Practice 57
## Some Basic Mappings

Find the image of $(-2, 4)$ under each transformation.

1. The translation $T: (x, y) \rightarrow (x - 1, y + 3)$ _($-3, 7$)_

2. Reflection in the x-axis _($-2, -4$)_

3. Reflection in the y-axis _($2, 4$)_

4. Reflection in the line $y = x$ _($4, -2$)_

5. $D_{O,\frac{1}{2}}$ _($-1, 2$)_

6. Glide-reflection: glide 3 units right, followed by reflection in the x-axis _($1, -4$)_

$\triangle ABC$ and $\triangle ADC$ are equilateral triangles. R_x and R_y are reflections in the x- and y-axes, respectively. Complete.
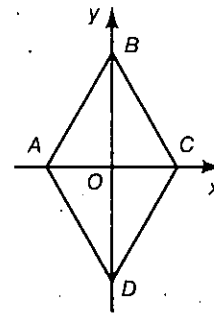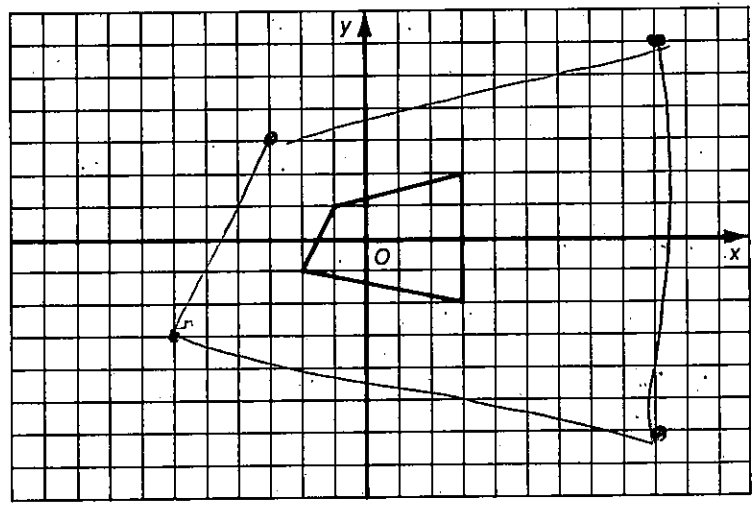
7. $\mathcal{R}_{C,60}: \dot{B} \rightarrow$ _A_

8. $R_y: \overline{BC} \rightarrow$ _$\overline{BA}$_

9. $H_O: \overline{AD} \rightarrow$ _$\overline{CB}$_

10. $D_{C,\frac{1}{2}}: \overline{AC} \rightarrow$ _$\overline{OC}$_

11. $\mathcal{R}_{A,-120}:$ _$\overline{AB}$_ $\rightarrow \overline{AD}$

12. $R_x:$ _$\overline{BC}$_ $\rightarrow \overline{DC}$

Exs. 7–12

The numbers 1 to 12 are equally spaced around the face of a clock. Find the number that is the image of each number under the following rotations.
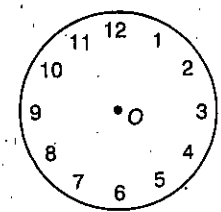
13. $\mathcal{R}_{O,30}(1) =$ _12_

14. $\mathcal{R}_{O,90}(6) =$ _3_

15. $\mathcal{R}_{O,180}:8 \rightarrow$ _2_

16. $\mathcal{R}_{O,120}:10 \rightarrow$ _6_

17. On the graph below, draw the image of the figure under the dilation $D_{O,3}$.

Transformations

Exercises 1–3 refer to the function $f: x \rightarrow 2x^2 - 1$.

1. Find $f(2)$. ___7___
2. Find $f(-2)$. ___7___

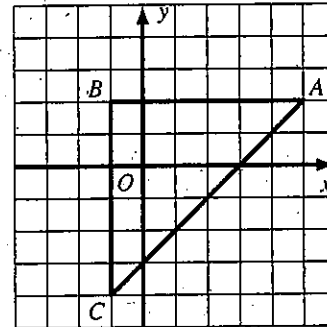3. Is f a one-to-one function? ___no___

Refer to the figure. In Exercise 6, k is the line $y = x$.

4. $R_x: A \rightarrow$ _(5, -2)_
5. $R_y: B \rightarrow$ _(1, 2)_

6. $R_k: C \rightarrow$ _(-4, -1)_
7. $\mathcal{R}_{B, 90}: C \rightarrow$ _A (5, 2)_

In Exercises 8–10 use the translation $T: (x, y) \rightarrow (x - 1, y + 3)$.
Refer to the figure.

8. $T: A \rightarrow ($ _4_ , _5_ $)$ and $T: C \rightarrow ($ _-2_ , _-1_ $)$.

9. Find AC and $A'C'$. $AC =$ _6√2_ $A'C' =$ _6√2_

10. Find the preimage of $(3, 4)$. _(4, 1)_

Exs. 4–10

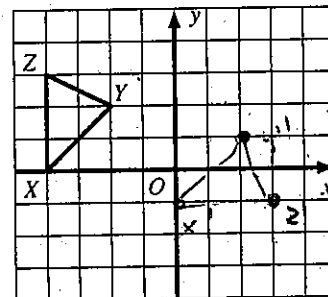11. Find the coordinates of the image of Y by each dilation.

   a. $D_{O,2}$ _(-4, 4)_
   b. $D_{O, -\frac{1}{2}}$ _(1, -1)_

12. A glide reflection is described below. Graph $\triangle X'Y'Z'$, the image of $\triangle XYZ$ under the glide. Also graph $\triangle X''Y''Z''$, the image of $\triangle X'Y'Z'$ under the reflection.
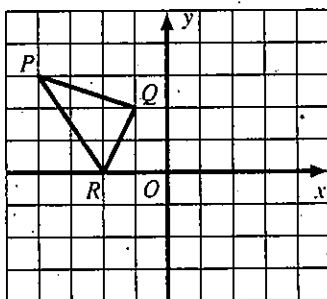
Glide: All points move right 3 units.
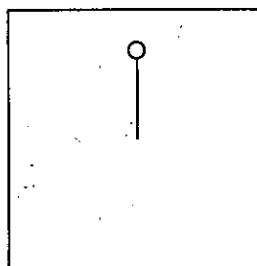Reflection: All points are reflected in the line $y = x$.

Exs. 11, 12

~~13.~~ Graph $\triangle P''Q''R''$, the image of $\triangle PQR$ by $R_x \circ R_y$.

Ex. 13

Ex. 14

~~14.~~ Complete the figure at the right above so that it has 90°, 180°, and 270° rotational symmetry. How many lines of symmetry does the completed figure have? _____

~~15.~~ If $S: (x, y) \rightarrow (x - 1, y + 2)$, then $S^{-1}: (x, y) \rightarrow$ _____
and $S^{-1} \circ S: (x, y) \rightarrow$ _____.

Practice 59
Chapter 14 Practice

In Exercises 1–4 use the mapping $T:(x, y) \rightarrow (2x, y - 4)$.

1. What is the image of $(2, 3)$? ___$(4, -1)$___

2. What is the preimage of $(-8, 2)$? ___$(-4, 6)$___

3. Does T appear to be an isometry? ___no___

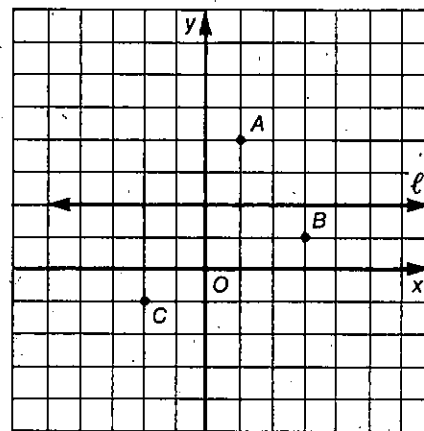4. The rule for T^{-1} is $T^{-1}:(x, y) \rightarrow$ _____.

In Exercises 5–12, find the coordinates of each image point.

5. $R_x:(1, 4) \rightarrow$ ___$(1, -4)$___

6. $R_y:(3, 1) \rightarrow$ ___$(-3, 1)$___

7. $R_l:(-2, -1) \rightarrow$ ___$(-2, 5)$___

8. $D_{O,2}:(-2, -1) \rightarrow$ ___$(-4, -2)$___

9. $H_O:(1, 4) \rightarrow$ ___$(-1, -4)$___

10. $R_l \circ R_x:(-2, -1) \rightarrow$ _____

11. $R_y \circ H_O:(-2, -1) \rightarrow$ _____

12. $R_l \circ D_{O,2}:(3, 1) \rightarrow$ _____

Exs. 5–12

Tell whether the regular hexagon shown below has the following symmetries.

13. Point symmetry _____

14. Line symmetry _____

15. 90° rotational symmetry _____
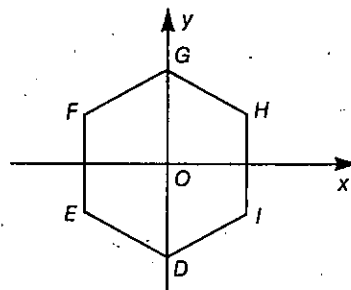
Exercises 16–21 refer to regular hexagon *GHIDEF*.

16. $\mathcal{R}_{O,120}(G) =$ ___F___

17. $\mathcal{R}_{O,180}(I) =$ ___F___
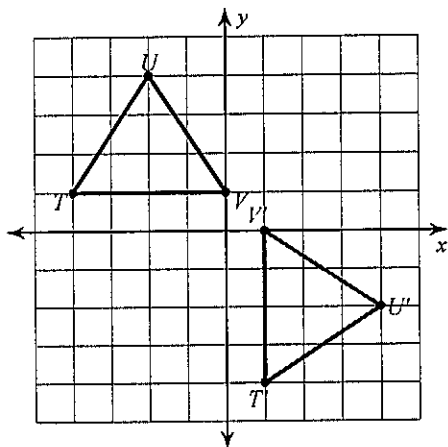
18. $R_x(F) =$ ___E___

19. $H_O \circ R_y:F \rightarrow$ _____

20. $\mathcal{R}_{O,60} \circ H_O:E \rightarrow$ _____

21. $\mathcal{R}_{O,120} \circ \mathcal{R}_{O,240}:D \rightarrow$ _____

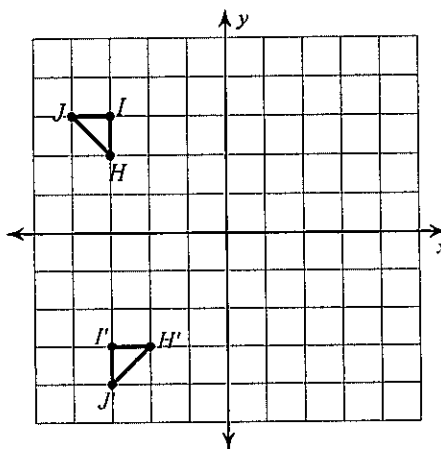Exs. 13–21

Name___Key___

Transformations Practice

Graph the image of the figure using the transformation given.
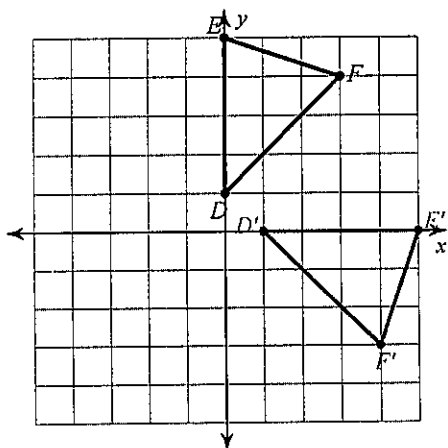
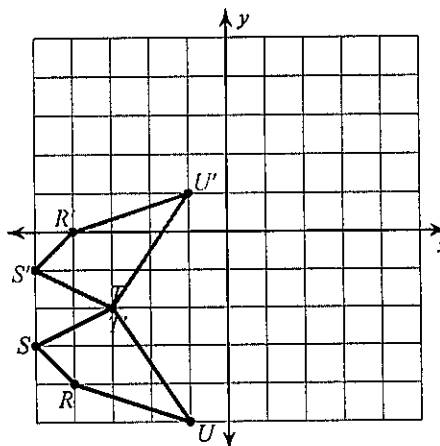1) reflection across $y = x$

2) rotation 90° counterclockwise about the origin
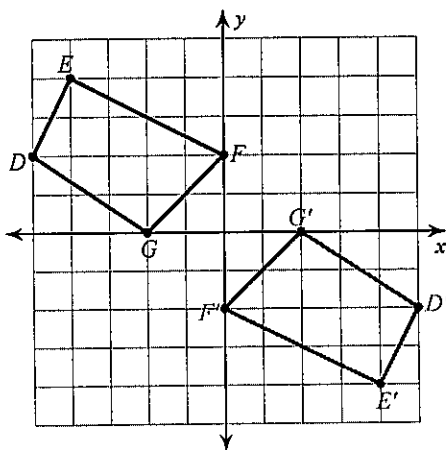

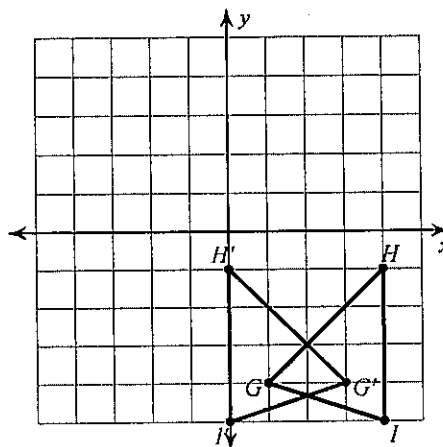3) rotation 90° clockwise about the origin
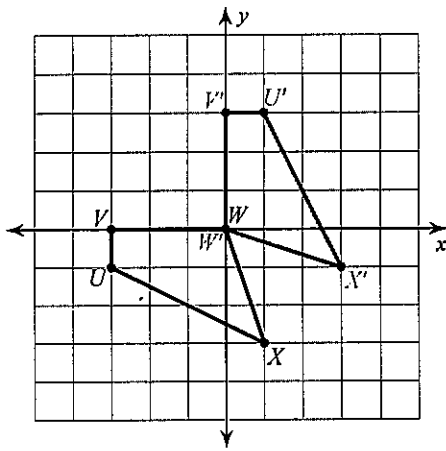

4) reflection across $y = -2$
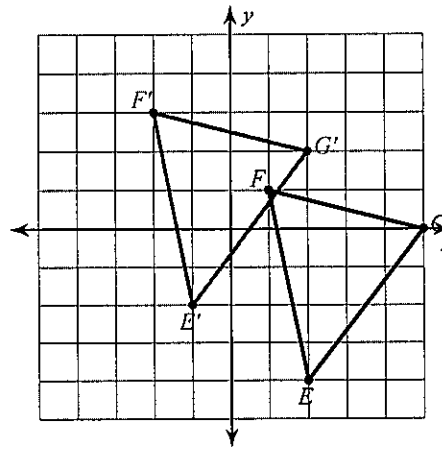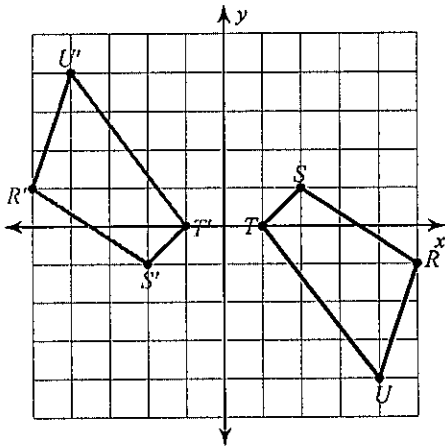

5) rotation 180° about the origin

6) reflection across $x = 2$

7) reflection across $y = -x$

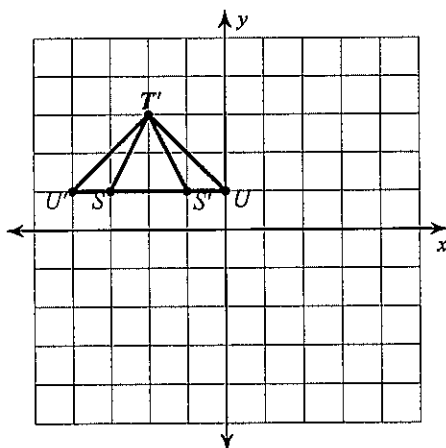8) translation: 3 units left and 2 units up

9) rotation 180° about the origin
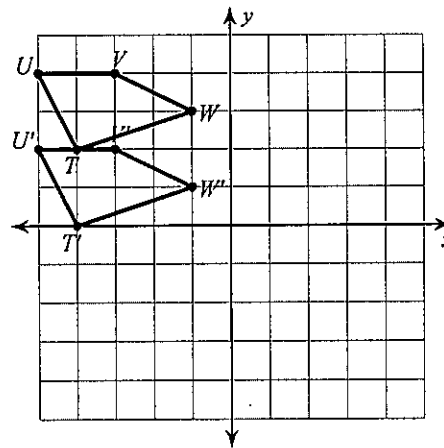
10) rotation 90° clockwise about the origin
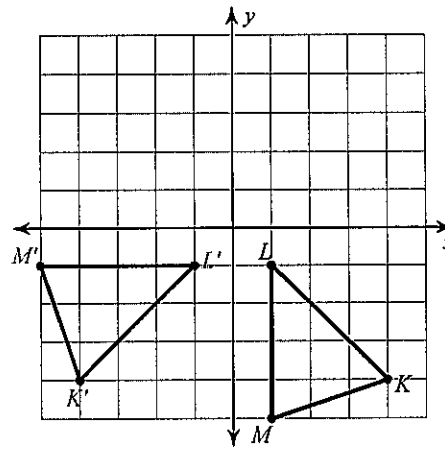
Write a rule to describe each transformation.
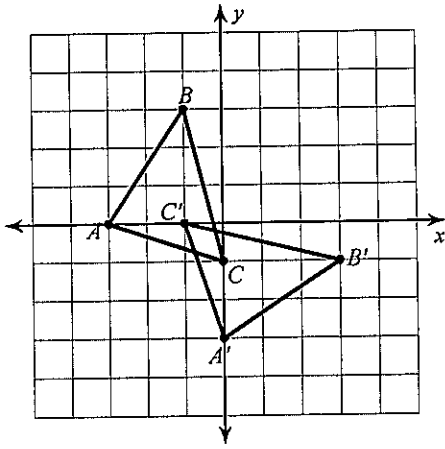
11)

reflection across $x = -2$

12)

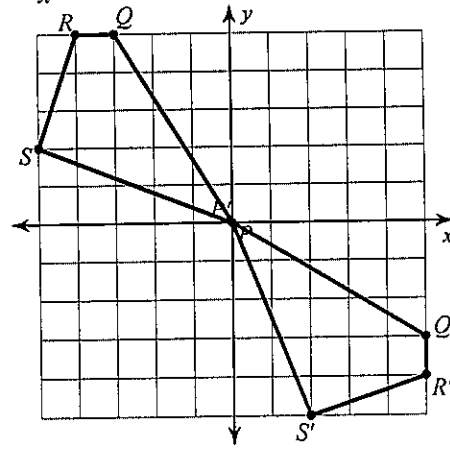translation: 2 units down

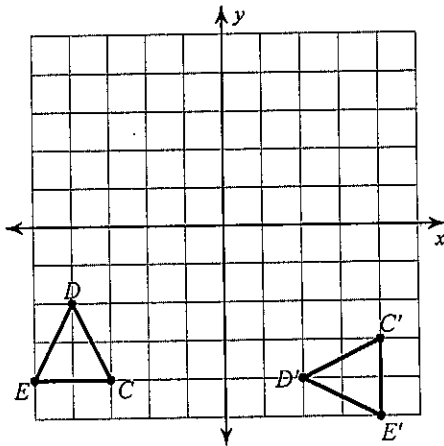13)   reflection across $y = x$ 14)   reflection across $y =$
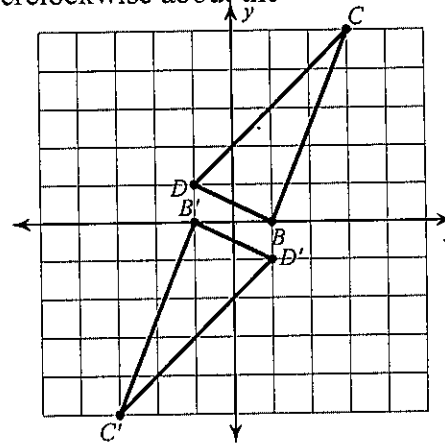

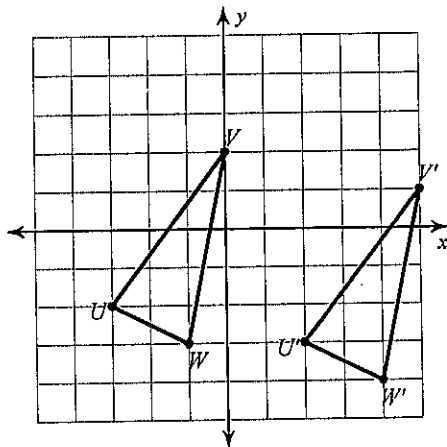15)   rotation 90° counterclockwise about the 16)   rotation 180° about
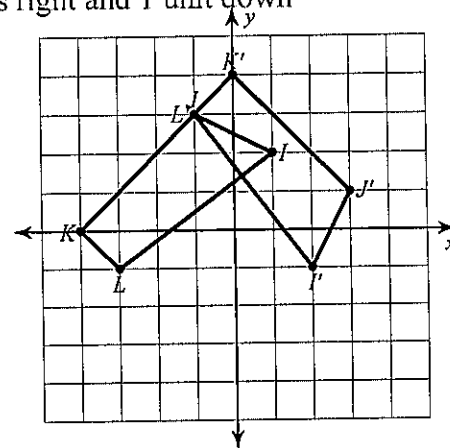   origin

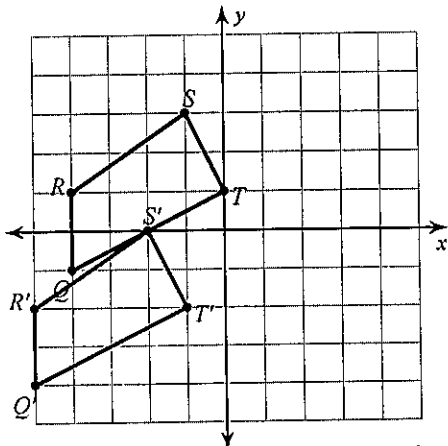17)   translation: 5 units right and 1 unit down 18)   rotation 90° clockwi

19)   20)   reflection across the
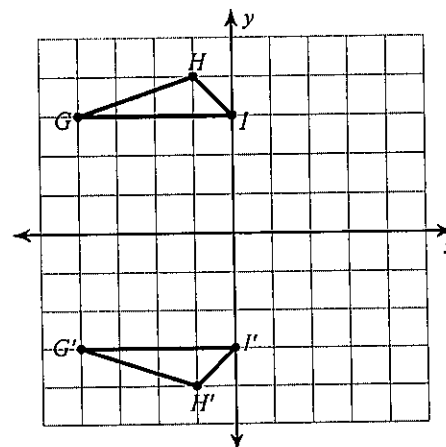

translation: 1 unit left and 3 units down   -3-