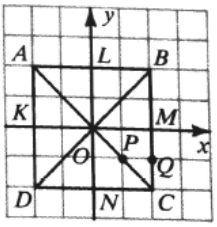
Geometry Honors Chapter 4 Online Review

Self-Test 1

1. Define an isometry.
2. If $f(x) = 3x - 7$, find the image of 2 and the preimage of 2.
3. If $T:(x, y) \rightarrow (x + 1, y - 2)$, find the image and preimage of the origin.
4. Find the image of (3, 5) when reflected in each line.
   a. the x-axis b. the y-axis c. the line $y = x$.
5. A dilation with scale factor 3 maps $\triangle ABC$ to $\triangle A'B'C'$. Which of the following are true?
   a. $\overline{AB} \parallel \overline{A'B'}$ b. $\frac{A'B'}{AB} = 3$ c. $\frac{\text{area of } \triangle A'B'C'}{\text{area of } \triangle ABC} = 3$
6. Give two other names for the rotation $\mathcal{R}_{O,\,-30}$.

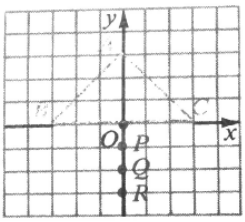
Complete. R_x and R_y denote reflections in the x- and y-axes, respectively.

7. $R_y:A \rightarrow$ ___?___
8. $R_x:B \rightarrow$ ___?___
9. $R_x:\overline{DC} \rightarrow$ ___?___
10. $R_y:$ ___?___ $\rightarrow \overline{OA}$
11. $H_O:K \rightarrow$ ___?___
12. $H_O:$ ___?___ $\rightarrow \overline{CO}$
13. $\mathcal{R}_{O,\,90}$ maps M to ___?___.
14. $\mathcal{R}_{O,\,-90}$ maps $\triangle MCO$ to $\triangle$ ___?___.
15. $D_{O,\,2}$ maps P to ___?___.
16. $D_{M,\,-\frac{1}{2}}$ maps B to ___?___.
17. A translation that maps A to L maps N to ___?___.
18. The glide reflection in $\overleftrightarrow{BD}$ that maps K to M maps N to ___?___.



Self-Test 2

For Exercises 1–6, refer to the figure.



1. $R_x \circ \mathcal{R}_{O,\,90}:B \rightarrow$ ___?___
2. $R_x \circ H_O:A \rightarrow$ ___?___
3. $\mathcal{R}_{O,\,110} \circ \mathcal{R}_{O,\,70}:C \rightarrow$ ___?___
4. $D_{O,\,\frac{1}{2}} \circ D_{R,\,\frac{1}{2}}:P \rightarrow$ ___?___
5. What is the symmetry line of $\triangle ABC$?
6. Does $\triangle ABC$ have point symmetry?
7. For any transformation T, $T^{-1} \circ T:P \rightarrow$ ___?___.
8. The composite of any transformation T and the identity is ___?___.
9. If line a is parallel to line b, then the composite $R_a \circ R_b$ is a ___?___.
10. Give the inverse of each transformation.
    a. $D_{O,\,5}$ b. $\mathcal{R}_{O,\,-70}$ c. R_y d. $S:(x, y) \rightarrow (x + 2, y - 3)$
11. How many lines of symmetry does a regular hexagon have?

Answers:
Self Test 1
1. An isometry is a one-to-one mapping from the whole plane onot the shole palne that maps every segment to a congruent segment.
2. -1, 3 3. (1, -2), (-1, 2) 4. a) (3, -5) b) (-3, 5) c) (5, 3)
5. a, b 6. May vary 7. B 8. C 9. AB 10. OB 11. M 12. AO
13. L 14. NDO 15. C 16. Q 17. C 18. L

Self Test 2

1. A 2. A 3. B 4. P 5. Y-axis 6. No 7. P 8. T 9. Translation

10. a) $D_{O,\,1/5}$ b) $\mathcal{R}_{O,\,70}$ c) R_y d) skip 11. 6

PM 88

In Exercises 1–3 $f(x) = x^2$ and $g(x) = 3x + 1$. Evaluate the following.

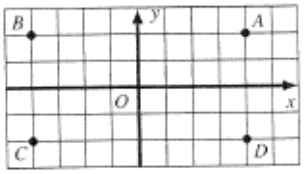
1. $(g \circ f)(3)$ _____ 2. $(f \circ g)(3)$ _____ 3. $(f \circ g)(x)$ _____

Complete.

4. $R_x \circ R_y : B \rightarrow$ _____ 5. $R_x \circ R_y : C \rightarrow$ _____

6. $R_x \circ H_O : D \rightarrow$ _____ 7. $R_y \circ H_O : A \rightarrow$ _____

8. $H_O \circ H_O : C \rightarrow$ _____ 9. $R_y \circ R_x : B \rightarrow$ _____



Exs. 4–9

In Exercises 10 and 11 tell which of the following properties are invariant under the given transformation: (a) distance, (b) angle measure, (c) area, and (d) orientation.

10. The composite of a reflection and a translation _____

11. The composite of a rotation and a dilation _____

12. Given translations $S : (x, y) \rightarrow (x + 1, y + 3)$ and $T : (x, y) \rightarrow (x - 2, y - 4)$ and points $A(3, 1)$, $B(2, 4)$, and $C(1, 0)$, complete each of the following.

a. $S \circ T : A \rightarrow$ _____; $S \circ T : B \rightarrow$ _____; $S \circ T : C \rightarrow$ _____

b. $T \circ S : A \rightarrow$ _____; $T \circ S : B \rightarrow$ _____; $T \circ S : C \rightarrow$ _____

c. Is $S \circ T$ equal to $T \circ S$? _____

d. $S \circ T : (x, y) \rightarrow$ (_____, _____)

Answers:

In Exercises 1–3 $f(x) = x^2$ and $g(x) = 3x + 1$. Evaluate the following.

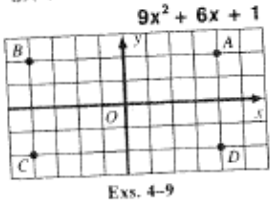
1. $(g \circ f)(3)$ **28** 2. $(f \circ g)(3)$ **100** 3. $(f \circ g)(x)$ **$(3x + 1)^2$ or $9x^2 + 6x + 1$**

Complete.

4. $R_x \circ R_y : B \rightarrow$ **D** 5. $R_x \circ R_y : C \rightarrow$ **A**

6. $R_x \circ H_O : D \rightarrow$ **C** 7. $R_y \circ H_O : A \rightarrow$ **D**

8. $H_O \circ H_O : C \rightarrow$ **C** 9. $R_y \circ R_x : B \rightarrow$ **D**



Exs. 4–9

In Exercises 10 and 11 tell which of the following properties are invariant under the given transformation: (a) distance, (b) angle measure, (c) area, and (d) orientation.

10. The composite of a reflection and a translation **a, b, c**

11. The composite of a rotation and a dilation **b, d**

12. Given translations $S : (x, y) \rightarrow (x + 1, y + 3)$ and $T : (x, y) \rightarrow (x - 2, y - 4)$ and points $A(3, 1)$, $B(2, 4)$, and $C(1, 0)$, complete each of the following.

a. $S \circ T : A \rightarrow$ **(2, 0)**; $S \circ T : B \rightarrow$ **(1, 3)**; $S \circ T : C \rightarrow$ **(0, −1)**

b. $T \circ S : A \rightarrow$ **(2, 0)**; $T \circ S : B \rightarrow$ **(1, 3)**; $T \circ S : C \rightarrow$ **(0, −1)**

c. Is $S \circ T$ equal to $T \circ S$? **Yes**

d. $S \circ T : (x, y) \rightarrow$ (**x − 1**, **y − 1**)

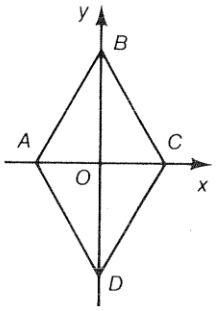
Practice 57
Some Basic Mappings

Lessons 14-1 through 14-

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

1. The translation T: $(x, y) \rightarrow (x - 1, y + 3)$ _____
2. Reflection in the x-axis _____
3. Reflection in the y-axis _____
4. Reflection in the line $y = x$ _____
5. $D_{O,\frac{1}{2}}$ _____
6. Glide-reflection: glide 3 units right, followed by reflection in the x-axis _____

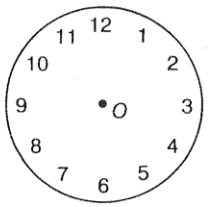
$\triangle ABC$ and $\triangle ADC$ are equilateral triangles. R_x and R_y are reflections in the x- and y-axes, respectively. Complete.



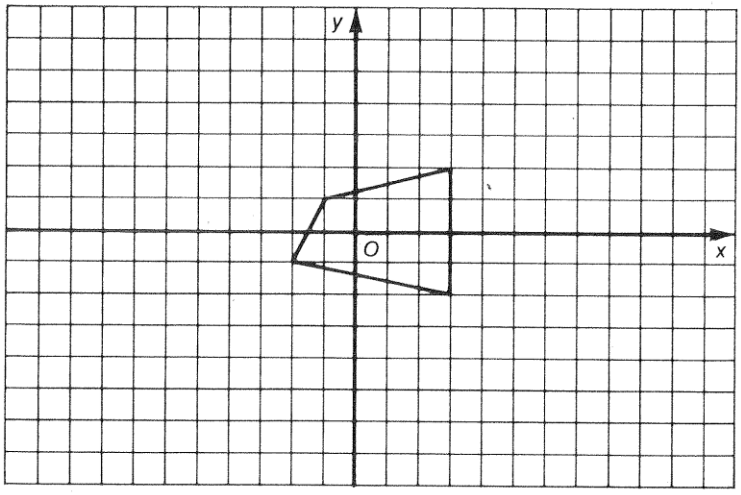
Exs. 7–12

7. $\mathcal{R}_{C,60}: B \rightarrow$ _____
8. $R_y: \overline{BC} \rightarrow$ _____
9. $H_O: \overline{AD} \rightarrow$ _____
10. $D_{C,\frac{1}{2}}: \overline{AC} \rightarrow$ _____
11. $\mathcal{R}_{A,-120}:$ _____ $\rightarrow \overline{AD}$
12. $R_x:$ _____ $\rightarrow \overline{DC}$

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. $\mathcal{R}_{O,30}(1) =$ _____
14. $\mathcal{R}_{O,90}(6) =$ _____
15. $\mathcal{R}_{O,180}: 8 \rightarrow$ _____
16. $\mathcal{R}_{O,120}: 10 \rightarrow$ _____
17. On the graph below, draw the image of the figure under the dilation $D_{O,3}$.

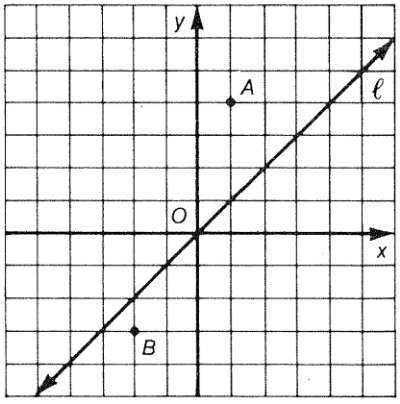


Practice 58
Composition and Symmetry

Lessons 14-6 through 14-8

For each exercise, find the coordinates of the image point.

1. $R_x \circ R_y:(1, 4) \rightarrow$ _____
2. $R_x \circ H_O:(-2, -3) \rightarrow$ _____
3. $R_y \circ R_l:(1, 4) \rightarrow$ _____
4. $R_l \circ H_O:(-2, -3) \rightarrow$ _____



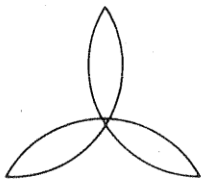
Exs. 1–4

Complete the following.

5. If $S:(x, y) \rightarrow (x - 2, y + 1)$, then the rule for S^2 is $S^2:(x, y) \rightarrow$ _____.
6. If $T:(x, y) \rightarrow (x + 3, 5y)$, then the rule for T^{-1} is $T^{-1}:(x, y) \rightarrow$ _____.
7. The inverse of $D_{O,3}$ is _____.
8. The inverse of $\mathcal{R}_{O,450}$ is _____.

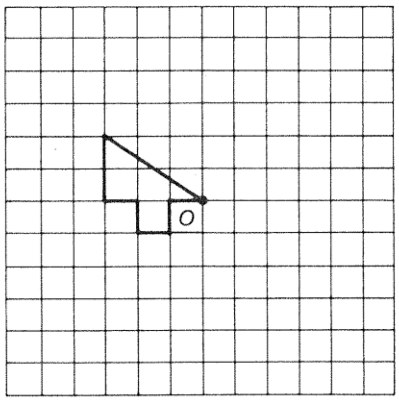
Does the figure drawn at the right have the following properties?

9. Line symmetry _____
10. Point symmetry _____
11. 60° rotational symmetry _____
12. 120° rotational symmetry _____

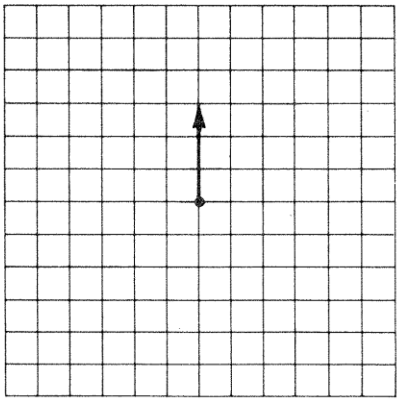


Complete each figure so that it has the specified symmetries.

13. Symmetry in point O



14. Point symmetry and 4 lines of symmetry

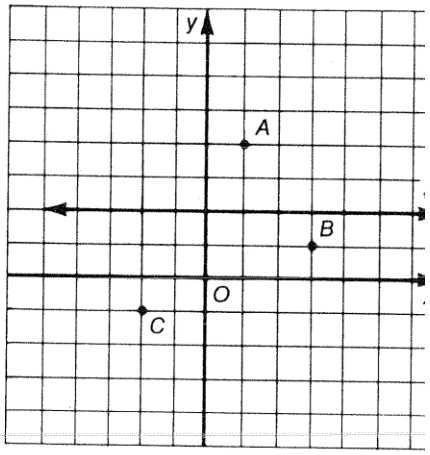


Practice 59
Chapter 14 Practice

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

1. What is the image of (2, 3)? _____
2. What is the preimage of $(-8, 2)$? _____
3. Does T appear to be an isometry? _____
4. The rule for T^{-1} is $T^{-1}:(x, y) \rightarrow$ _____.

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

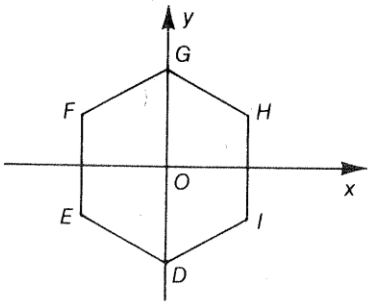


Exs. 5–12

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

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

13. Point symmetry _____
14. Line symmetry _____
15. 90° rotational symmetry _____



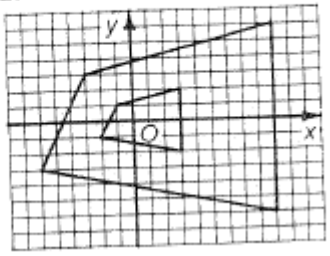
Exs. 13–21

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

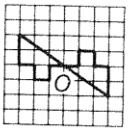
16. $\mathcal{R}_{O,120}(G) =$ _____
17. $\mathcal{R}_{O,180}(I) =$ _____
18. $R_x(F) =$ _____
19. $H_O \circ R_y:F \rightarrow$ _____
20. $\mathcal{R}_{O,60} \circ H_O:E \rightarrow$ _____
21. $\mathcal{R}_{O,120} \circ \mathcal{R}_{O,240}:D \rightarrow$ _____

Answers:

Practice 57 **1.** $(-3, 7)$ **2.** $(-2, -4)$ **3.** $(2, 4)$ **4.** $(4, -2)$ **5.** $(-1, 2)$ **6.** $(1, -4)$ **7.** A **8.** $\overline{BA}$ **9.** $\overline{CB}$ **10.** $\overline{OC}$ **11.** $\overline{AB}$ **12.** $\overline{BC}$ **13.** 12 **14.** 3 **15.** 2 **16.** 6 **17.**



Practice 58 **1.** $(-1, -4)$ **2.** $(2, -3)$ **3.** $(-4, 1)$ **4.** $(3, 2)$ **5.** $(x - 4, y + 2)$ **6.** $(x - 3, \frac{y}{5})$ **7.** $D_{O, \frac{1}{3}}$ **8.** $\mathcal{R}_{O, -90}$ **9.** yes **10.** no **11.** no **12.** yes **13.**



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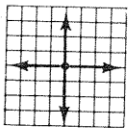

Practice 59 **1.** $(4, -1)$ **2.** $(-4, 6)$ **3.** no **4.** $\left(\frac{x}{2}, y + 4\right)$ **5.** $(1, -4)$ **6.** $(-3, 1)$ **7.** $(-2, 5)$ **8.** $(-4, -2)$ **9.** $(-1, -4)$ **10.** $(-2, 3)$ **11.** $(-2, 1)$ **12.** $(6, 2)$ **13.** yes **14.** yes **15.** no

16. E **17.** F **18.** E **19.** E **20.** G **21.** D