

# Practice 56

## Supplementary Practice

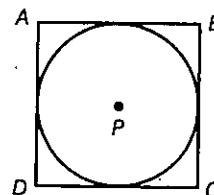
Lessons 14-1 through 14-3

In Exercises 1-3,  $f: x \rightarrow 3x + 8$ .

- Find the image of  $-5$ .  $-7$
- Find the preimage of  $2$ .  $-2$
- Is  $f$  a one-to-one function? yes

In the figure,  $\odot P$  is inscribed in square  $ABCD$ .

- Describe a way of mapping each point of  $\odot P$  to a point of  $ABCD$  so that the mapping is one-to-one. For every pt.  $x$  on  $\odot P$ , map  $x$  to  $x'$  on  $ABCD$  where  $x'$  is the intersection of  $\overrightarrow{Px}$  +  $ABCD$
- Is the mapping an isometry? no



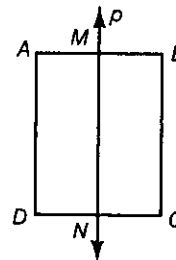
Exs. 4, 5

For the mapping  $T: (x, y) \rightarrow (x + 3, y - 1)$ , find the following.

- The image of  $(2, 1)$   $(5, 0)$
- The image of  $(4, -2)$   $(7, -3)$
- The preimage of  $(0, 0)$   $(-3, 1)$
- The preimage of  $(5, -3)$   $(2, -2)$
- Does  $T$  appear to be an isometry? yes

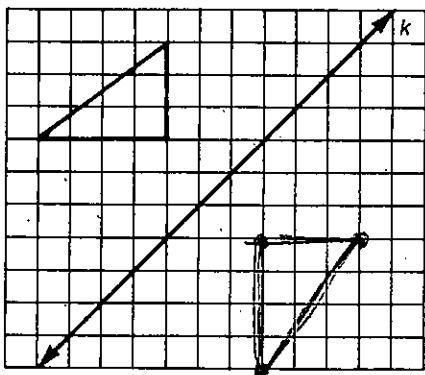
In the figure, line  $p$  is the perpendicular bisector of both  $\overline{AB}$  and  $\overline{DC}$ . Complete.

- $R_p: \overline{AB} \rightarrow \overline{BA}$
- $R_p: \overline{AM} \rightarrow \overline{BM}$
- $R_p: \overline{BC} \rightarrow \overline{AD}$
- $R_p: \overline{MN} \rightarrow \overline{MN}$

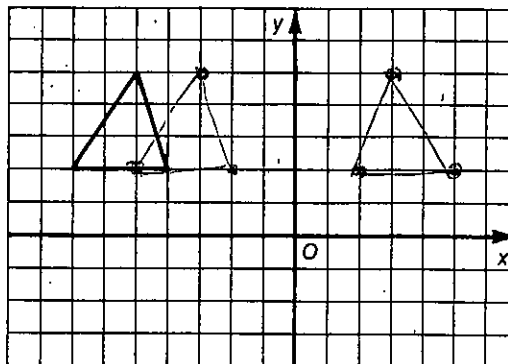


Draw the image of each figure by the transformation specified.

15. Reflection in line  $k$



16. Glide 2 units to the right, followed by reflection in the  $y$ -axis



# Practice 57

## Some Basic Mappings

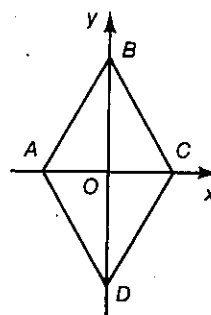
Lessons 14-1 through 14-5

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.

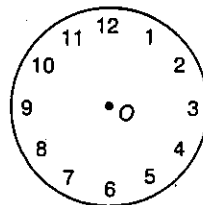
7.  $R_{C, 60}: B \rightarrow$   $A$
8.  $R_y: \overline{BC} \rightarrow$   $\overline{BA}$
9.  $H_O: \overline{AD} \rightarrow$   $\overline{CB}$
10.  $D_{C, \frac{1}{2}}: \overline{AC} \rightarrow$   $\overline{OC}$
11.  $R_{A, -120}: \overline{AB} \rightarrow$   $\overline{AD}$
12.  $R_x: \overline{BC} \rightarrow$   $\overline{DC}$



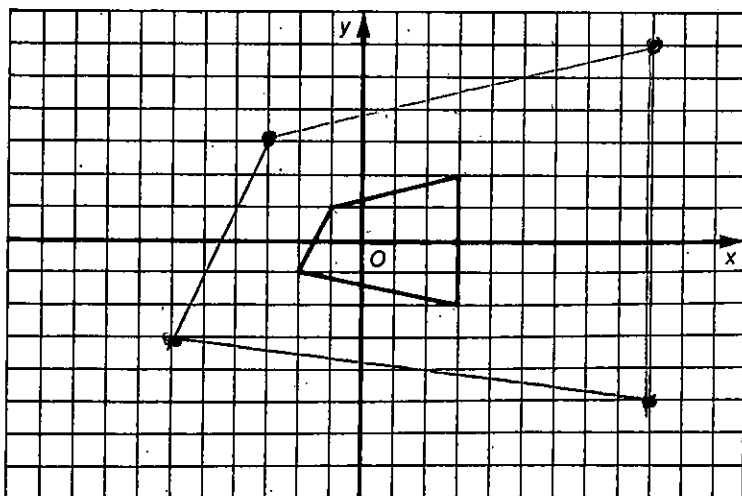
Exs. 7-12

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.  $R_{O, 30}(1) =$   $12$
14.  $R_{O, 90}(6) =$   $3$
15.  $R_{O, 180}(8) \rightarrow$   $2$
16.  $R_{O, 120}(10) \rightarrow$   $6$



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



# Transformations

For use after Chapter 14

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

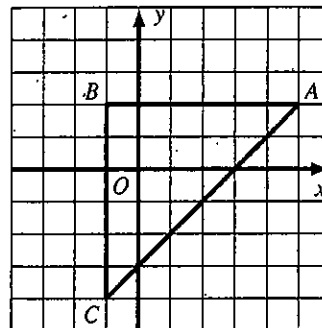
Refer to the figure. In Exercise 6,  $k$  is the line  $y = x$ .

4.  $R_x: A \rightarrow (5, -2)$

5.  $R_y: B \rightarrow (1, 2)$

6.  $R_k: C \rightarrow (-4, -1)$

7.  $R_{B, 90}: C \rightarrow A \text{ OR } (5, 2)$



Exs. 4-10

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  $A'C'$ .  $AC = 6\sqrt{2}$   $A'C' = 6\sqrt{2}$

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

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

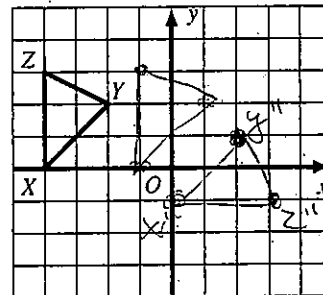
a.  $D_{O, 2} (-4, 4)$

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.

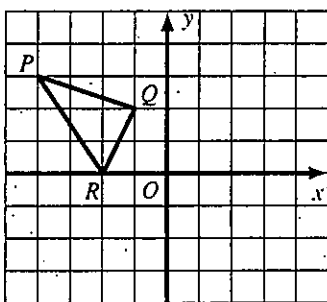
Reflection: All points are reflected in the line  $y = x$ .



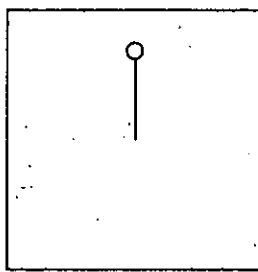
Exs. 11, 12

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  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$  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

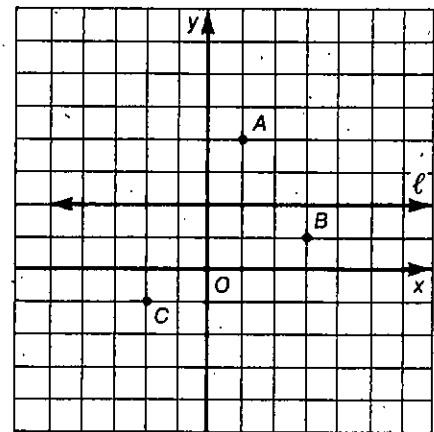
### Chapter 14 Practice

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.

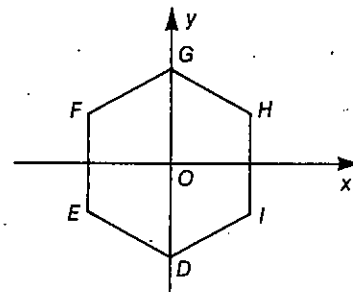
5.  $R_x:(1, 4) \rightarrow$   $(1, -4)$
6.  $R_y:(3, 1) \rightarrow$   $(-3, 1)$
7.  $R_l:(-2, -1) \rightarrow$   $(-2, 5)$
8.  $D_{O,2}:(-2, -1) \rightarrow$   $(-4, -2)$
9.  $H_O:(1, 4) \rightarrow$   $(-1, -4)$
10.  $R_l \circ R_x:(-2, -1) \rightarrow$  \_\_\_\_\_
11.  $R_y \circ H_O:(-2, -1) \rightarrow$  \_\_\_\_\_
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.  $90^\circ$  rotational symmetry \_\_\_\_\_



Exs. 13–21

Exercises 16–21 refer to regular hexagon  $GHIDEF$ .

16.  $\mathcal{R}_{O,120}(G) =$   $E$
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.  $\mathcal{R}_{O,120} \circ \mathcal{R}_{O,240}:D \rightarrow$  \_\_\_\_\_