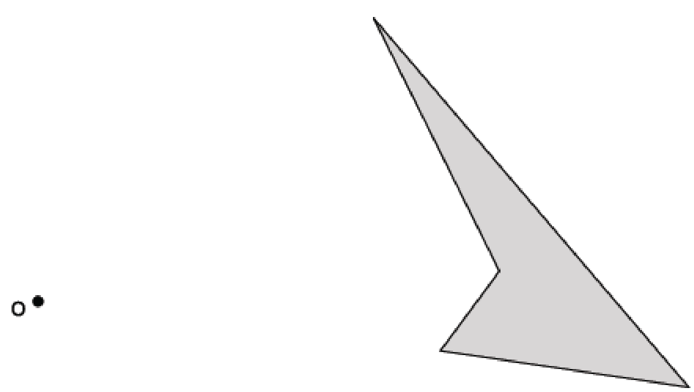
Name ____ Date ____________________

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

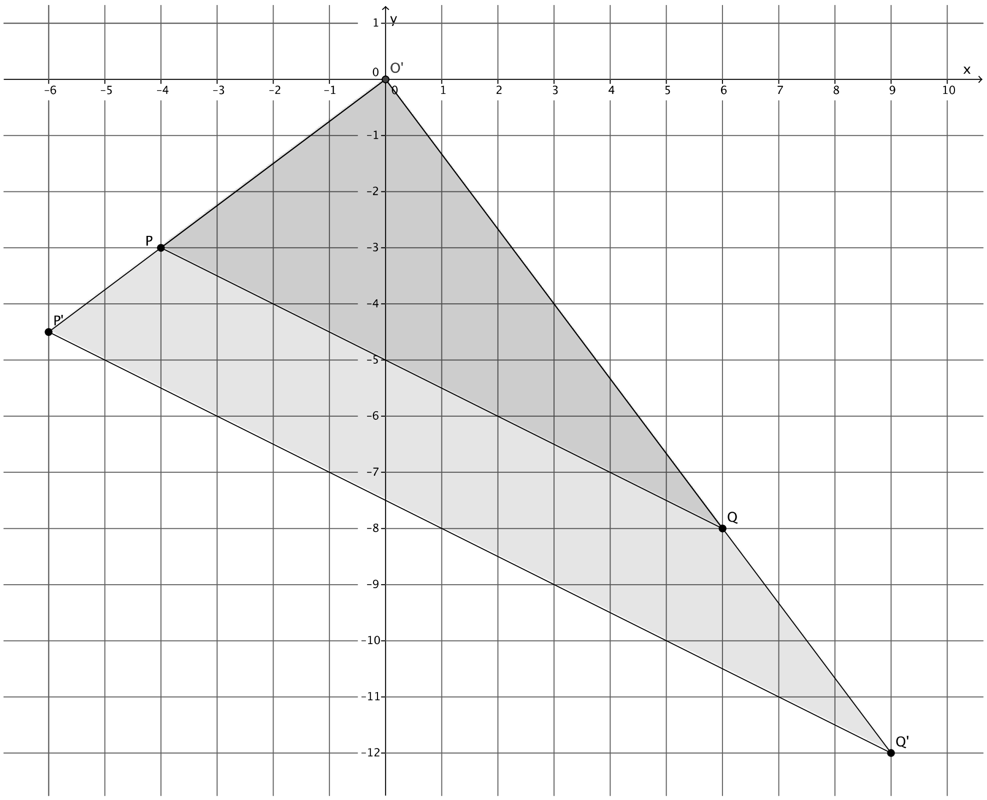


a. Use a compass and ruler to produce an image of the figure with center O and scale factor $r = 2$.

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 $Dilation(Q) = Q'$.

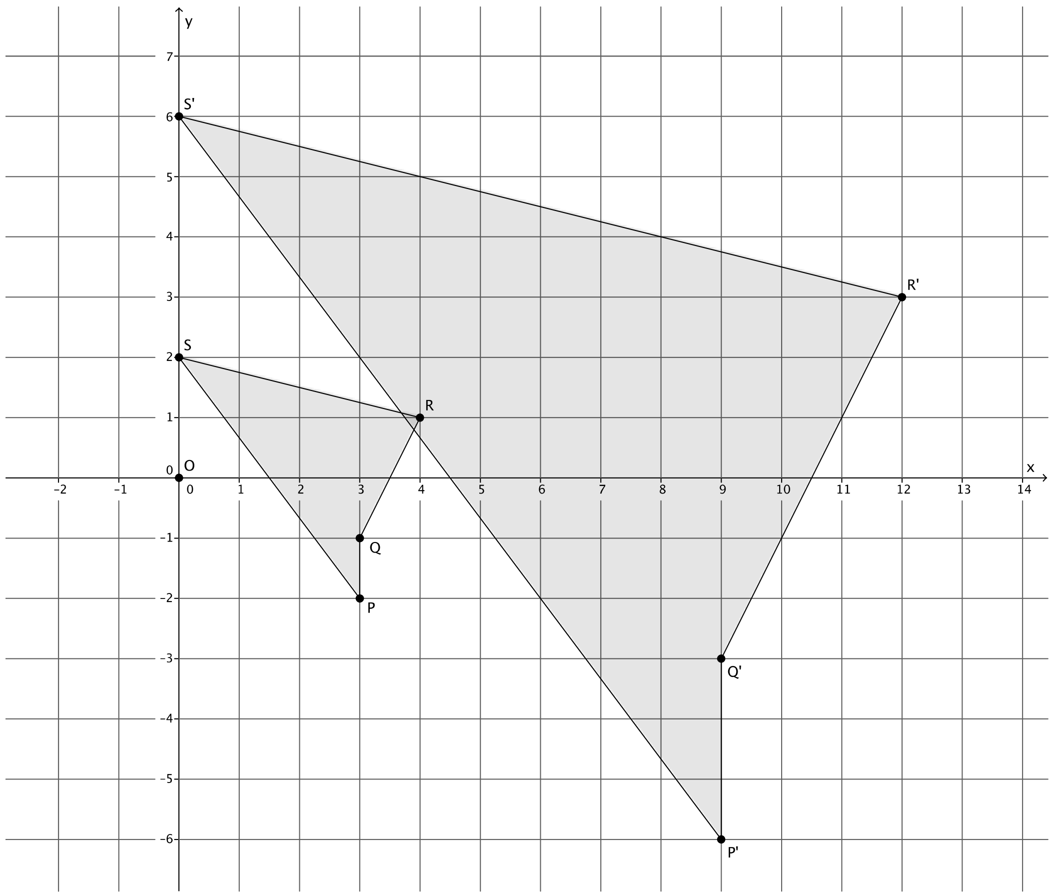


   a. Use lengths $|OQ| = 10$ units and $|OQ'| = 15$ units to determine the scale factor r of dilation D. Describe how to determine the coordinates of P' using the coordinates of P.

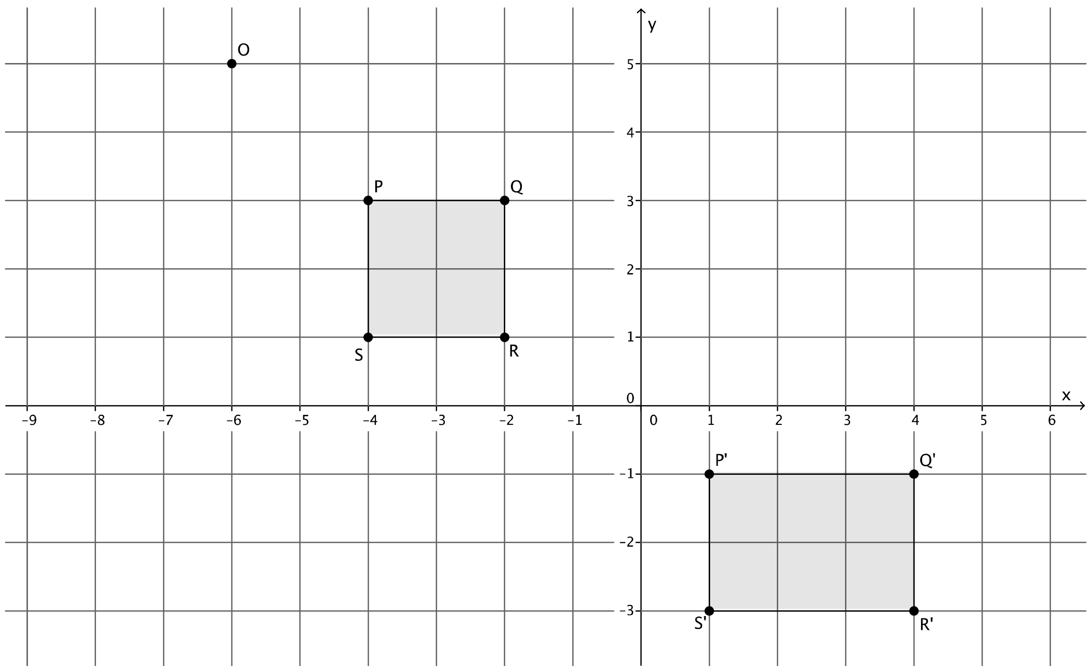
   b. If $|OQ| = 10$ units, $|OQ'| = 15$ units, and $|P'Q'| = 11.2$ units, determine the length of $|PQ|$. Round your answer to the tenths place, if necessary.

3. Use a ruler and compass, as needed, to answer parts (a) and (b).

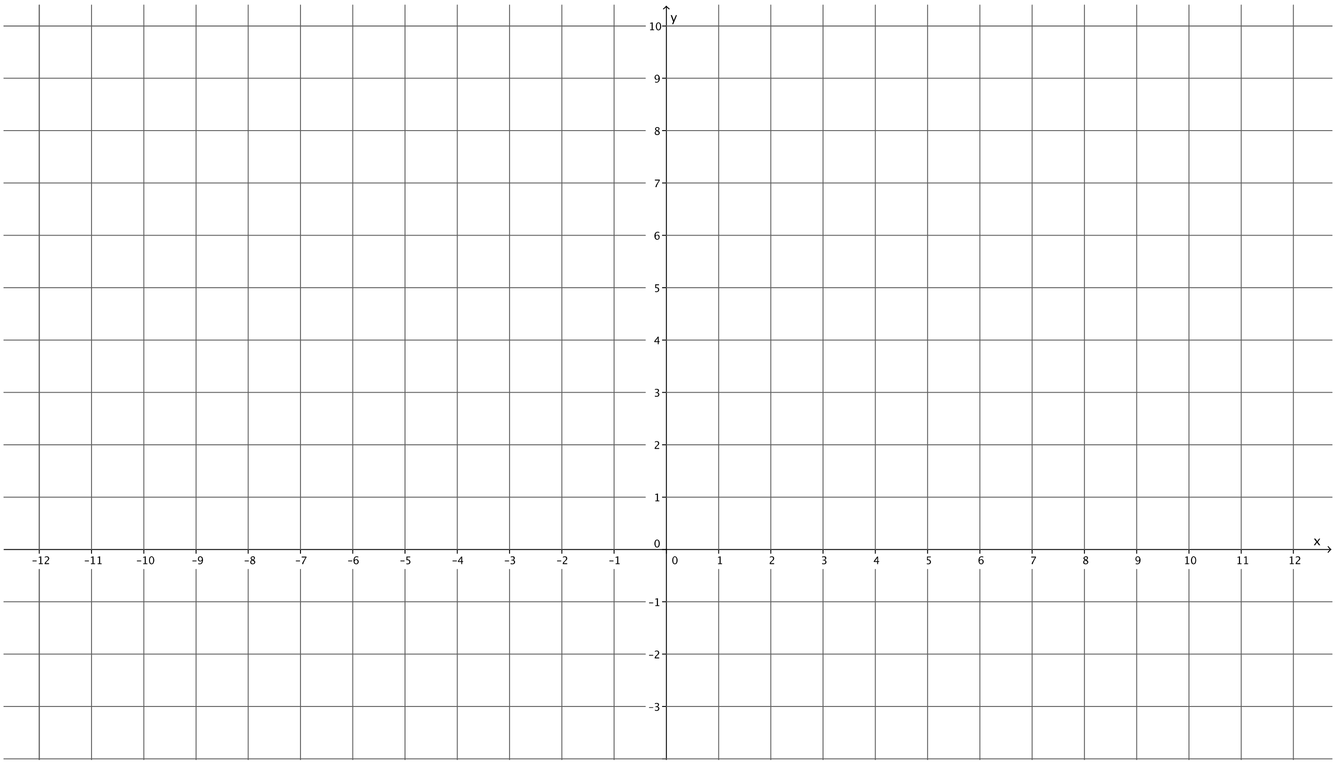
   a. Is there a dilation D with center O that would map figure $PQRS$ to figure $P'Q'R'S'$? If yes, describe the dilation in terms of coordinates of corresponding points.



b. Is there a dilation D with center O that would map figure $PQRS$ to figure $P'Q'R'S'$? If yes, describe the dilation in terms of 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.



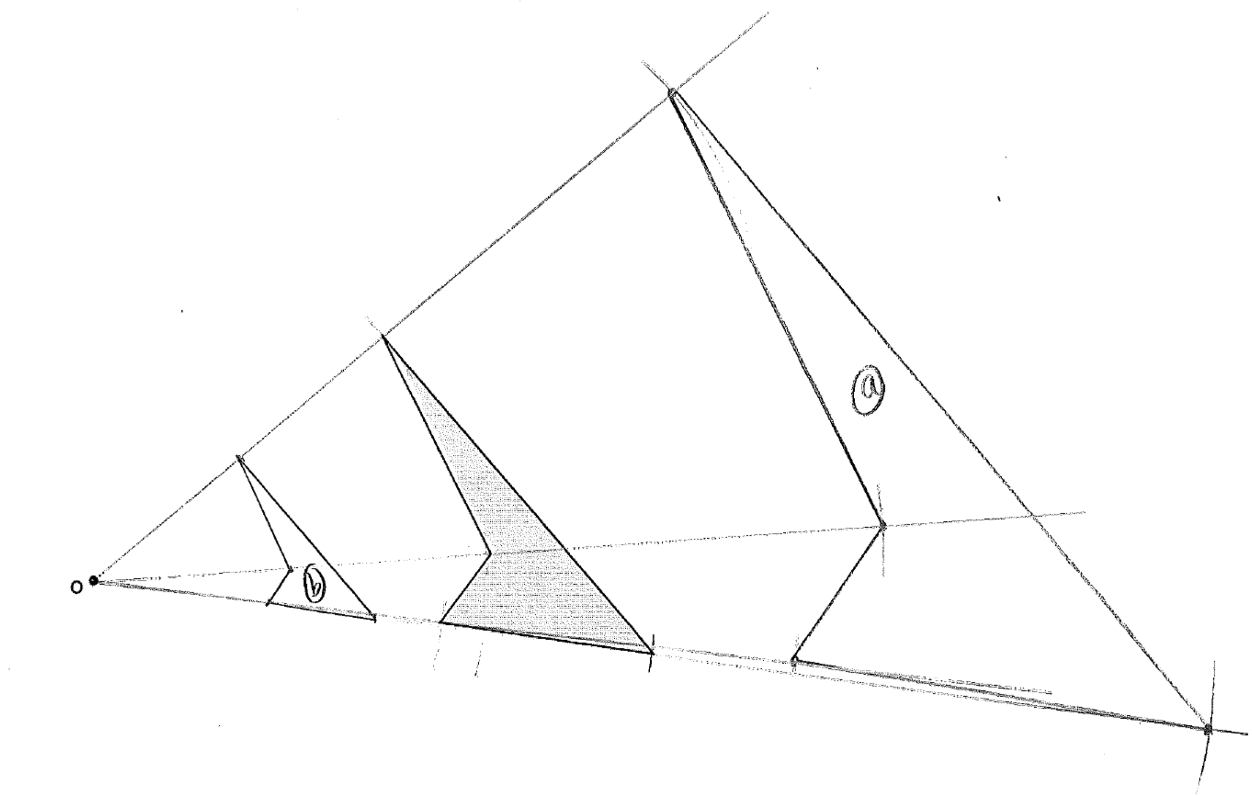
A Progression Toward Mastery					
Assessment Task Item		STEP 1 Missing or incorrect answer and little evidence of reasoning or application of mathematics to solve the problem.	STEP 2 Missing or incorrect answer but evidence of some reasoning or application of mathematics to solve the problem.	STEP 3 A correct answer with some evidence of reasoning or application of mathematics to solve the problem, OR an incorrect answer with substantial evidence of solid reasoning or application of mathematics to solve the problem.	STEP 4 A correct answer supported by substantial evidence of solid reasoning or application of mathematics to solve the problem.
1	**a** 8.G.A.3	Student does not use compass and ruler to dilate the figure, i.e., the dilated figure is drawn free hand or not drawn. Student used uses an incorrect or no scale factor. The dilated figure is smaller than the original figure. The corresponding segments are not parallel.	Student may or may not have used a compass and/or ruler to dilate the figure, i.e., some of the work is done by free hand. The dilated figure is larger than the original figure. Student may or may not have drawn solid or dotted rays drawn from the center O through most of the vertices. Student may have used an incorrect scale factor for parts of the dilated figure, i.e., the length from the center O to all dilated vertices is not two times the length from the center to the corresponding vertices. Some of the corresponding segments are parallel.	Student uses a compass to dilate the figure, evidenced by arcs on the figure to measure the appropriate lengths. The dilated figure is larger than the original figure. Student has drawn solid or dotted rays from the center O through most of the vertices. Student may have used an incorrect scale factor for parts of the dilated figure, i.e., the length from the center O to all dilated vertices is not two times the length from the center to the corresponding vertices. Most of the corresponding segments are parallel.	Student uses a compass to dilate the figure, evidenced by arcs on the figure to measure the appropriate lengths. The dilated figure is larger than the original figure. Student has drawn solid or dotted rays from the center O through all of the vertices. The length from the center O to all dilated vertices is two times the length from the center to the corresponding vertices. All of the corresponding segments are parallel.
	b 8.G.A.3	Student does not use a ruler to dilate the figure, i.e., the dilated figure is drawn free hand or not drawn.	Student may or may not have used a ruler to dilate the figure, i.e., parts of the work were done by free hand.	Student uses a ruler to dilate the figure. The dilated figure is smaller than the original figure.	Student uses a ruler to dilate the figure. The dilated figure is smaller than the original figure.

		Student used an incorrect or no scale factor. The dilated figure is larger than the original figure. The corresponding segments are not parallel.	The dilated figure is smaller than the original figure. Student may or may not have solid or dotted rays drawn from the center O through most of the vertices. Student may have used an incorrect scale factor for parts of the dilated figure, e.g., the length from the center O to all dilated vertices is not one half of the length from the center to the corresponding vertices. Some of the corresponding segments are parallel.	Student has solid or dotted rays drawn from the center O through most of the vertices. Student may have used an incorrect scale factor for parts of the dilated figure, e.g., the length from the center O to all dilated vertices is not one half of the length from the center to the corresponding vertices. Most of the corresponding segments are parallel.	Student has solid or dotted rays drawn from the center O through all of the vertices. The length from the center O to all dilated vertices is one half of the length from the center to the corresponding vertices. All of the corresponding segments are parallel.
2	**a** **8.G.A.3**	Student does not attempt the problem. Student may or may not have calculated the scale factor correctly.	Student uses the definition of dilation with the given side lengths to calculate the scale factor. Student may have made calculation errors when calculating the scale factor. Student may or may not have attempted to find the coordinates of P'.	Student uses the definition of dilation with the given side lengths to calculate the scale factor $r = 1.5$ or equivalent. Student determined the coordinates of point P' but did not explain or relate it to scale factor and point P.	Student uses the definition of dilation with the given side lengths to calculate the scale factor $r = 1.5$ or equivalent. Student explained that the coordinates of P' are found by multiplying the coordinates of P by the scale factor. Student determines the coordinates of $Q' = (-6, -4.5)$.
	b **8.G.A.3**	Student does not attempt the problem. Student writes a number for the length of $\|PQ\|$ without showing any work to show how he/she arrived at the answer.	Student may have inverted one of the fractions of the equal ratios leading to an incorrect answer. Student may have made a calculation error in finding the length of $\|PQ\|$. Student does not answer the question in a complete sentence.	Student correctly sets up ratios to find the length of $\|PQ\|$. Student may have made a rounding error in stating the length. Student does not answer the question in a complete sentence or does not include units in the answer.	Student correctly sets up ratios to find the length of $\|PQ\|$. Student correctly identifies the length of $\|PQ\| \approx 7.5$ units. Student answers the question in a complete sentence and identifies the units.

3	a 8.G.A.3	Student does not attempt the problem. Student writes a number for scale factor without showing any work or providing an explanation for how the scale factor was determined. Student does not describe the dilation.	Student makes an error in calculation leading to an incorrect scale factor. Student does not describe the dilation in terms of coordinates of corresponding points.	Student may have identified the scale factor of dilation as $r = \frac{1}{3}$ instead of $r = 3$. Student attempts to describe the dilation with some evidence of mathematical vocabulary and/or reasoning.	Student correctly identifies the scale factor as $r = 3$. Student clearly describes the dilation in terms of the coordinates of at least one pair of corresponding points. There is strong evidence of mathematical reasoning and use of related vocabulary.
	b 8.G.A.3	Student does not attempt the problem. Student answers with yes or no only. Student does not give any explanation or reasoning.	Student answers yes or no. Student explanation and/or reasoning is not based on mathematics, e.g., "doesn't look like there is." Student attempts to solve problem by showing measurements. Student may or may not have attempted to solve problem by drawing in a solid or dotted ray from center O through one vertex, e.g., from center O through P and P'.	Student answers no correctly. Student uses mathematical vocabulary in the explanation. Basis for explanation relies heavily on the diagram, e.g., "look at drawing." Student attempts to solve problem by drawing a solid or dotted ray from center O through one or more vertices, e.g., from center O through P and P'.	Student answers no correctly. Student uses mathematical vocabulary in the explanation. Explanation includes the fact that the corresponding vertices and center O must be on the same line, e.g., "center O, P, and P' would be on the same ray if a dilation was possible." Student draws solid or dotted rays from center O through multiple vertices. Diagram enhanced explanation.
	c 8.G.A.3	Student does not attempt the problem. Student may have drawn $\triangle ABC$ using incorrect coordinates, or student does not label coordinates correctly.	Student correctly draws and labels $\triangle ABC$. Student may or may not have identified the correct coordinates of the dilated points. For example, student may have only multiplied one coordinate of each ordered pair to determine location of image point. Student may have placed the image of $\triangle ABC$ at the wrong coordinates.	Student correctly draws and labels $\triangle ABC$. Student may have minor calculation errors when identifying the coordinates of A', B', C'. For example, student multiplies -4 and 3 and writes 12. Student draws and labels $\triangle A'B'C'$ using the incorrect coordinates that are calculated.	Student correctly draws and labels $\triangle ABC$. Student correctly identifies the image of the points as $A' = (-12, 9)$, $B' = (9,9)$, and $C' = (6, -3)$. Student correctly draws and labels $\triangle A'B'C'$.

Name ______________________________ Date ________________

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 $r = 2$.

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

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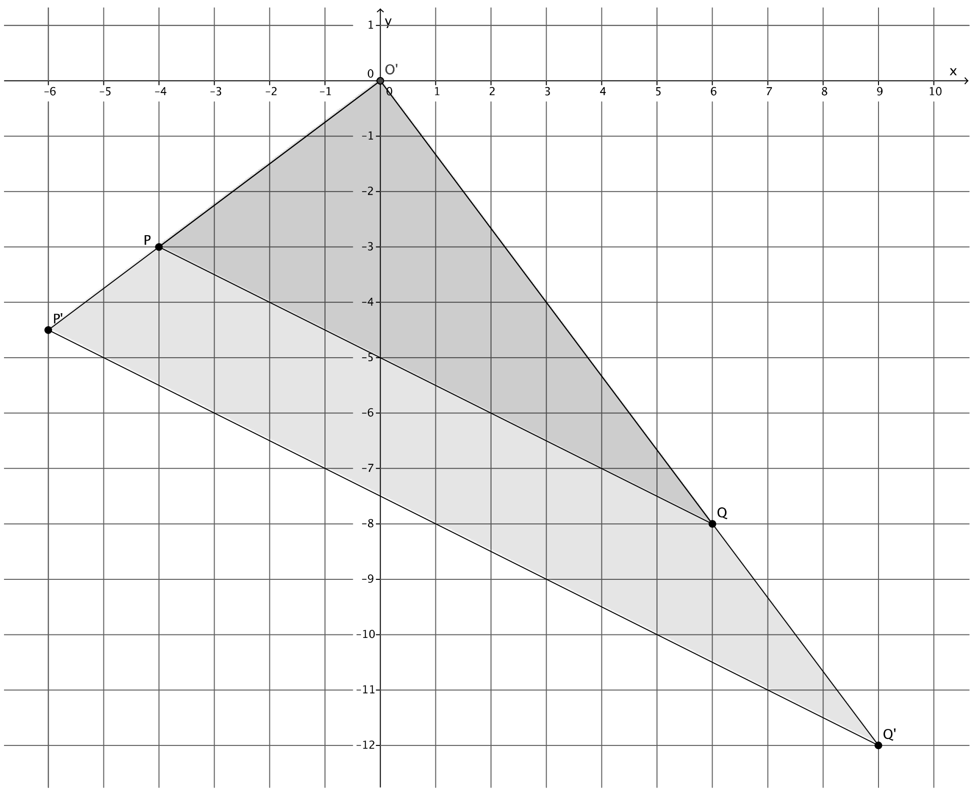


a. Use lengths $|OQ| = 10$ units and $|OQ'| = 15$ units to determine the scale factor r of dilation D. Describe how to determine the coordinates of P' using the coordinates of P.

$|OQ|r = |OQ'|$

$r = \frac{|OQ'|}{|OQ|}$

$r = \frac{15}{10}$

$r = \frac{3}{2}$

THE SCALE FACTOR IS $r = \frac{3}{2}$.

SINCE THE COORDINATES OF $P = (-4, -3)$ THE COORDINATES OF THE DILATED POINT P' WILL BE THE SCALE FACTOR TIMES THE COORDINATES OF P. THEREFORE $P' = (\frac{3}{2} \times (-4), \frac{3}{2} \times (-3)) = (-6, -4.5)$.

b. If $|OQ| = 10$ units, $|OQ'| = 15$ units, and $|P'Q'| = 11.2$ units, determine the length of $|PQ|$. Round your answer to the tenths place, if necessary.

$\frac{15}{10} = \frac{11.2}{|PQ|}$

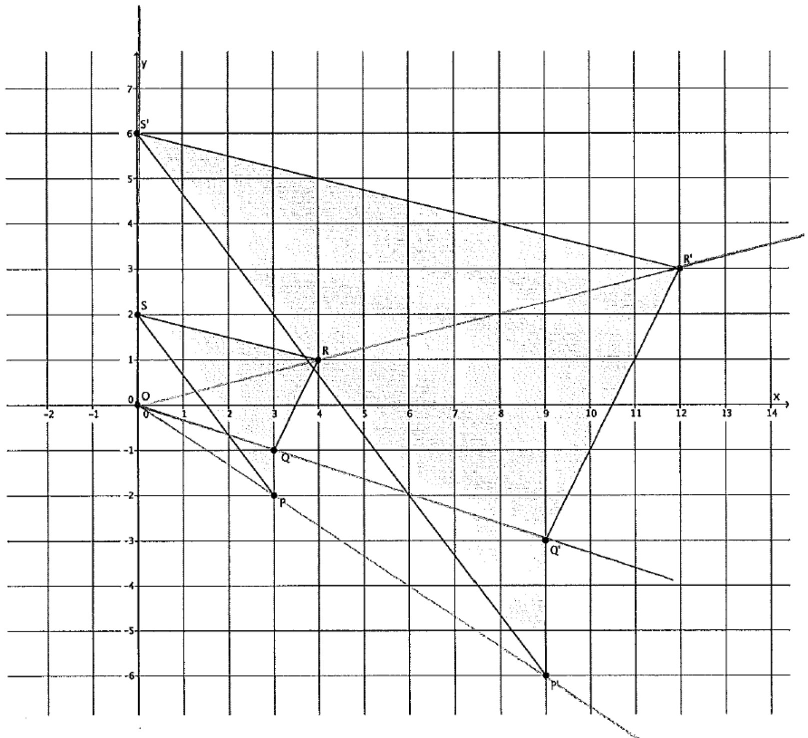
$15(|PQ|) = 112$

$|PQ| = \frac{112}{15} \approx 7.5$

THE LENGTH OF PQ IS ABOUT 7.5 UNITS

3. Use a ruler and compass, as needed, to answer parts (a) and (b).

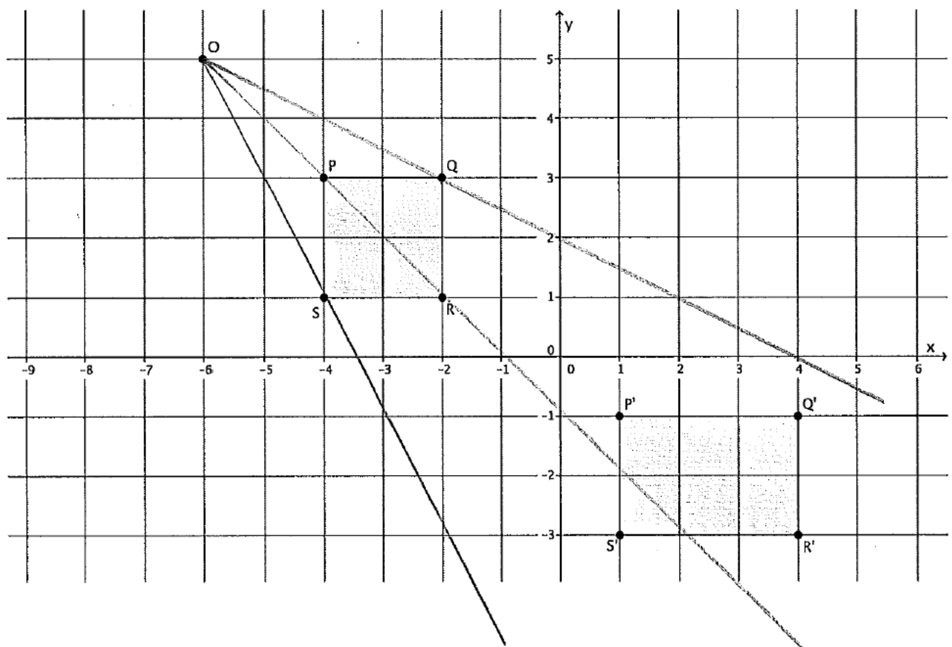
   a. Is there a dilation D with center O that would map figure $PQRS$ to figure $P'Q'R'S'$? If yes, describe the dilation in terms of coordinates of corresponding points.



$P = (3,-2)$ $\quad P' = (9,-6)$
$Q = (3,-1)$ $\quad Q' = (9,-3)$
$R = (4,1)$ $\quad R' = (12,3)$
$S = (0,2)$ $\quad S' = (0,6)$

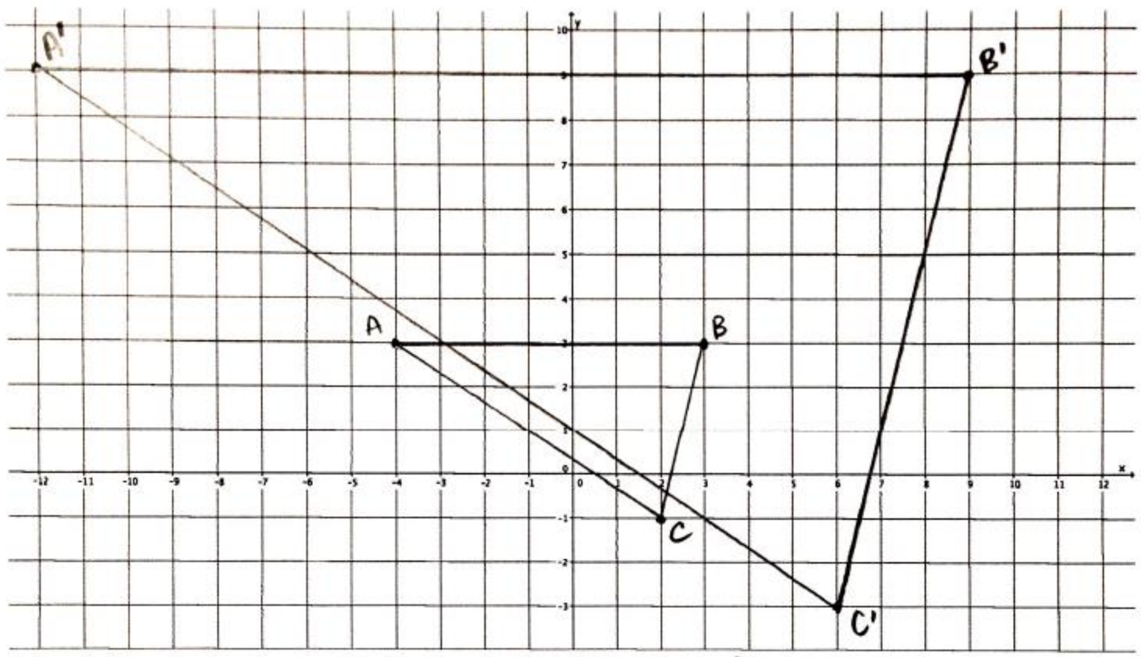
YES, THERE IS A DILATION D WITH CENTER O THAT MAPS PQRS TO P'Q'R'S'. THE SCALE FACTOR IS 3. THE IMAGE OF EACH POINT IS 3 TIMES THE COORDINATES OF THE ORIGINAL IMAGE. FOR EXAMPLE, $P = (3,-2)$ AND $P' = (3 \times 3, 3 \times (-2)) = (9,-6)$.

b. Is there a dilation D with center O that would map figure $PQRS$ to figure $P'Q'R'S'$? If yes, describe the dilation in terms of coordinates of corresponding points.



NO, THERE IS NOT A DILATION D THAT WILL MAP PQRS TO P'Q'R'S'. A DILATION WILL MOVE A POINT, S, TO ITS IMAGE S' ON THE RAY $\overrightarrow{OS}$. IN THE PICTURE ABOVE O, S, S' ARE NOT ON THE SAME RAY. A SIMILAR STATEMENT CAN BE MADE FOR POINTS P, Q, AND R. THEREFORE, THERE IS NO DILATION THAT MAPS PQRS TO P'Q'R'S'.

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.



$A = (-4, 3)$ $\quad A' = (-4 \times 3, 3 \times 3) = (-12, 9)$

$B = (3, 3)$ $\quad B' = (3 \times 3, 3 \times 3) = (9, 9)$

$C = (2, -1)$ $\quad C' = (2 \times 3, -1 \times 3) = (6, -3)$