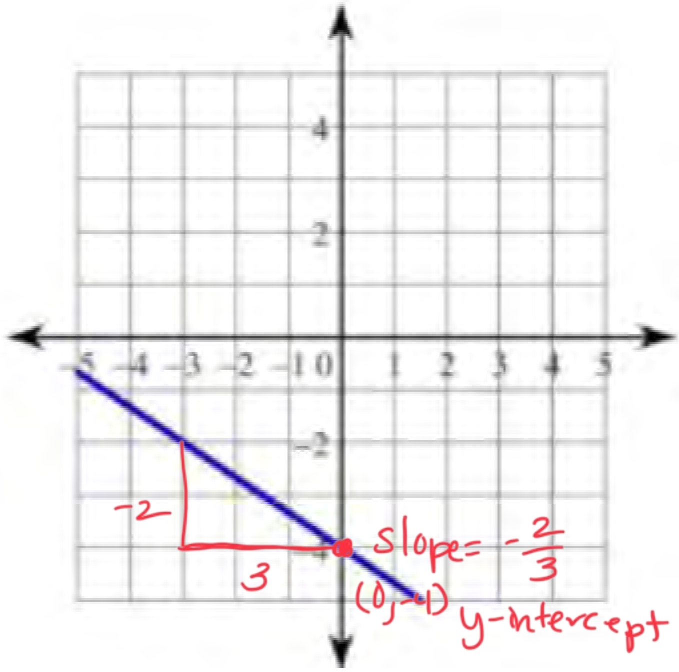
$y = mx + b$

$y = -\frac{3}{5}x + 1$

Name: Answer Key

Write equations of lines.

1. Identify the slope and *y*-intercept to write the equation of the line.

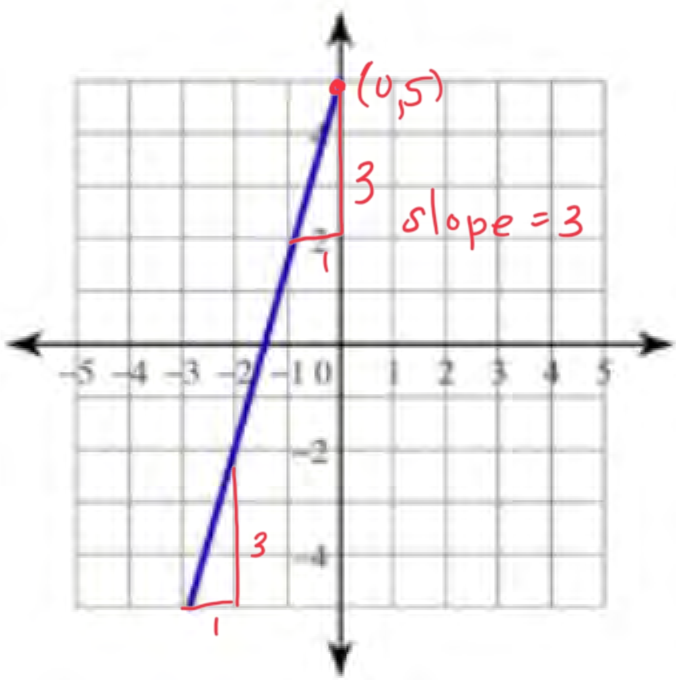


$y = mx + b$

$y = \frac{-2}{3}x + (-4)$

$y = \frac{-2}{3}x - 4$

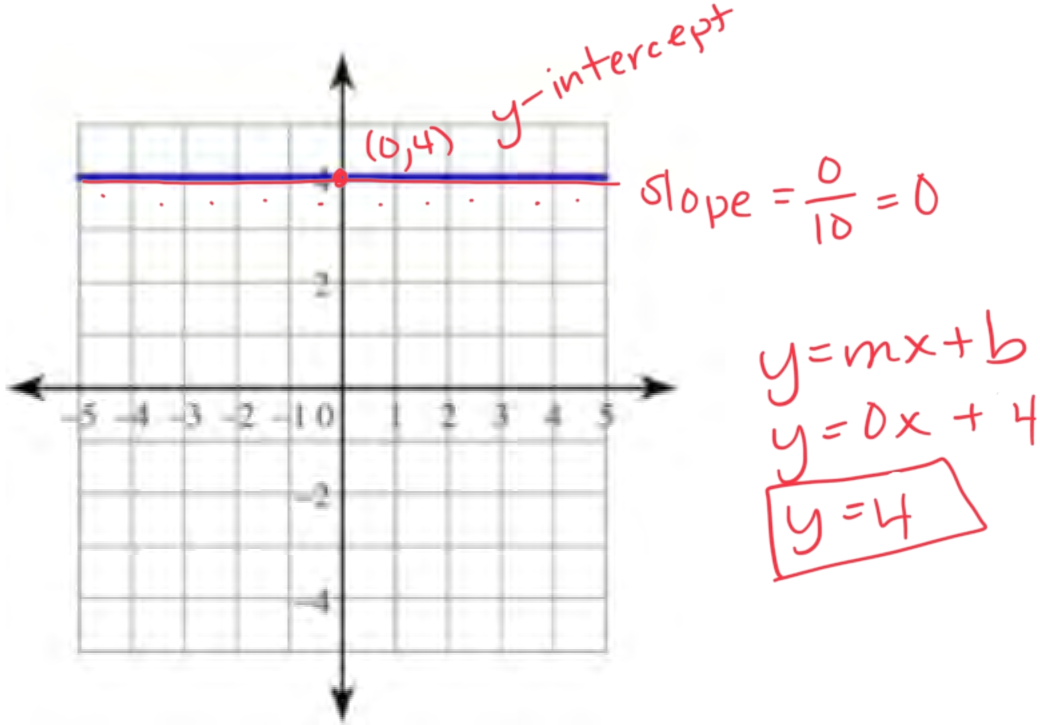
2. Identify the slope and *y*-intercept to write the equation of the line.



$y = mx + b$

$y = 3x + 5$

3. Identify the slope and y-intercept to write the equation of the line.



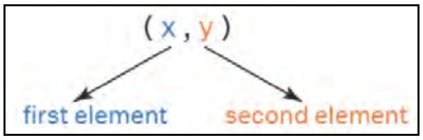
G8 U2 Lesson 10
Use an equation of a line to determine if a point is on the line.

CITYTUTOR DC

G8 U2 Lesson 10 - Use an equation of a line to determine if a point is on the line.

Warm Welcome (Slide 1): Tutor Choice

Frame the Learning/Connection to Prior Learning (Slides 2 - 3): Today we will use equations of lines to determine if a point is on the line. In order to do that, we'll rely on our algebra skills to balance equations.

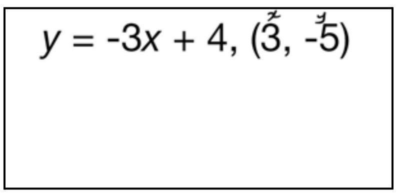


Remember, the *x*-coordinate is the first number in an ordered pair and the *y*-coordinate is the 2nd number.

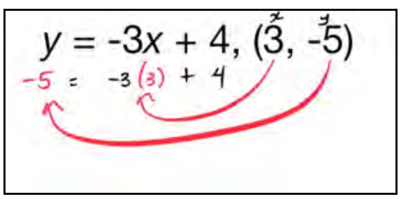
Let's Talk (Slide 4): How do you think we might check to see if a point is on a line? Possible Students Answers, Key Points:

- Graph the line and plot the point to see if it is there.
- Plug in the coordinates to the equation to see if it checks out.

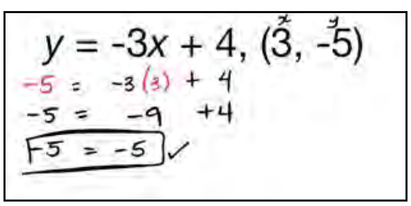
Let's Think (Slide 5): That's right. Let's consider the equation $y = -3x + 4$. Is the point (3, -5) on the line? Rather than graphing the line and looking for the point, let's plug it in and see what happens.



First, let's identify which coordinate is which. *(Write x and y above the appropriate coordinate.)*

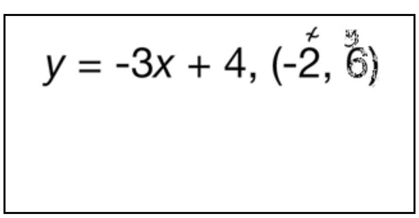


Next, let's substitute the values into the equation. *(Substitute the values of x and y and draw arrows to show the students.)*

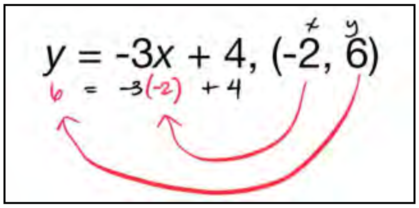


Now, let's solve the equation to see if it keeps the equation balanced. *(Simplify the expression.)*

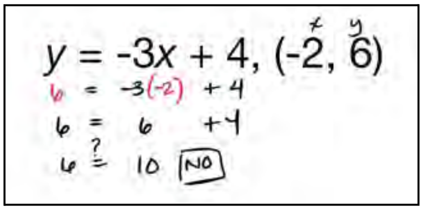
In this case, the answer is yes! Since -5 is in fact equal to -5, this point is on the line. Now, let's try one that does not check out.



Again, let's identify which coordinate is which. *(Write x and y above the appropriate coordinate.)*



Next, let's substitute the values into the equation. *(Substitute the values of x and y and draw arrows to show the students.)*



Now, let's solve the equation to see if it keeps the equation balanced. *(Simplify the expression.)*

In this case, the answer is no because the coordinates do not create a true statement.

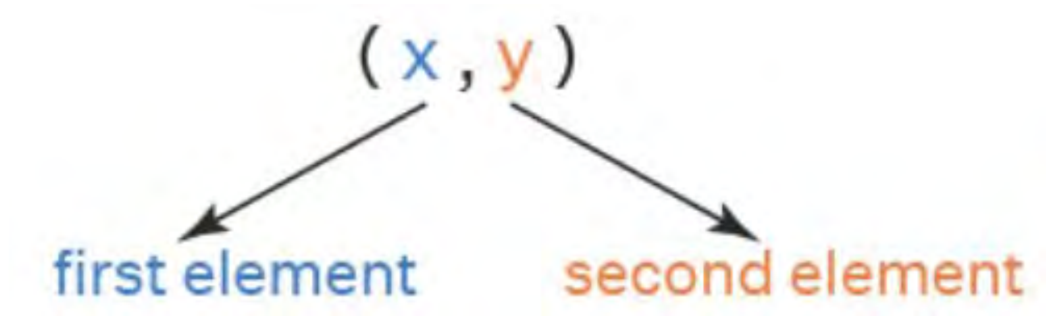
Let's Try it (Slides 7): Let's work on determining if points lie on a line. Remember, be sure to identify your coordinates and substitute them for the correct variable. If the coordinates make the equation balance, the point is on the line. If not, the point is not on the line.

WARM WELCOME

Use an equation of a line to determine if a point is on the line.

Let's Review:

The *x*-coordinate is the first number in a an ordered pair and the *y*-coordinate is the second number.



Let's Talk:

How do you determine if a point is on a line?

What might we do to determine if the point is on the line?

$$y = -3x + 4, (3, -5)$$

Let's Think: **How do you determine if a point is on a line?**

Determine if the point is on the line.

$$y = -3x + 4, (3, -5)$$

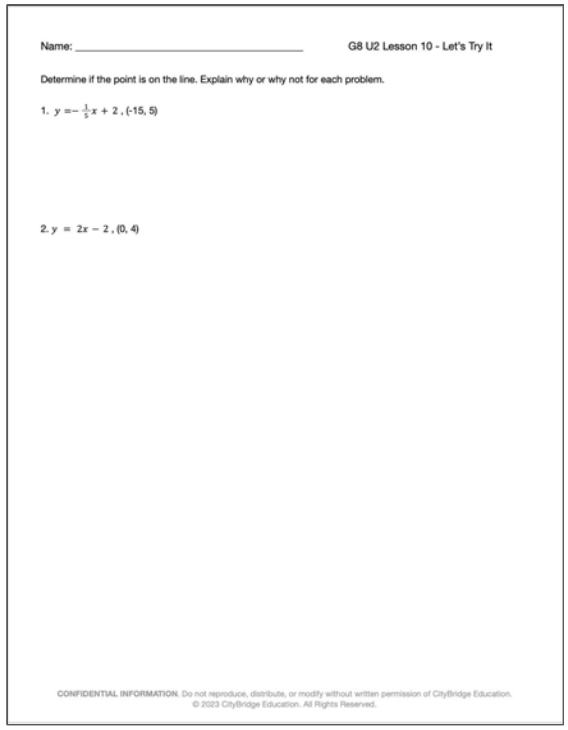
Let's Think: **How do you determine if a point is on a line?**

Determine if the point is on the line.

$$y = -3x + 4, (-2, 6)$$

Let's Try It:

Let's practice determining if a point is on a line.



Name: ______________________________ G8 U2 Lesson 10 - Let's Try It

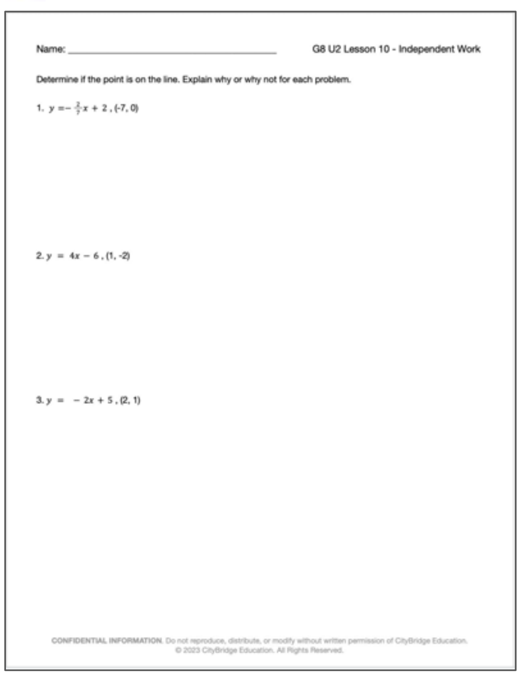
Determine if the point is on the line. Explain why or why not for each problem.

1. $y = -\frac{1}{5}x + 2$, (-15, 5)

2. $y = 2x - 2$, (0, 4)

On your Own:

Now it's time to practice determining is a point is on a line on your own.



Name: ______________________________ G8 U2 Lesson 10 - Independent Work

Determine if the point is on the line. Explain why or why not for each problem.

1. $y = -\frac{2}{7}x + 2$, (-7, 0)

2. $y = 4x - 6$, (1, -2)

3. $y = -2x + 5$, (2, 1)

Name: ______________________________________ G8 U2 Lesson 10 - Let's Try It

Determine if the point is on the line. Explain why or why not for each problem.

1. $y = -\frac{1}{5}x + 2$, (-15, 5)

2. $y = 2x - 2$, (0, 4)

Name: ____

Determine if the point is on the line. Explain why or why not for each problem.

1. $y = -\frac{2}{7}x + 2$, (-7, 0)

2. $y = 4x - 6$, (1, -2)

3. $y = -2x + 5$, (2, 1)

Name: Answer Key

Determine if the point is on the line. Explain why or why not for each problem.

1. $y = -\frac{1}{5}x + 2$, (-15, 5)

$5 = -\frac{1}{5}(-15) + 2$

$5 = 3 + 2$

$5 = 5$ ✓

Yes. Since (-15, 5) makes the equation true, it is a point on the line.

2. $y = 2x - 2$, (0, 4)

$4 = 2(0) - 2$

$4 = 0 - 2$

$4 \stackrel{?}{=} -2$ NO

No. (0, 4) does not make the equation true.

Name: Answer Key

Determine if the point is on the line. Explain why or why not for each problem.

1. $y = -\frac{2}{7}x + 2$, (-7, 0)

$0 = -\frac{2}{7}(-7) + 2$

$0 = 2 + 2$

$0 \stackrel{?}{=} 4$ NO

NO. (-7, 0) does not make the equation true.

2. $y = 4x - 6$, (1, -2)

$-2 = 4(1) - 6$

$-2 = 4 - 6$

$-2 = -2$ ✓

Yes. (1, -2) makes the equation true so it is a point on the line.

3. $y = -2x + 5$, (2, 1)

$1 = -2(2) + 5$

$1 = -4 + 5$

$1 = 1$ ✓

Yes. (2, 1) makes the equation true so it is a point on the line.