

# A Story of Ratios<sup>®</sup>

## Eureka Math<sup>™</sup>

### Grade 8, Module 3

### Student File\_B

*Contains Exit Ticket,  
and Assessment Materials*

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# Exit Ticket Packet

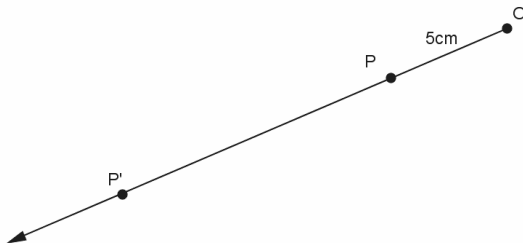
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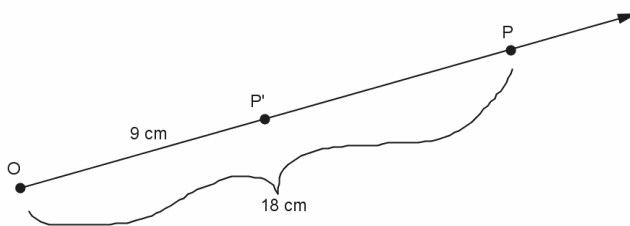
## Lesson 1: What Lies Behind “Same Shape”?

### Exit Ticket

- Why do we need a better definition for similarity than “same shape, not the same size”?
- Use the diagram below. Let there be a dilation from center  $O$  with scale factor  $r = 3$ . Then,  $Dilation(P) = P'$ . In the diagram below,  $|OP| = 5$  cm. What is  $|OP'|$ ? Show your work.



- Use the diagram below. Let there be a dilation from center  $O$ . Then,  $Dilation(P) = P'$ . In the diagram below,  $|OP| = 18$  cm and  $|OP'| = 9$  cm. What is the scale factor  $r$ ? Show your work.



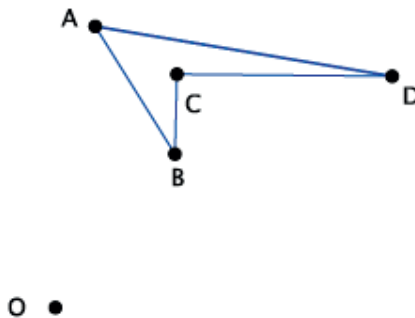
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## Lesson 2: Properties of Dilations

### Exit Ticket

1. Given center  $O$  and quadrilateral  $ABCD$ , using a compass and ruler, dilate the figure from center  $O$  by a scale factor of  $r = 2$ . Label the dilated quadrilateral  $A'B'C'D'$ .



2. Describe what you learned today about what happens to lines, segments, rays, and angles after a dilation.

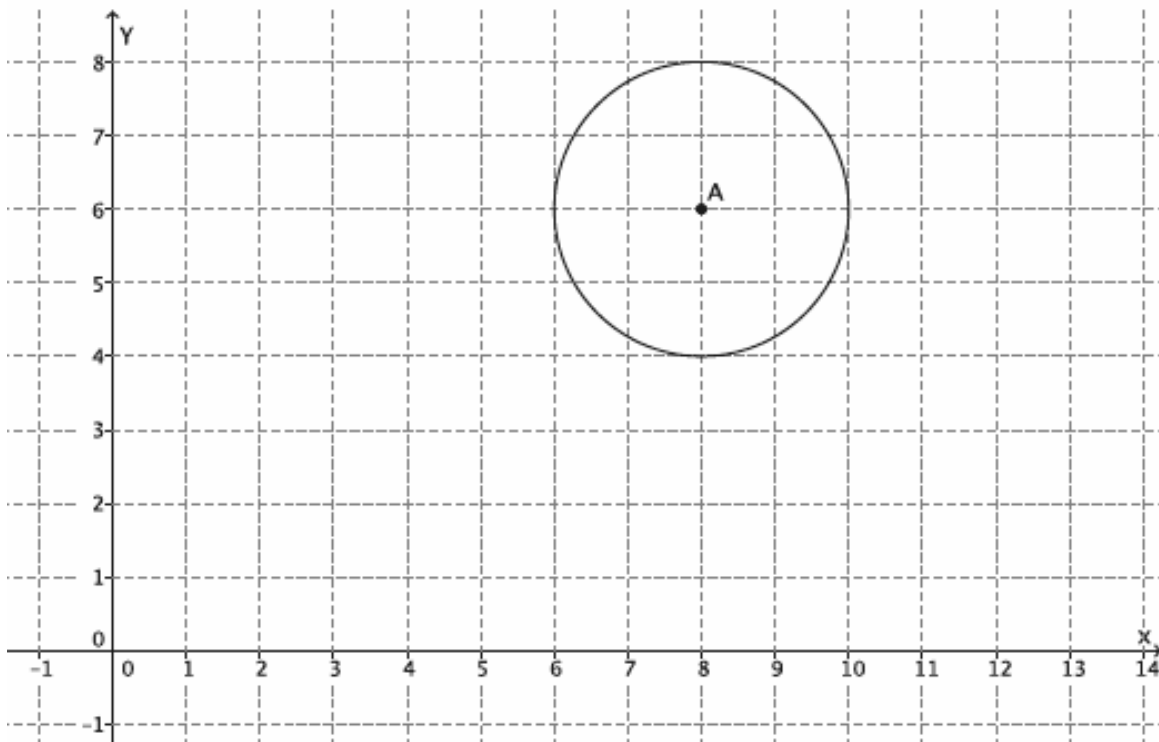
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## Lesson 3: Examples of Dilations

### Exit Ticket

1. Dilate circle  $A$  from center  $O$  by a scale factor  $r = \frac{1}{2}$ . Make sure to use enough points to make a good image of the original figure.



2. What scale factor would magnify the dilated circle back to the original size of circle  $A$ ? How do you know?

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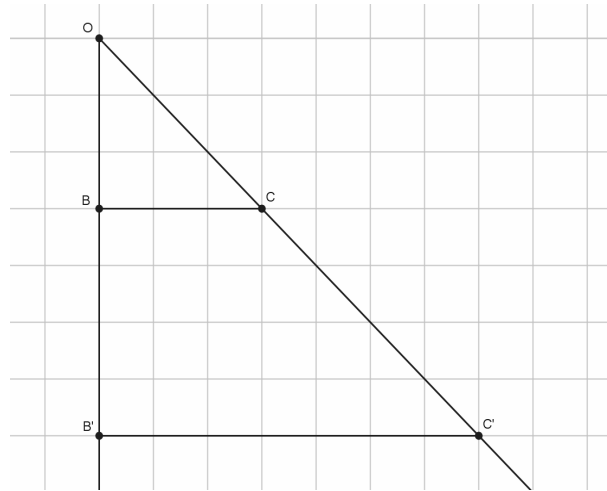
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## Lesson 4: Fundamental Theorem of Similarity (FTS)

### Exit Ticket

Steven sketched the following diagram on graph paper. He dilated points  $B$  and  $C$  from point  $O$ . Answer the following questions based on his drawing.

1. What is the scale factor  $r$ ? Show your work.



2. Verify the scale factor with a different set of segments.

3. Which segments are parallel? How do you know?

4. Are  $\angle OBC$  and  $\angle OB'C'$  right angles? How do you know?

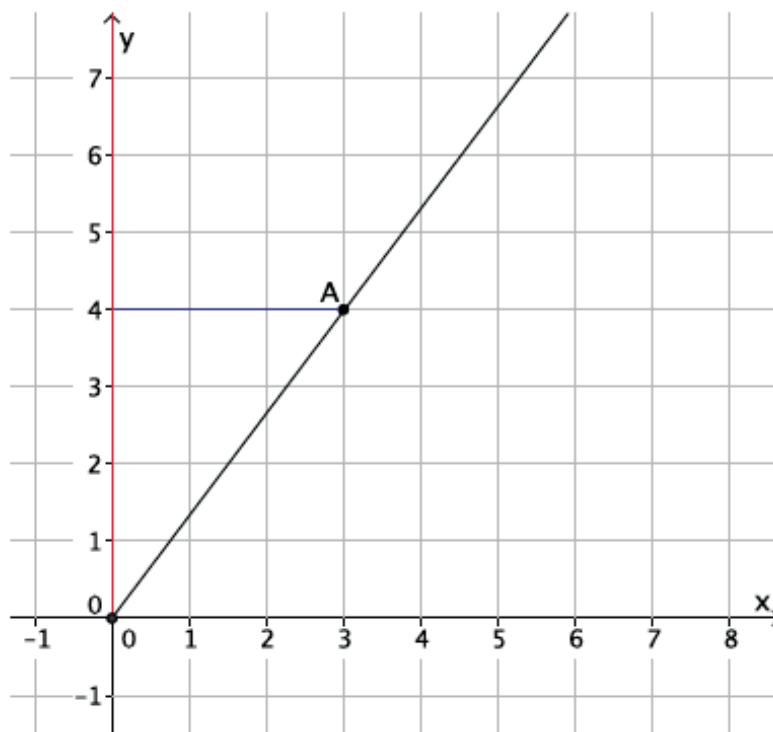
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## Lesson 5: First Consequences of FTS

### Exit Ticket

In the diagram below, you are given center  $O$  and ray  $\overrightarrow{OA}$ . Point  $A$  is dilated by a scale factor  $r = \frac{6}{4}$ . Use what you know about FTS to find the location of point  $A'$ .



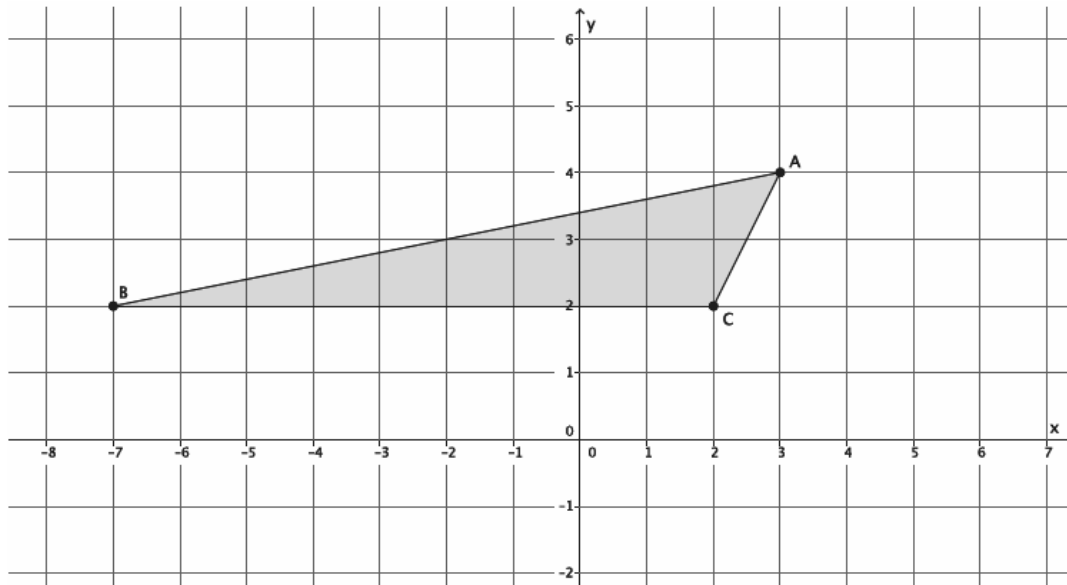
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## Lesson 6: Dilations on the Coordinate Plane

### Exit Ticket

1. The point  $A(7, 4)$  is dilated from the origin by a scale factor  $r = 3$ . What are the coordinates of point  $A'$ ?
2. The triangle  $ABC$ , shown on the coordinate plane below, is dilated from the origin by scale factor  $r = \frac{1}{2}$ . What is the location of triangle  $A'B'C'$ ? Draw and label it on the coordinate plane.





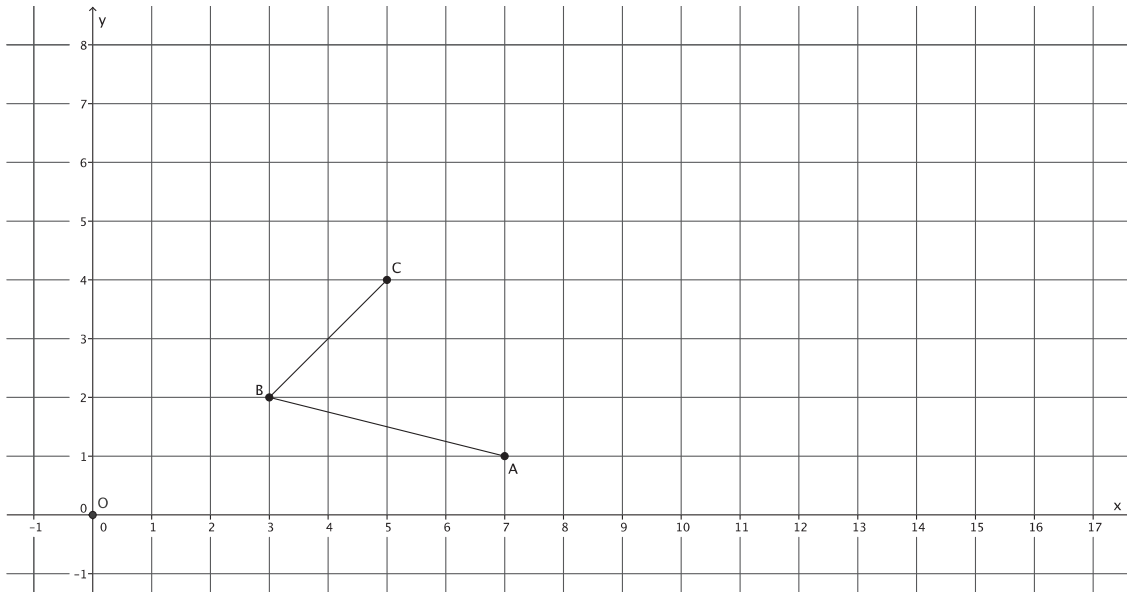
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## Lesson 7: Informal Proofs of Properties of Dilations

### Exit Ticket

Dilate  $\angle ABC$  with center  $O$  and scale factor  $r = 2$ . Label the dilated angle,  $\angle A'B'C'$ .



1. If  $\angle ABC = 72^\circ$ , then what is the measure of  $\angle A'B'C'$ ?
2. If the length of segment  $AB$  is 2 cm, what is the length of segment  $A'B'$ ?
3. Which segments, if any, are parallel?

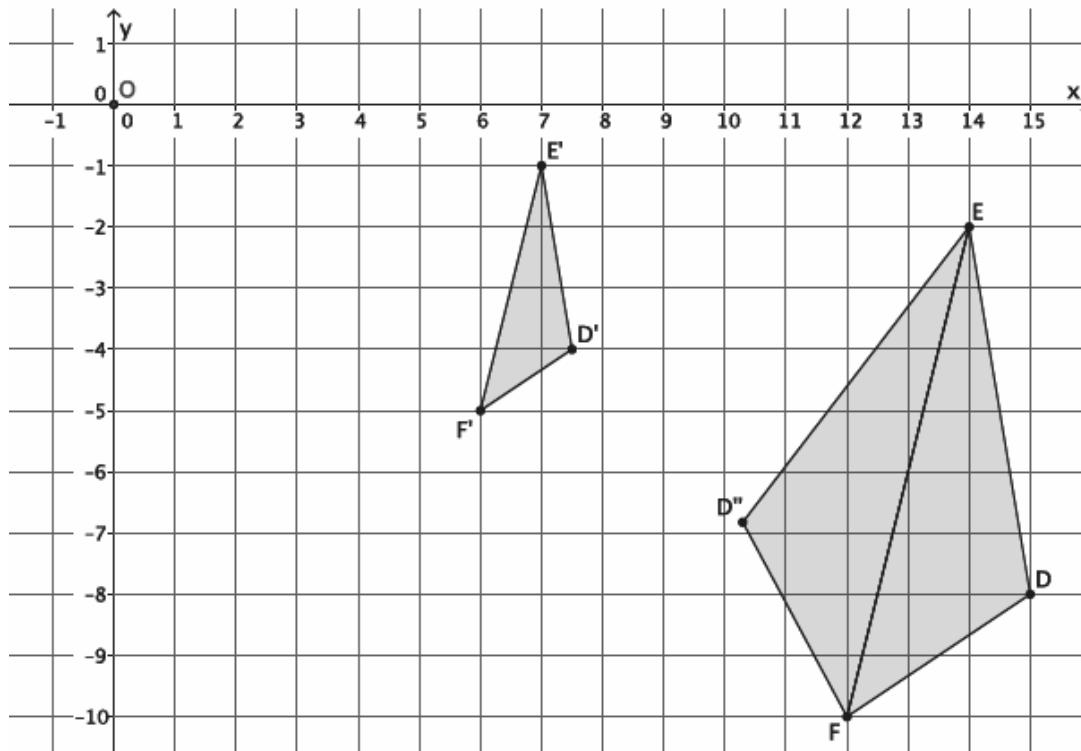
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## Lesson 8: Similarity

### Exit Ticket

In the picture below, we have triangle  $DEF$  that has been dilated from center  $O$  by scale factor  $r = \frac{1}{2}$ . The dilated triangle is noted by  $D'E'F'$ . We also have a triangle  $D''EF$ , which is congruent to triangle  $DEF$  (i.e.,  $\triangle DEF \cong \triangle D''EF$ ). Describe the sequence of a dilation followed by a congruence (of one or more rigid motions) that would map triangle  $D'E'F'$  onto triangle  $D''EF$ .



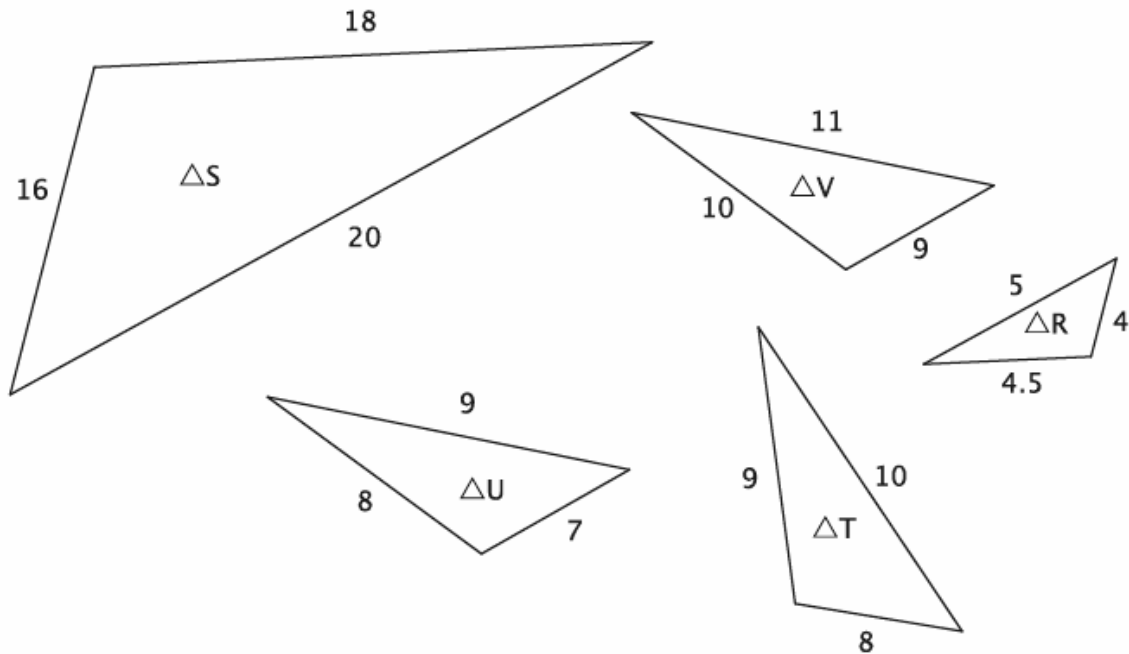
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## Lesson 9: Basic Properties of Similarity

### Exit Ticket

Use the diagram below to answer Problems 1 and 2.



- Which two triangles, if any, have similarity that is symmetric?
- Which three triangles, if any, have similarity that is transitive?

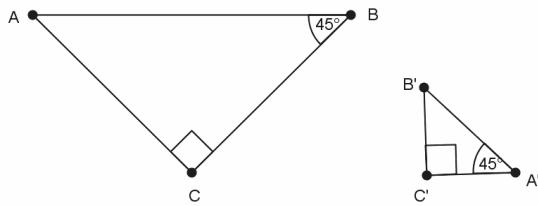
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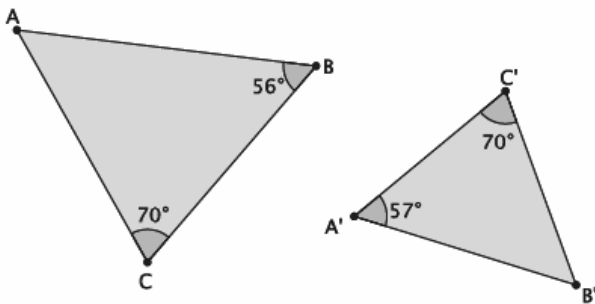
## Lesson 10: Informal Proof of AA Criterion for Similarity

### Exit Ticket

1. Are the triangles shown below similar? Present an informal argument as to why they are or are not similar.



2. Are the triangles shown below similar? Present an informal argument as to why they are or are not similar.



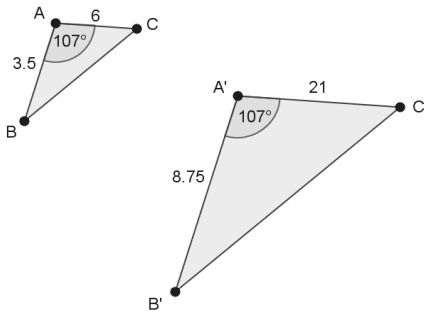
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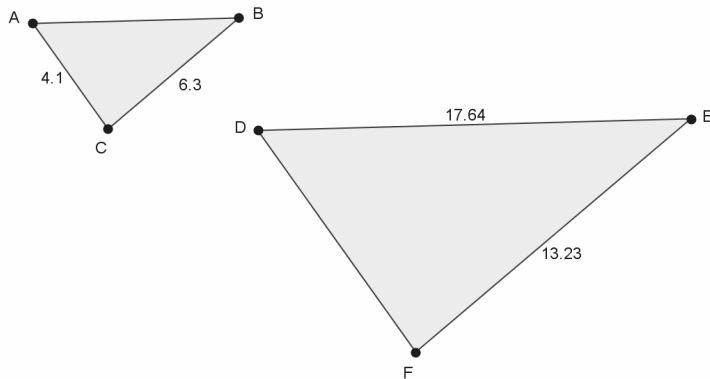
## Lesson 11: More About Similar Triangles

### Exit Ticket

1. In the diagram below, you have  $\triangle ABC$  and  $\triangle A'B'C'$ . Based on the information given, is  $\triangle ABC \sim \triangle A'B'C'$ ? Explain.



2. In the diagram below,  $\triangle ABC \sim \triangle DEF$ . Use the information to answer parts (a)–(b).



- a. Determine the length of side  $\overline{AB}$ . Show work that leads to your answer.
- b. Determine the length of side  $\overline{DF}$ . Show work that leads to your answer.

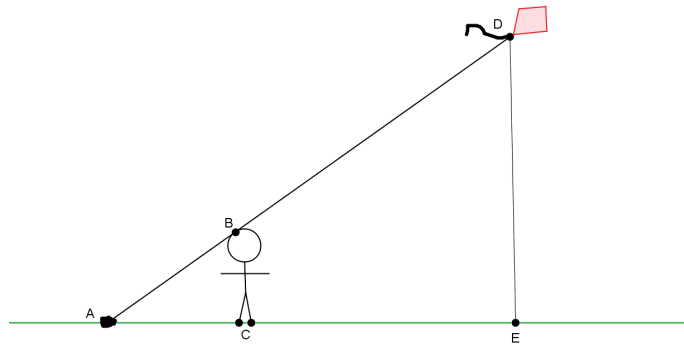
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## Lesson 12: Modeling Using Similarity

### Exit Ticket

Henry thinks he can figure out how high his kite is while flying it in the park. First, he lets out 150 feet of string and ties the string to a rock on the ground. Then, he moves from the rock until the string touches the top of his head. He stands up straight, forming a right angle with the ground. He wants to find out the distance from the ground to his kite. He draws the following diagram to illustrate what he has done.



- a. Has Henry done enough work so far to use similar triangles to help measure the height of the kite? Explain.
- b. Henry knows he is  $5\frac{1}{2}$  feet tall. Henry measures the string from the rock to his head and finds it to be 8 feet. Does he have enough information to determine the height of the kite? If so, find the height of the kite. If not, state what other information would be needed.

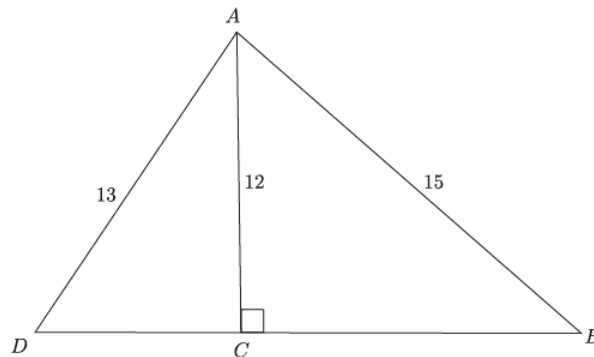
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## Lesson 13: Proof of the Pythagorean Theorem

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Determine the length of side  $\overline{BD}$  in the triangle below.



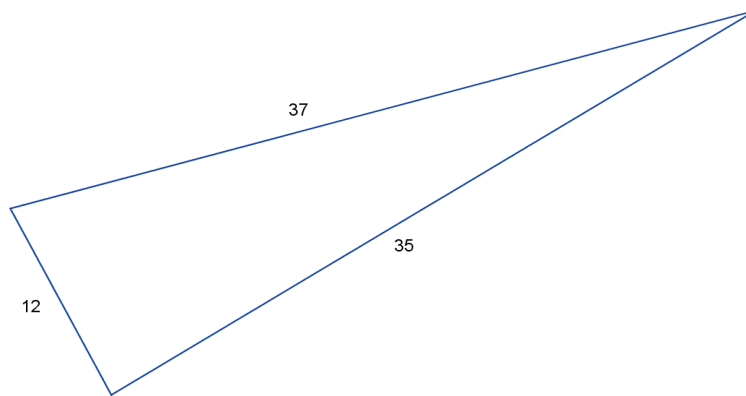
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## Lesson 14: The Converse of the Pythagorean Theorem

### Exit Ticket

1. The numbers in the diagram below indicate the lengths of the sides of the triangle. Bernadette drew the following triangle and claims it is a right triangle. How can she be sure?



2. Do the lengths 5, 9, and 14 form a right triangle? Explain.

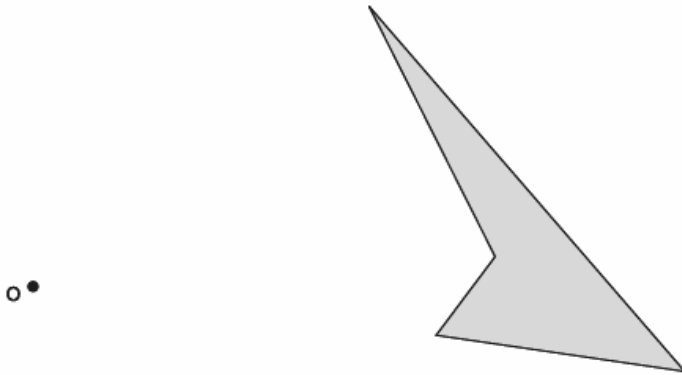


# Assessment Packet

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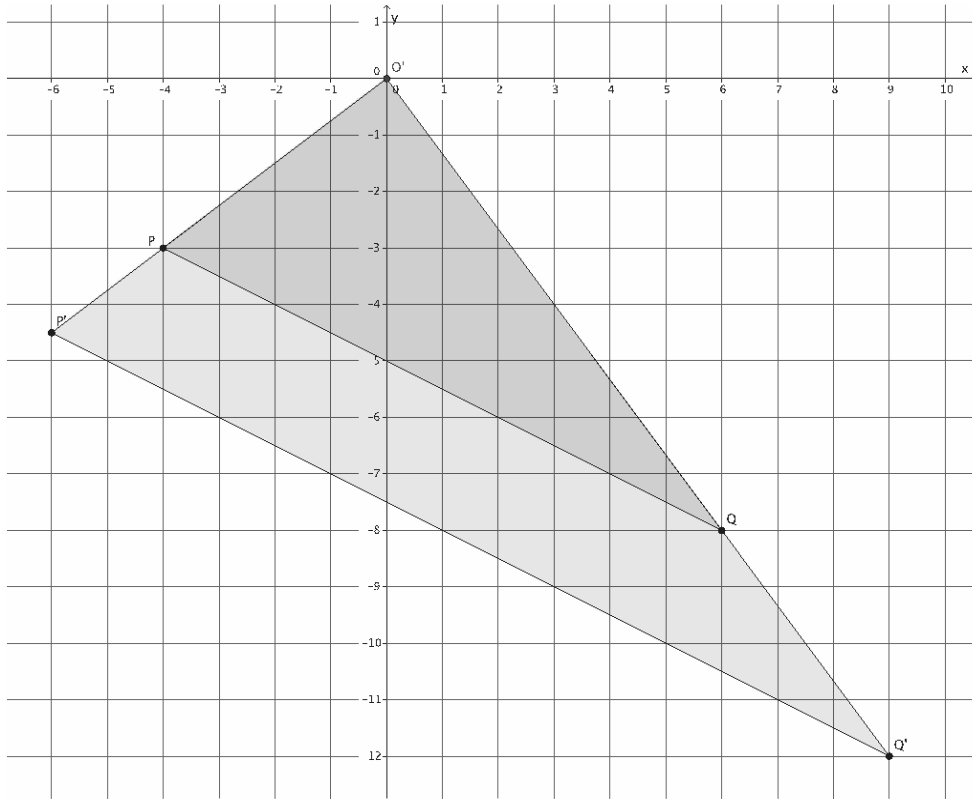
1. Use the figure below to complete parts (a) and (b).



- a. Use a compass and ruler to produce an image of the figure with center  $O$  and scale factor  $r = 2$ .
- b. Use a ruler to produce an image of the figure with center  $O$  and scale factor  $r = \frac{1}{2}$ .

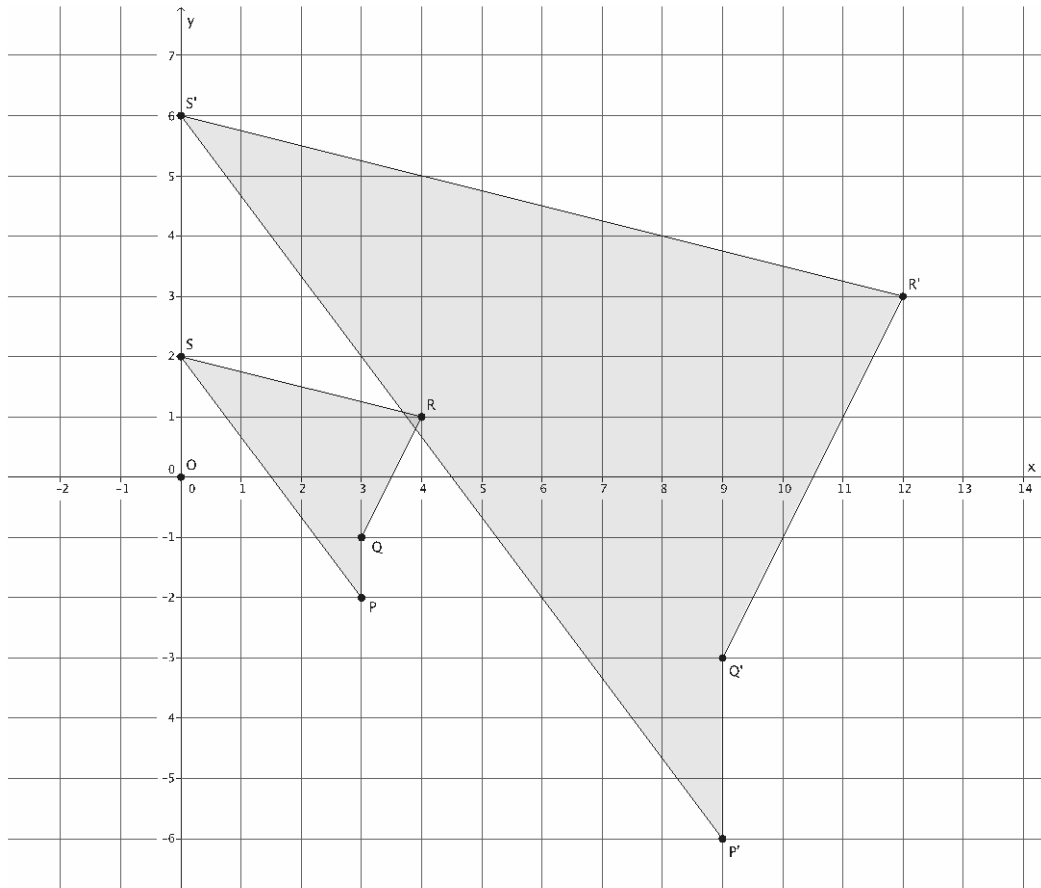
2. Use the diagram below to answer the questions that follow.

Let  $D$  be the dilation with center  $O$  and scale factor  $r > 0$  so that  $Dilation(P) = P'$  and  $Dilation(Q) = Q'$ .

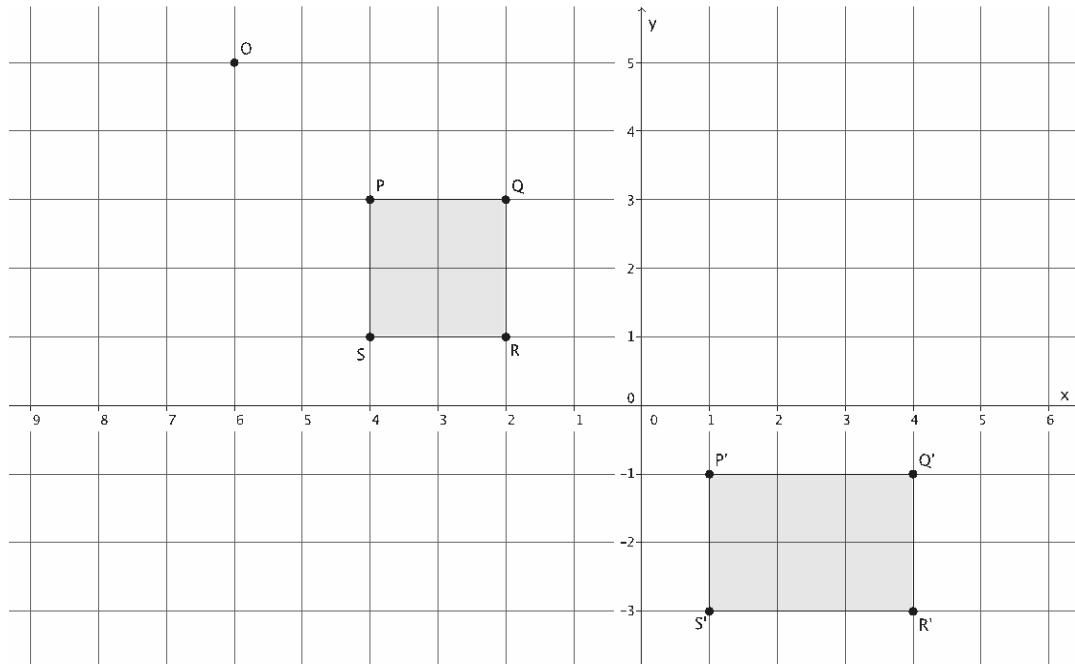


- a. Use lengths  $|OQ| = 10$  units and  $|OQ'| = 15$  units to determine the scale factor  $r$  of dilation  $D$ . Describe how to determine the coordinates of  $P'$  using the coordinates of  $P$ .
- b. If  $|OQ| = 10$  units,  $|OQ'| = 15$  units, and  $|P'Q'| = 11.2$  units, determine  $|PQ|$ . Round your answer to the tenths place, if necessary.

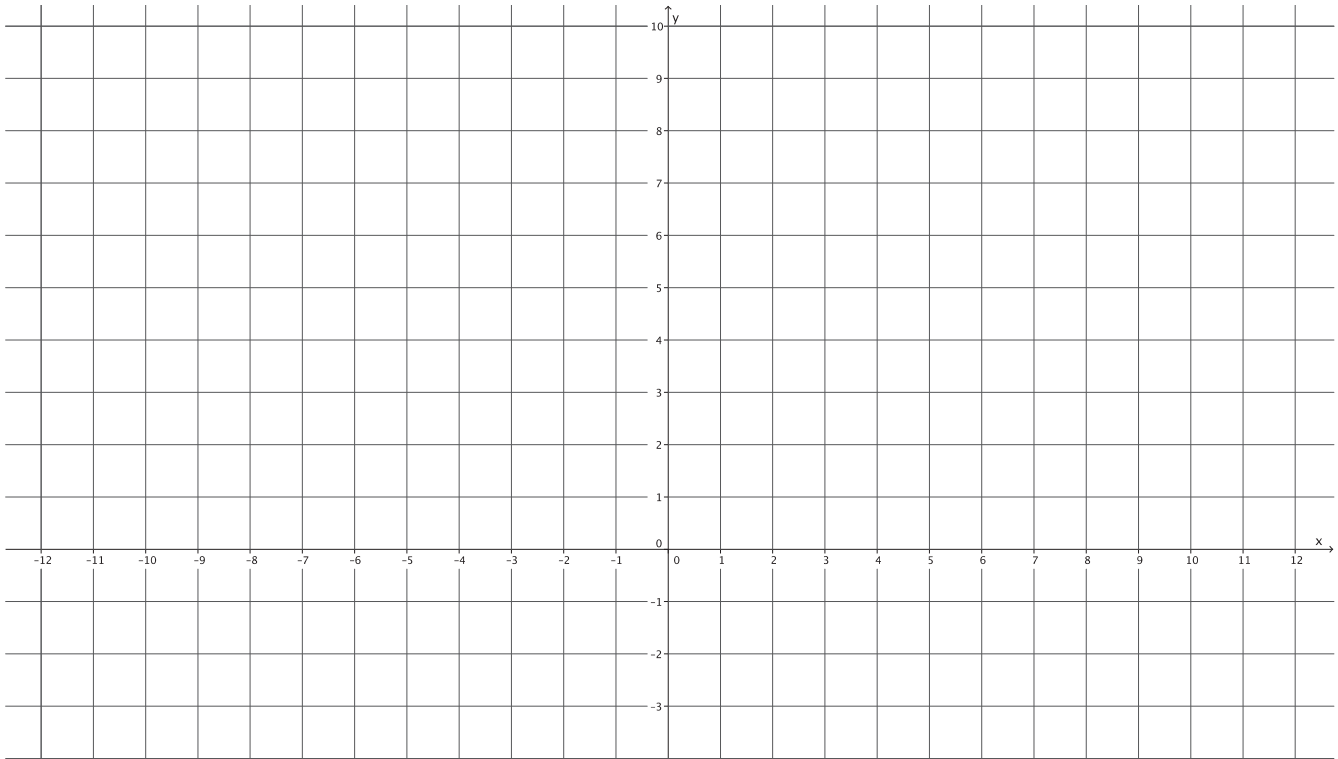
3. Use a ruler and compass, as needed, to answer parts (a) and (b).
- a. Is there a dilation  $D$  with center  $O$  that would map figure  $PQRS$  to figure  $P'Q'R'S'$ ? Explain in terms of scale factor, center, and coordinates of corresponding points.



- b. Is there a dilation  $D$  with center  $O$  that would map figure  $PQRS$  to figure  $P'Q'R'S'$ ? Explain in terms of scale factor, center, and coordinates of corresponding points.



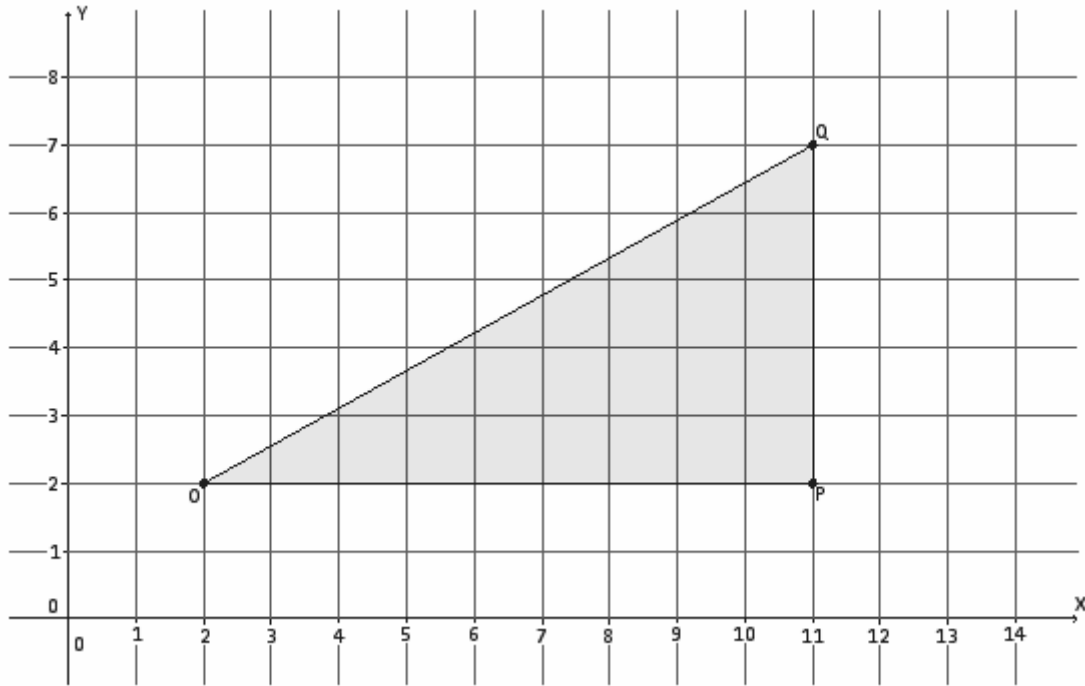
- c. Triangle  $ABC$  is located at points  $A(-4, 3)$ ,  $B(3, 3)$ , and  $C(2, -1)$  and has been dilated from the origin by a scale factor of 3. Draw and label the vertices of triangle  $ABC$ . Determine the coordinates of the dilated triangle  $A'B'C'$ , and draw and label it on the coordinate plane.



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1. Use the diagram below to answer the questions that follow.

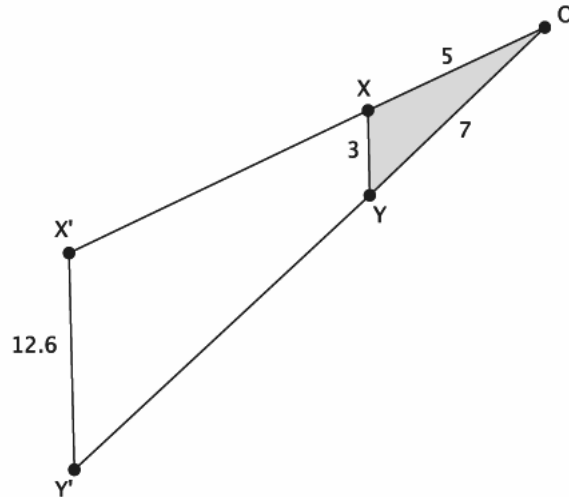


- a. Dilate  $\triangle OPQ$  from center  $O$  and scale factor  $r = \frac{4}{9}$ . Label the image  $\triangle OP'Q'$ .
- b. Find the coordinates of points  $P'$  and  $Q'$ .

- c. Are  $\angle OQP$  and  $\angle OQ'P'$  equal in measure? Explain.
- d. What is the relationship between the segments  $PQ$  and  $P'Q'$ ? Explain in terms of similar triangles.
- e. If the length of segment  $OQ$  is 9.8 units, what is the length of segment  $OQ'$ ? Explain in terms of similar triangles.

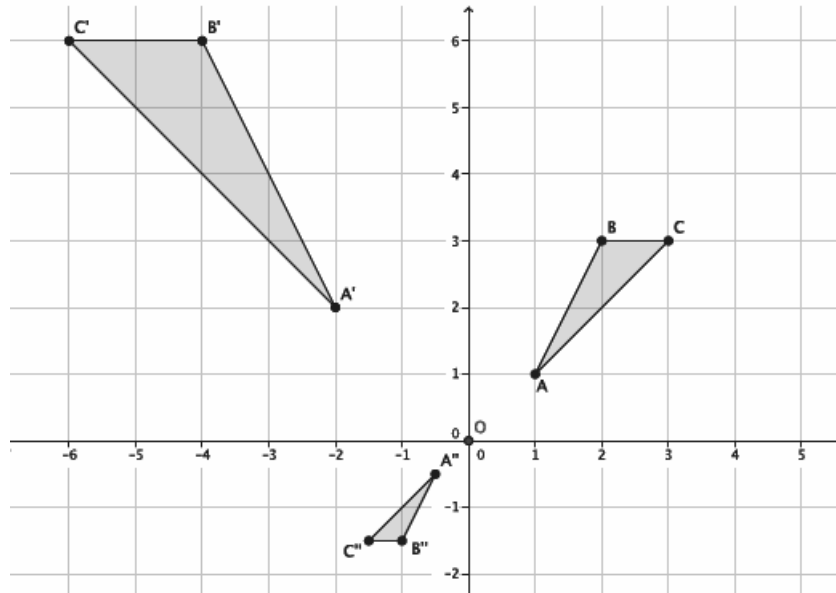


2. Use the diagram below to answer the questions that follow. The length of each segment is as follows: segment  $OX$  is 5 units, segment  $OY$  is 7 units, segment  $XY$  is 3 units, and segment  $X'Y'$  is 12.6 units.



- a. Suppose segment  $XY$  is parallel to segment  $X'Y'$ . Is  $\triangle OXY$  similar to  $\triangle OX'Y'$ ? Explain.
- b. What is the length of segment  $OX'$ ? Show your work.
- c. What is the length of segment  $OY'$ ? Show your work.

3. Given  $\triangle ABC \sim \triangle A'B'C'$  and  $\triangle ABC \sim \triangle A''B''C''$  in the diagram below, answer parts (a)–(c).



- a. Describe the sequence that shows the similarity for  $\triangle ABC$  and  $\triangle A'B'C'$ .
- b. Describe the sequence that shows the similarity for  $\triangle ABC$  and  $\triangle A''B''C''$ .
- c. Is  $\triangle A'B'C'$  similar to  $\triangle A''B''C''$ ? How do you know?