

4.2 Start Thinking

Lay a yardstick at the base of a mirror. Stand at the end of the yardstick so you are 3 feet from the mirror. Is your reflection the same distance from the mirror? Explain why or why not.

Hold up your right hand. Is your reflection holding up its right hand as well? Explain why or why not.

4.2 Warm Up

Reflect point P . State the coordinates of P' .

1. $P(-5, 3)$; reflection in y -axis
2. $P(-4, -3)$; reflection in y -axis
3. $P(-1, -5)$; reflection in y -axis
4. $P(-1, 1)$; reflection in x -axis
5. $P(4, 6)$; reflection in x -axis
6. $P(5, 1)$; reflection in x -axis

4.2 Cumulative Review Warm Up

Classify the angle.

- | | | |
|---------------|---------------|----------------|
| 1. 59° | 2. 90° | 3. 153° |
| 4. 97° | 5. 29° | 6. 180° |

4.2

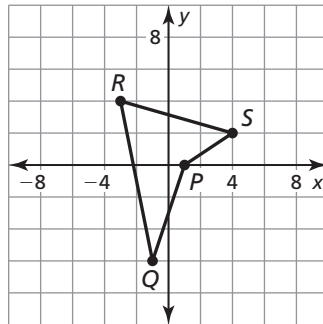
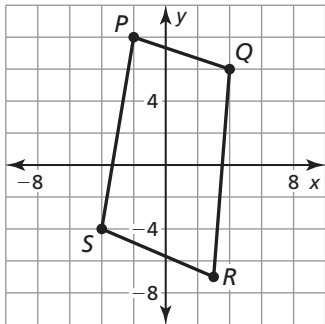
Practice A

In Exercises 1–3, graph $\triangle ABC$ and its image after a reflection in the given line.

1. $A(0, 2), B(1, -3), C(2, 4)$; x -axis
2. $A(-2, -4), B(6, 2), C(3, -5)$; y -axis
3. $A(4, -1), B(3, 8), C(-1, 1)$; $y = -2$

In Exercises 4 and 5, graph the polygon and its image after a reflection in the given line.

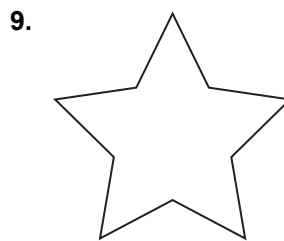
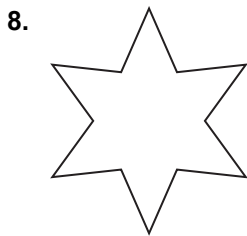
4. $y = -x$
5. $y = x$



In Exercises 6 and 7, graph $\triangle JKL$ with vertices $J(2, 3), K(-2, 1),$ and $L(-1, 5)$ and its image after the glide reflection.

6. **Translation:** $(x, y) \rightarrow (x - 1, y)$
Reflection: in the x -axis
7. **Translation:** $(x, y) \rightarrow (x + 2, y - 3)$
Reflection: in the line $x = -2$

In Exercises 8 and 9, determine the number of lines of symmetry for the figure.



10. Find point W on the y -axis so that $VW + XW$ is a minimum given $V(2, 3)$ and $X(-2, -1)$.
11. A line $y = 3x - 5$ is reflected in $x = a$ so that the image is given by $y = 1 - 3x$. What is the value of a ?
12. Your friend claims that it is not possible to have a glide reflection if you have two translations followed by one reflection. Is your friend correct? Explain your reasoning.

4.2

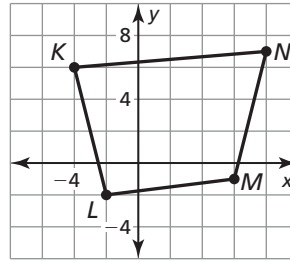
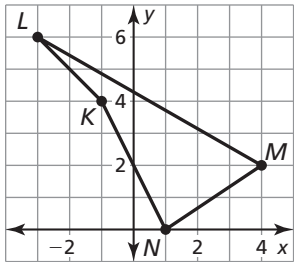
Practice B

In Exercises 1 and 2, graph $\triangle CDE$ and its image after a reflection in the given line.

1. $C(3, 4), D(2, -1), E(0, -5)$; y -axis 2. $C(1, 6), D(12, 2), E(7, -8)$; $x = 8$

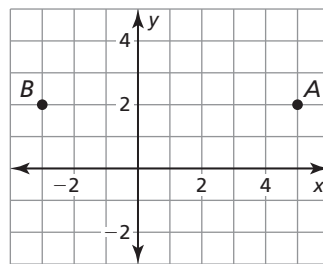
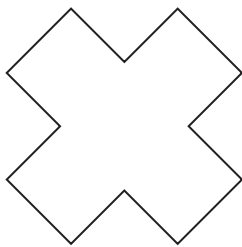
In Exercises 3 and 4, graph the polygon and its image after a reflection in the given line.

3. x -axis 4. $y = -1$



In Exercises 5 and 6, graph $\triangle ABC$ with vertices $A(-1, 4), B(2, -1),$ and $C(4, 3)$ and its image after the glide reflection.

5. **Translation:** $(x, y) \rightarrow (x + 2, y - 1)$ 6. **Translation:** $(x, y) \rightarrow (x - 3, y + 1)$
Reflection: in the line $y = x$ **Reflection:** in the line $y = -x$
7. Determine the number of lines of symmetry for the figure. 8. Find point P on the x -axis so that $AP + BP$ is a minimum.

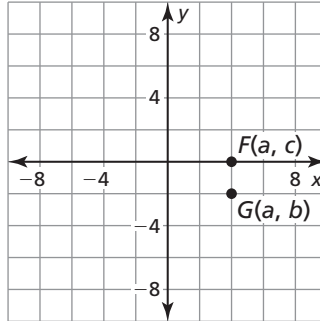


9. Is it possible to perform two reflections of an object so that the final image is identical to the original image? If so, give an example. If not, explain your reasoning.
10. A triangle undergoes a glide reflection. Is it possible for the sides of the triangle to change length during this process? Explain your reasoning.
11. Your friend claims that it is not possible to have a glide reflection if you have one translation followed by two reflections. Is your friend correct? Explain your reasoning.

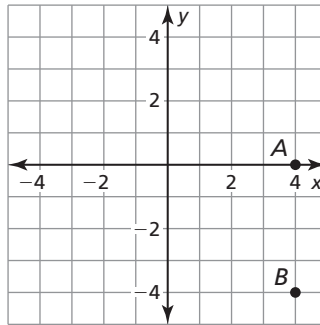
4.2 Enrichment and Extension

Reflections

1. Reflect points F and G in the y -axis. Name the coordinates and connect the points to form a polygon. Give the most specific name for the polygon.
2. Reflect points F and G in the x -axis. Name the coordinates.



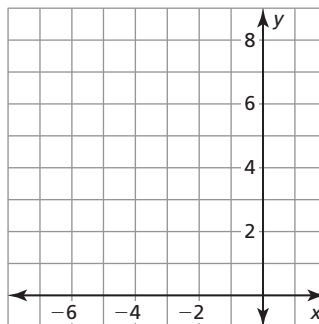
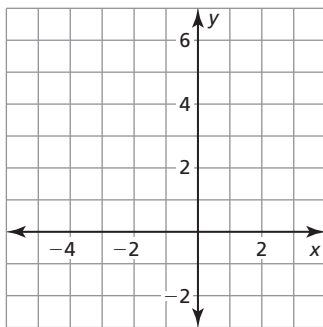
3. Reflect the points A and B in the line $y = x$. Connect the points to form a polygon. Give the most specific name for the polygon.
4. Reflect the points A and B in the line $y = -x$. Connect the points to form a polygon. Give the most specific name for the polygon.



The vertices of $\triangle ABC$ are $A(-4, 4)$, $B(0, 7)$, and $C(-1, 3)$. Reflect $\triangle ABC$ in line 1 to obtain $\triangle A'B'C'$. Then reflect $\triangle A'B'C'$ in line 2 to obtain $\triangle A''B''C''$. Graph triangles $\triangle A'B'C'$ and $\triangle A''B''C''$.

5. Line 1: $y = 4$; Line 2: $x = -1$

6. Line 1: $x = -3$; Line 2: $y = 5$



4.2 Puzzle Time

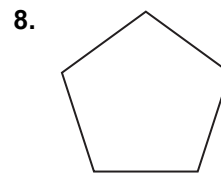
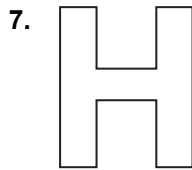
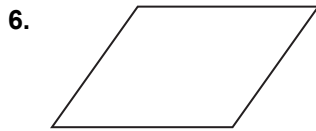
What Type Of Dance Does A Geometry Teacher Like?

Circle the letter of each correct answer in the boxes below. The circled letters will spell out the answer to the riddle.

Complete the sentence.

1. A _____ is a transformation that uses a line like a mirror to reflect the figure.
2. If (a, b) is reflected in the x -axis, then its image is the point _____.
3. If (a, b) is reflected in the line $y = x$, then its image is the point _____.
4. A _____ reflection is a transformation involving a translation followed by a reflection.
5. A figure in the plane has line _____ when the figure can be mapped onto itself by a reflection in a line.

How many lines of symmetry does the figure have?



Identify the vertices of the image created after the reflection in the given line.

9. $A(3, 4), B(5, 2); y = x$
10. $A(6, -3), B(-2, 4); x$ -axis
11. $A(-2, -1), B(3, 9); y = -x$

H	S	K	L	Q	U	W	I	A	R	E
9	(b, a)	16	7	0	symmetry	slider	$A'(1, -2), B'(3, -9)$	2	5	$A'(6, 3), B'(-2, -4)$
G	I	D	F	O	A	D	N	E	C	E
$A'(3, -4), B'(5, -2)$	$(-b, -a)$	$(a, -b)$	6	4.5	reflection	rotation	$A'(1, 2), B'(-9, -3)$	$\frac{1}{2}$	$A'(4, 3), B'(2, 5)$	glide