Dilations

STRAND: Measurement and Geometry

STRAND CONCEPT: Coordinates Planes and Transformations

SOL 8.7a

Remediation Plan Summary

Students perform dilations of polygons on the coordinate plane.

Common Errors and Misconceptions

- Students may confuse the x- and y-coordinates when recording the ordered pair for the new point.
- Students may confuse the terms *image* and *preimage*.
- Students may have difficulty multiplying by a fractional scale factor

Materials

- Warm-up activity sheet
- Dilations recording sheet
- Calculators
- Reflecting on Dilations exit slip

Introductory Activity

Distribute the "Warm-up" worksheet, and allow students ample time to complete it. Give assistance as necessary. Review student responses before proceeding with the lesson.

Plan for Instruction

1. Distribute the "Dilations, Part 1" worksheet. Have students graph the given coordinates A, B, C, and D and connect the dots. Ask, "What shape did you draw?" (rectangle) Have them determine how long sides AB and AD are in grid units and record these lengths in the chart.
2. Ask students to fill in the second row of coordinates by multiplying both coordinates of each point in the first row by 2.
3. Have students predict what they think this new shape will look like. Then, have them plot the new coordinates and label the new coordinates A', B', C', and D'. (The prime sign is used to indicate that a point belongs to an image.) Ask them to describe the new shape. (It is the same shape but larger.) Prompt them to describe exactly how much larger it is (twice as large) by comparing the length of the new side A'B' to the original side AB, and comparing the length of the new side A'D' to the original side AD. Explain that they have just performed a dilation, using a scale factor of 2. This means that the figure gets twice as large.
4. Ask students how they think they will perform a dilation of the original figure, using a scale factor of 3. (Multiply both coordinates of each point by 3.) Have them perform the dilation in the same manner, labeling the points A", B", C", and D".
5. Have students complete the questions on the worksheet.

6. Distribute the "Dilations, Part 2" worksheet. Have students graph the given coordinates and connect the dots. Ask, "What shape did you draw?" (pentagon)
7. Explain that this time they will perform a dilation using a scale factor of ½. Ask them how they think they will accomplish this task. (Multiply both coordinates of each point by ½ or 0.5.) Have them perform the dilation in the same manner and complete the questions on the worksheet.

Pulling It All Together (Reflection)

Have students complete the "Reflecting on Dilations" exit ticket.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Virginia Department of Education 2018

Name:

Warm-up

1. Make a list of real-life situations in which you see “scaled up” or “scaled down” versions of objects.

2. Practice multiplying a fraction by a whole number:

   a. $\frac{1}{2} \cdot 6 =$

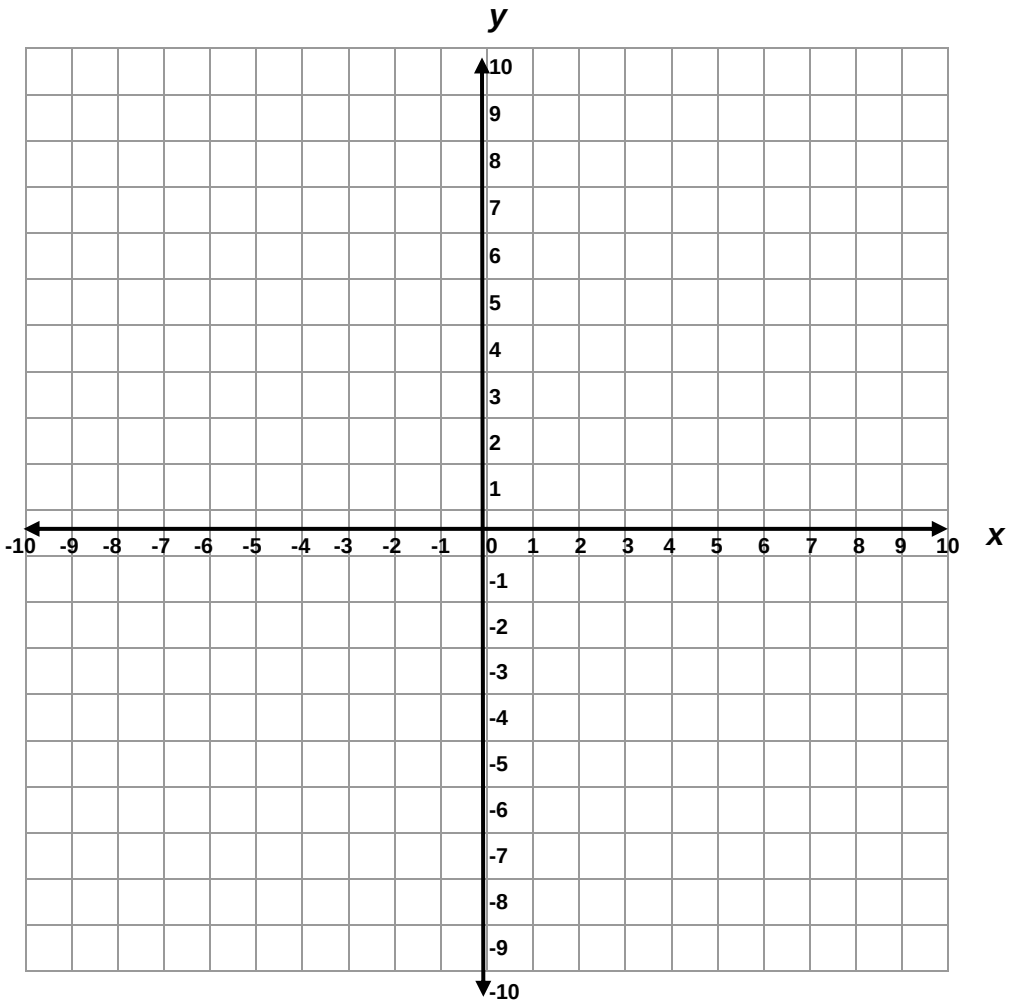
   b. $\frac{1}{3} \cdot 12 =$

   c. $\frac{3}{5} \cdot 10 =$

   d. $\frac{1}{4} \cdot 0 =$

Name:

Dilations, Part 1



SCALE FACTOR	COORDINATES				Length of AB	Length of AD
original	A (−1, −1)	B (2, −1)	C (2, 3)	D (−1, 3)		
2	A′ ( )	B′ ( )	C′ ( )	D′ ( )		
3	A″ ( )	B″ ( )	C″ ( )	D″ ( )		

1. What happens to the size of the figure after dilating it, using a scale factor of 2?

_____

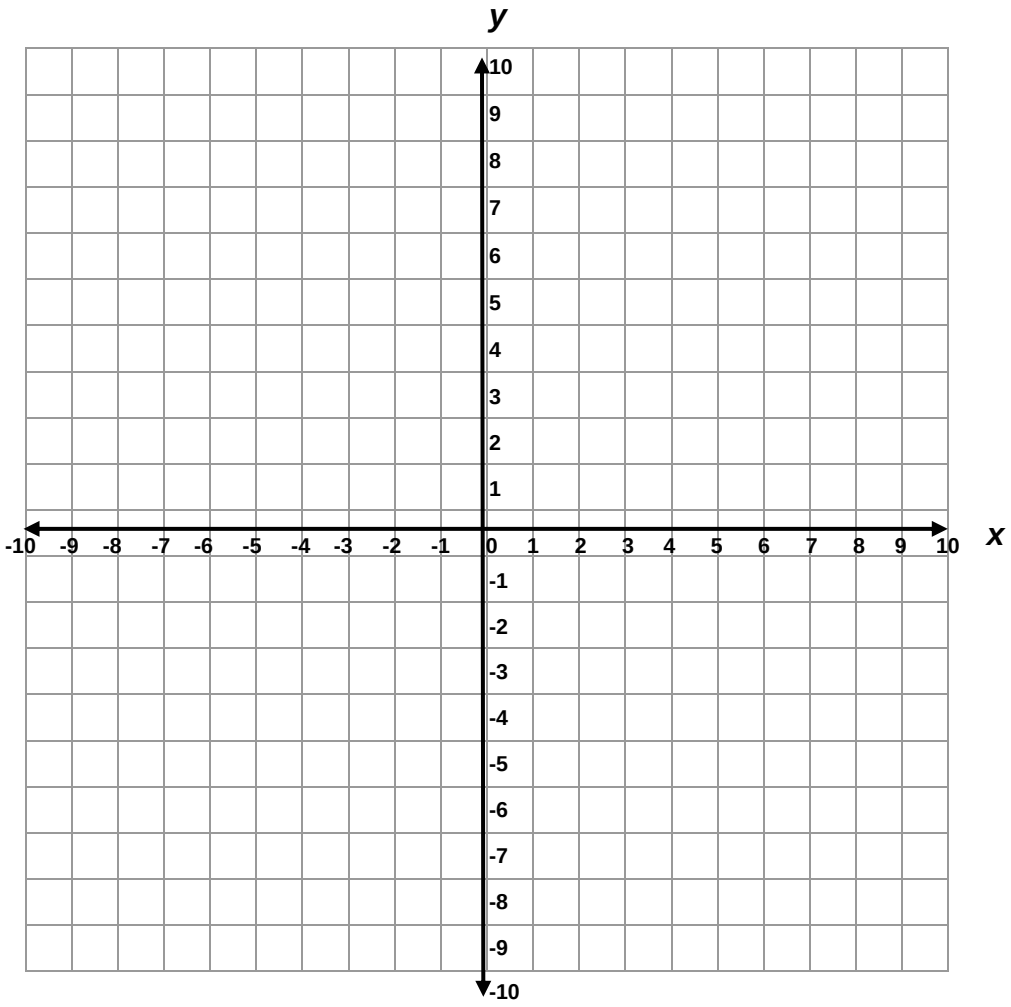
2. What happens to the size of the figure after dilating it, using a scale factor of 3?

_____

3. Does a dilation cause the shape to change? _____

Name:

Dilations, Part 2



SCALE FACTOR	COORDINATES				
original	**A (0, 4)**	**B (4, 0)**	**C (8, 4)**	**D (10, 10)**	**E (4, 8)**
½	**A′ ( )**	**B′ ( )**	**C′ ( )**	**D′ ( )**	**E′ ( )**

1. What happens to the size of the figure after dilating it, using a scale factor of ½?

   _____

2. Did the shape change? _____

Name:

Reflecting on Dilations

1. How would you describe a dilation?

2. If you dilate a figure using a scale factor greater than 1, what happens to the figure?

3. If you dilate a figure using a scale factor less than 1, what happens to the figure?

4. If you were to dilate a figure using a scale factor of 1, what do you think would happen to the figure?