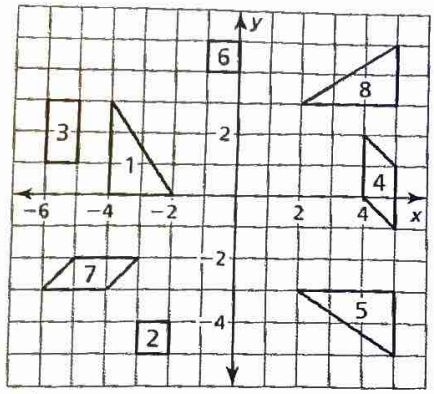
Name Key Date

4.4 Practice A

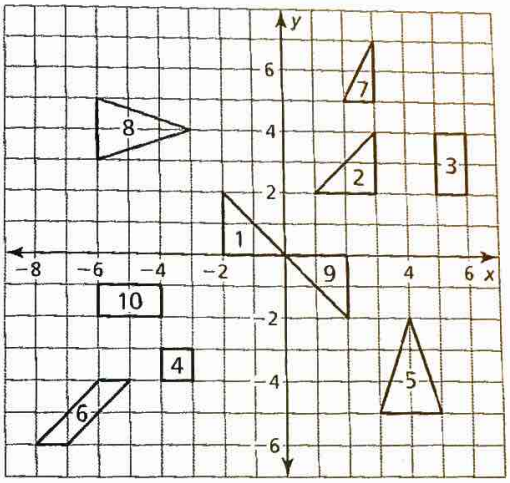
In Exercises 1 and 2, identify any congruent figures in the coordinate plane. Explain.

1.



△ 1, 5, 8
□ 2, 6
▱ 4, 7

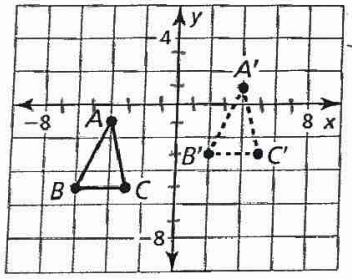
2.



△ 1, 2, 9
□ 3, 10
△ 5, 8

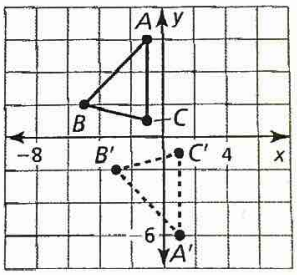
In Exercises 3 and 4, describe a congruence transformation that maps $\triangle ABC$ to $\triangle A'B'C'$.

3.



translation ⟨8, 2⟩

4.



reflect across x-axis
translate ⟨2, 0⟩

In Exercises 5 and 6, determine whether the polygons with the given vertices are congruent. Use transformations to explain your reasoning.

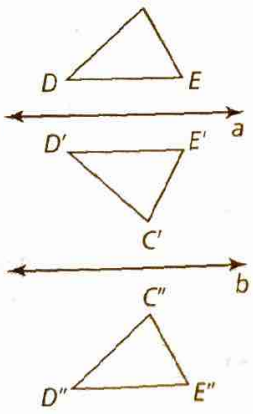
5. $A(5, 2), B(2, 2), C(2, 7)$ and $S(-4, -5), T(-1, -5), U(-1, 0)$

$\triangle ABC \cong \triangle STU$ reflect in y-axis then translate ⟨1, −7⟩

6. $E(6, -2), F(10, -2), G(10, -8), H(6, -8)$ and $W(4, 8), X(4, 10), Y(8, 10), Z(8, 8)$

not ≅, can't use rigid motion

7. In the figure, $a \parallel b$, $\triangle CDE$ is reflected in line a, and $\triangle C'D'E'$ is reflected in line b. List three pairs of segments that are parallel to each other. Then determine whether any segments are congruent to $\overline{EE''}$.



$\overline{CD} \parallel \overline{C''D''}$ $\overline{DE} \parallel \overline{D''E''}$ $\overline{CE} \parallel \overline{C''E''}$ yes, $\overline{EE''} \cong \overline{DD''} \cong \overline{CC''}$

In Exercises 8 and 9, find the measure of the acute or right angle formed by intersecting lines so that P can be mapped to P'' using two reflections.

8. A rotation of 28° maps P to P''. $\frac{28}{2} = 14°$

9. The rotation $(x, y) \rightarrow (-y, x)$ maps P to P''.

$(-y, x)$ is 270° counterclockwise which is same as 90° clockwise so $\frac{90}{2} = 45°$

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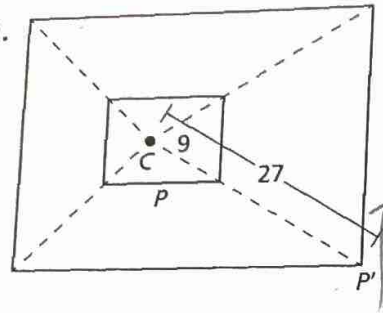
4.5 Practice A

In Exercises 1 and 2, find the scale factor of the dilation. Then tell whether the dilation is a *reduction* or an *enlargement*.

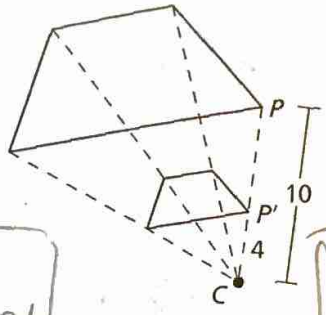
1.



$\frac{27}{9}$

$k = 3$ enlargement

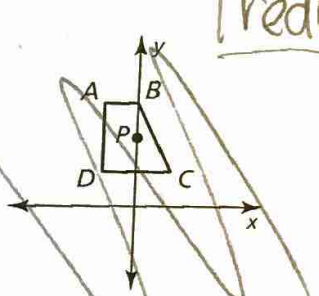
2.



$\frac{4}{10} = \frac{2}{5}$

$k = \frac{2}{5}$ reduction

In Exercises 3–5, copy the diagram. Then use a compass and straightedge to construct a dilation of quadrilateral *ABCD* with the given center and scale factor *k*.



3. Center B, $k = 3$

4. Center P, $k = \frac{1}{2}$

5. Center C, $k = 75\%$

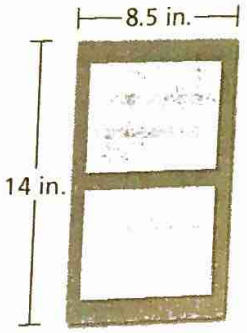
In Exercises 6 and 7, graph the polygon and its image after a dilation with a scale factor *k*.

6. $P(1, 2), Q(2, 2), R(4, -2), S(-1, -3); k = 2$ $P'(2,4)\ Q'(4,4)\ R'(8,-4)\ S'(-2,-6)$

7. $A(-4, 4), B(-2, 6), C(1, -1), D(-2, -4); k = -75\%$ $A'(3,-3)\ B'(\frac{3}{2}, \frac{-9}{2})\ C'(\frac{-3}{4}, \frac{3}{4})\ D'(\frac{3}{2}, 3)$

same as $-3/4$

8. A standard piece of paper is 8.5 inches by 11 inches. A piece of legal-size paper is 8.5 inches by 14 inches. By what scale factor k would you need to dilate the standard paper so that you could fit two pages on a single piece of legal paper?



$\frac{11}{14} = 0.79$

9. The old film-style cameras created photos that were best printed at 3.5 inches by 5 inches. Today's new digital cameras create photos that are best printed at 4 inches by 6 inches. Neither size picture will scale perfectly to fit in an 11-inch by 14-inch frame. Which type of camera will you minimize the loss of the edges of your picture?

10. Your friend claims that if you dilate a rectangle by a certain scale factor, then the area of the object also increases or decreases by the same amount. Is your friend correct? Explain your reasoning.

11. Would it make sense to state "A dilation has a scale factor of 1?" Explain your reasoning.

no, it won't change the image

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4.6 Practice A

In Exercises 1 and 2, graph $\triangle PQR$ with vertices $P(-1, 5)$, $Q(-4, 3)$, and $R(-2, 1)$ and its image after the similarity transformation.

1. **Rotation:** 180° about the origin

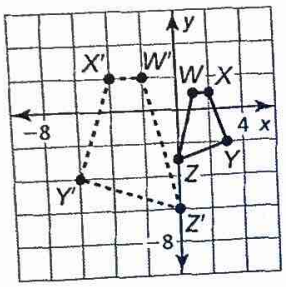
   Dilation: $(x, y) \rightarrow (2x, 2y)$

2. **Dilation:** $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

   Reflection: in the x-axis

answers on next page

3. Describe a similarity transformation that maps the black preimage onto the dashed image.



reflection in y-axis
then dilate by $k = 2$

In Exercises 4 and 5, determine whether the polygons with the given vertices are similar. Use transformations to explain your reasoning.

4. $A(-2, 5)$, $B(-2, 2)$, $C(-1, 2)$ and $D(3, 3)$, $E(3, 1)$, $F(2, 1)$

yes
$\langle 5, -1 \rangle$
then $\left(\frac{2}{3}x, \frac{2}{3}y\right)$

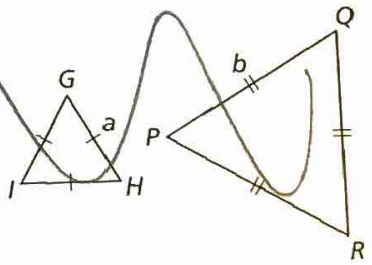
5. $J(-5, -3)$, $K(-3, -1)$, $L(-3, -5)$, $M(-5, -5)$ and $T(3, 3)$, $U(4, 3)$, $V(4, 2)$, $W(3, 1)$

yes
rotate 180°
then $\left(\frac{1}{2}x, \frac{1}{2}y\right)$

6. Prove that the figures are similar.

Given Equilateral $\triangle GHI$ with side length a, equilateral $\triangle PQR$ with side length b

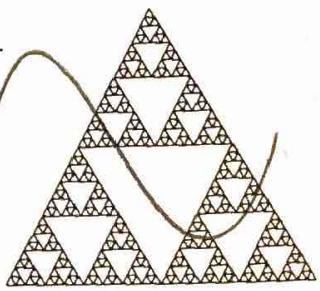
Prove $\triangle GHI$ is similar to $\triangle PQR$.



7. Your friend claims you can use a similarity transformation to turn a square into a rectangle. Is your friend correct? Explain your answer.

8. Is the composition of a dilation and a translation commutative? In other words, do you obtain the same image regardless of the order in which the transformations are performed? Justify your answer.

9. The image shown is known as a *Sierpinski triangle*. It is a common mathematical construct in the area of fractals. What can you say about the similarity transformations used to create the white triangles in this image?



① $(-x,-y)$ 180° then $(2x,2y)$

$P(-1,5) \longrightarrow P'(1,-5) \longrightarrow P''(2,-10)$

$Q(-4,3) \quad Q'(4,-3) \quad Q''(8,-6)$

$R(-2,1) \quad R'(2,-1) \quad R''(4,-2)$

② $(\frac{1}{2}x,\frac{1}{2}y)$ then ref. x-axis

$P(-1,5) \longrightarrow P'(\frac{1}{2},\frac{5}{2}) \longrightarrow P''(\frac{1}{2},-\frac{5}{2})$

$Q(-4,3) \quad Q'(-2,\frac{3}{2}) \quad Q''(-2,-\frac{3}{2})$

$R(-2,1) \quad R'(-1,\frac{1}{2}) \quad R''(-1,-\frac{1}{2})$