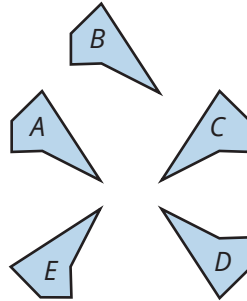


Skills Practice

Name _____ Date _____

I. Geometric Components of Rigid Motions

- A.** Describe a transformation or sequence of transformations that maps one figure onto the other. Be as specific as possible.

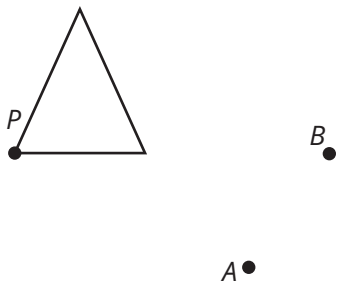


1. Figure A onto Figure B
2. Figure A onto Figure C
3. Figure A onto Figure E
4. Figure C onto Figure D
5. Figure D onto Figure A
6. Figure E onto Figure C

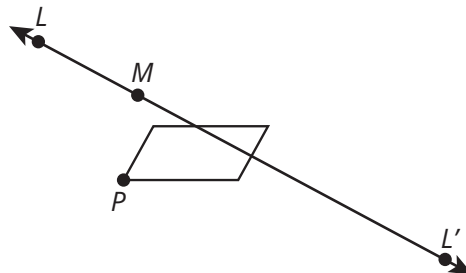
II. Translations as Functions

A. Complete each translation, given the function.

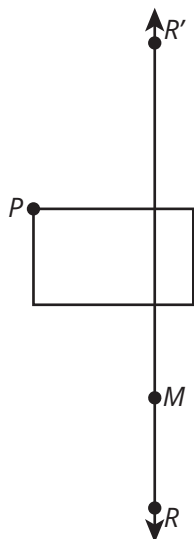
1. $T_{BA}(\text{Triangle}) = \text{Triangle}'$



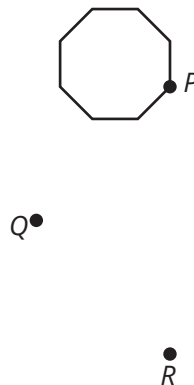
2. $T_{LM}(\text{Parallelogram}) = \text{Parallelogram}'$



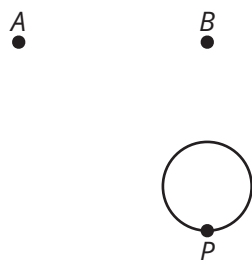
3. $T_{RM}(\text{Rectangle}) = \text{Rectangle}'$



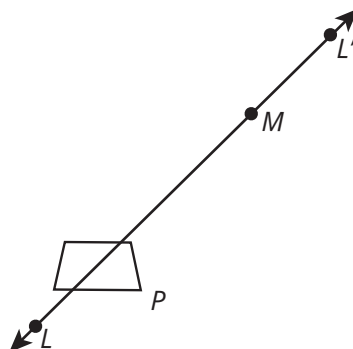
4. $T_{QR}(\text{Octagon}) = \text{Octagon}'$



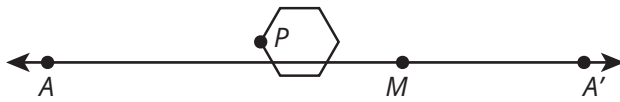
5. $T_{BA}(\text{Circle}) = \text{Circle}'$



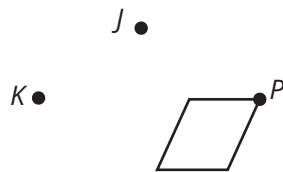
6. $T_{ML'}(\text{Trapezoid}) = \text{Trapezoid}'$



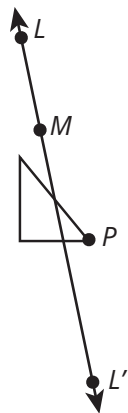
7. $T_{A'M}(\text{Hexagon}) = \text{Hexagon}'$



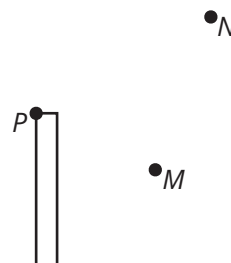
8. $T_{JK}(\text{Rhombus}) = \text{Rhombus}'$



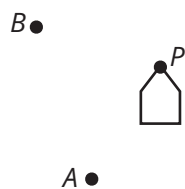
9. $T_{LM}(\text{Triangle}) = \text{Triangle}'$



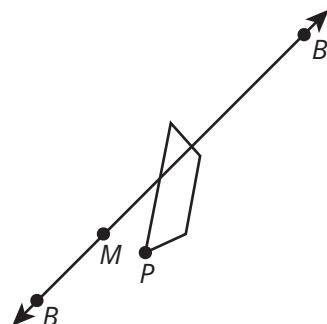
10. $T_{MN}(\text{Rectangle}) = \text{Rectangle}'$



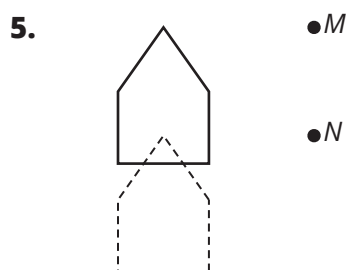
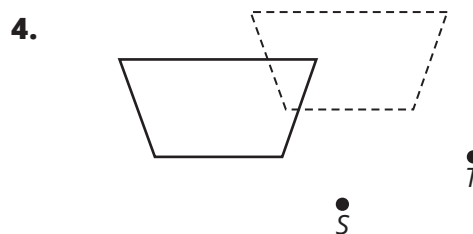
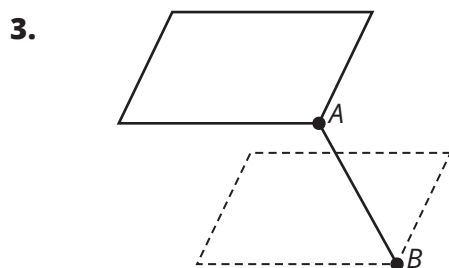
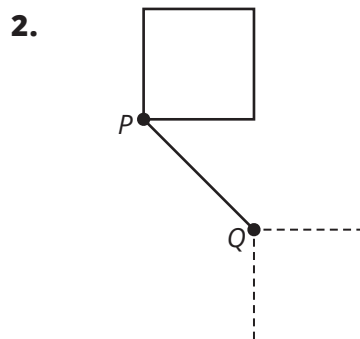
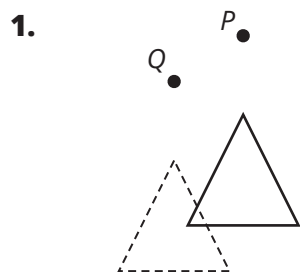
11. $T_{BA}(\text{Pentagon}) = \text{Pentagon}'$



12. $T_{BM}(\text{Trapezoid}) = \text{Trapezoid}'$



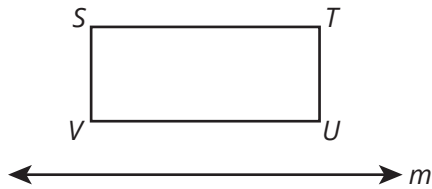
B. Write a function to describe each translation.



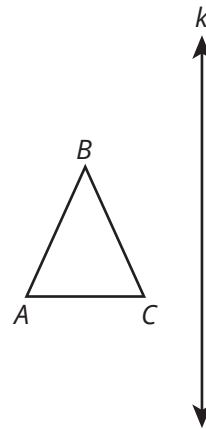
III. Reflections as Functions

A. Complete each reflection, given the function.

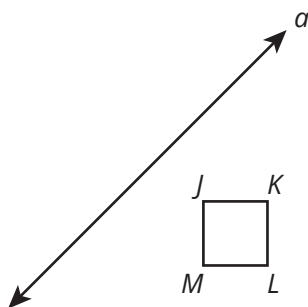
1. $R_m(STUV)$



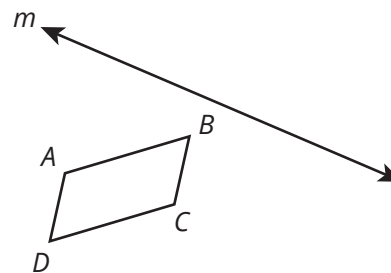
2. $R_k(ABC)$



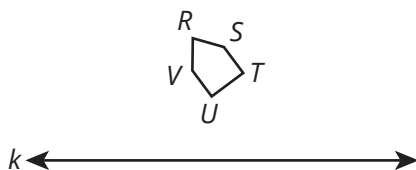
3. $R_a(JKLM)$



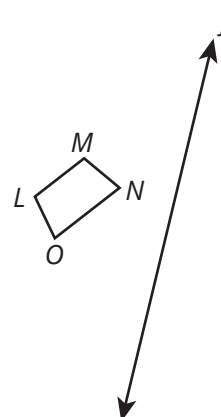
4. $R_m(ABCD)$



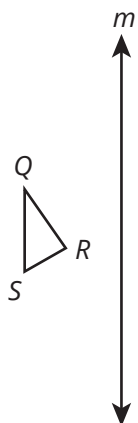
5. $R_k(RSTUV)$



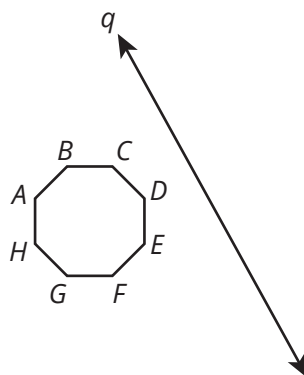
6. $R_j(LMNO)$



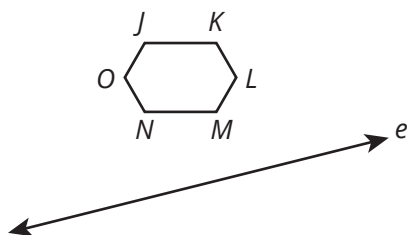
7. $R_m(QRS)$



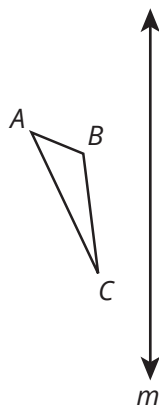
8. $R_q(ABCDEFGH)$



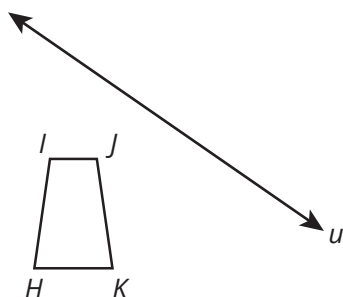
9. $R_e(JKLMNO)$



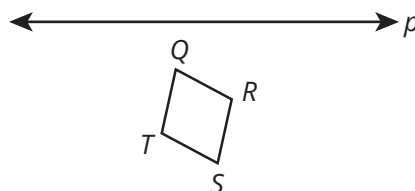
10. $R_m(ABC)$



11. $R_u(HIJK)$

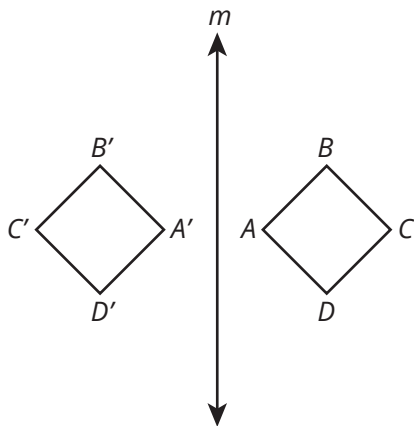


12. $R_p(QRST)$

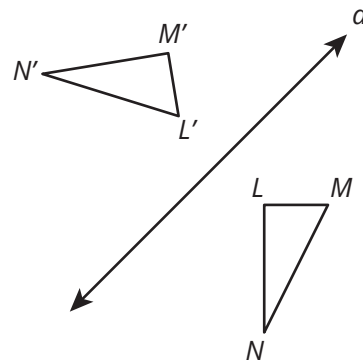


B. Write a function to describe each reflection.

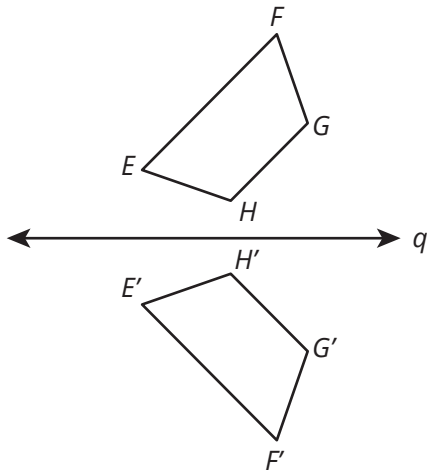
1.



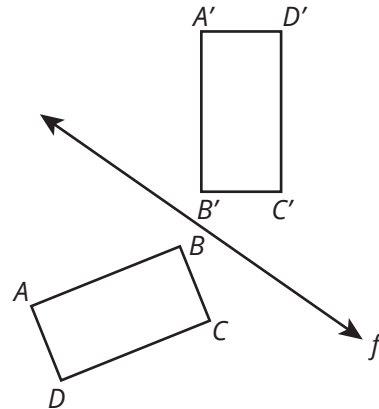
2.



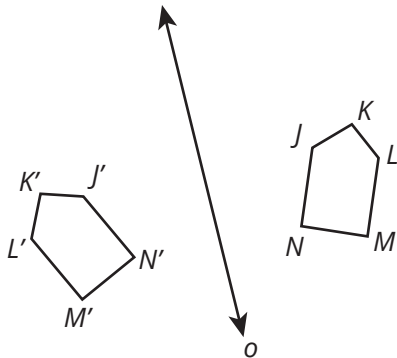
3.



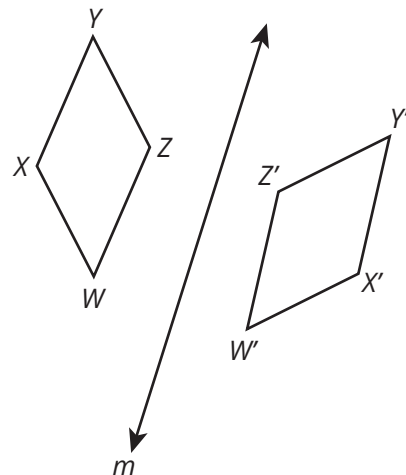
4.



5.



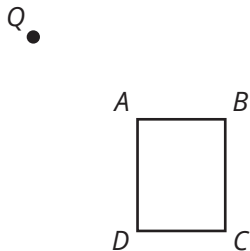
6.



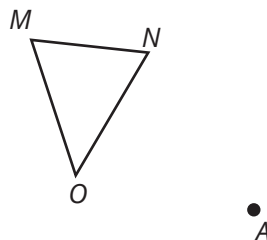
IV. Rotations as Functions

A. Complete each rotation, given the function.

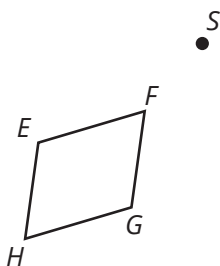
1. $R_{Q, 65}(ABCD)$



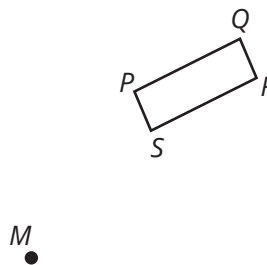
2. $R_{A, -45}(MNO)$



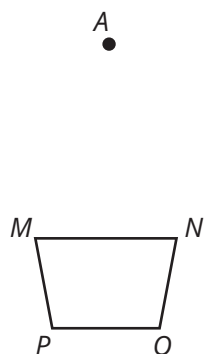
3. $R_{S, 125}(EFGH)$



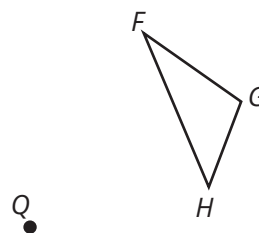
4. $R_{M, -95}(PQRS)$



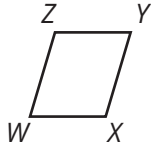
5. $R_{A, -40}(MNOP)$



6. $R_{Q, 150}(FGH)$

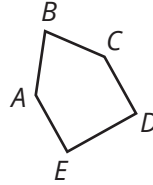


7. $R_{J, 60}(WXYZ)$



J

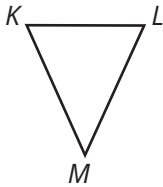
8. $R_{X, -120}(ABCDE)$



X

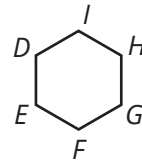
9. $R_{T, 20}(KLM)$

T

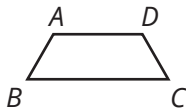


10. $R_{Q, 100}(DEFGHI)$

Q

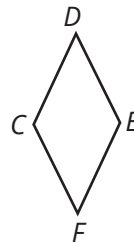


11. $R_{M, 45}(ABCD)$



M

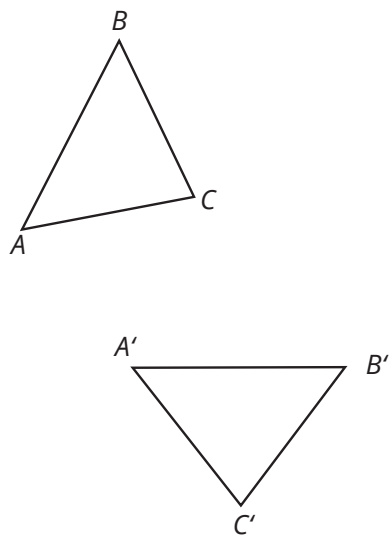
12. $R_{V, -90}(CDEF)$



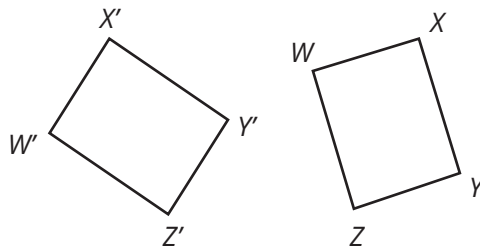
V

B. Determine the center of each rotation.

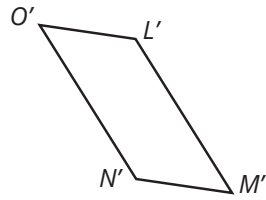
1.



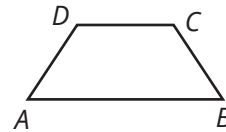
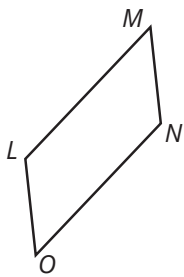
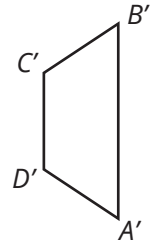
2.



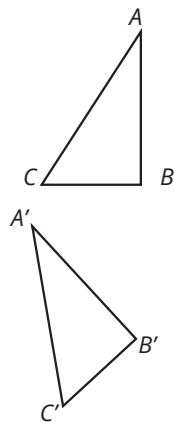
3.



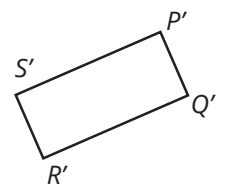
4.



5.

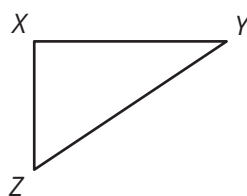
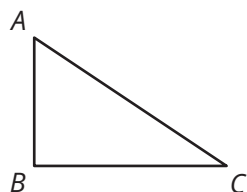


6.



- C.** Identify the transformation used to create $\triangle XYZ$ and write congruency statements for the corresponding sides of the figures. For reflections, identify the line of reflection. For rotations, identify the center and angle of rotation.

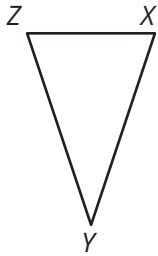
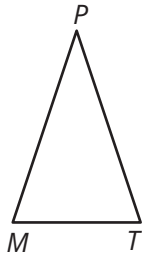
1.



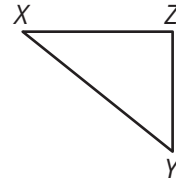
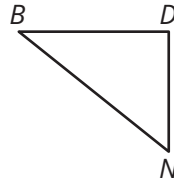
2.



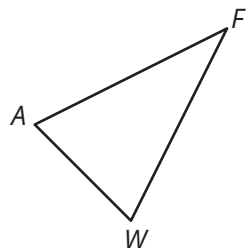
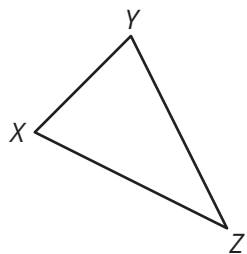
3.



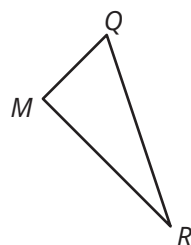
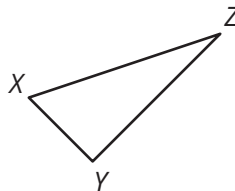
4.



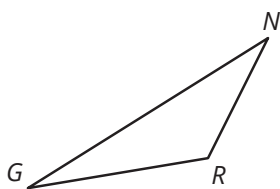
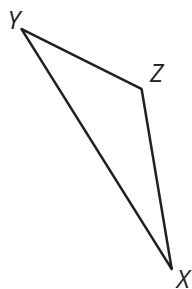
5.



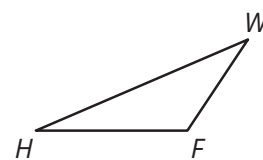
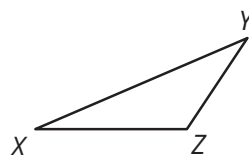
6.



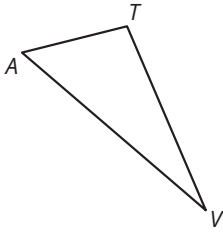
7.



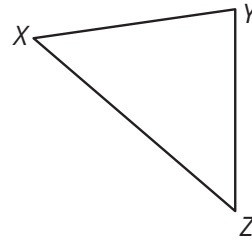
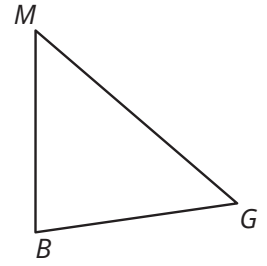
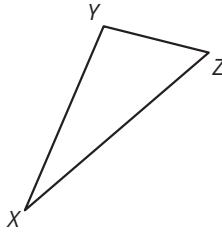
8.



9.

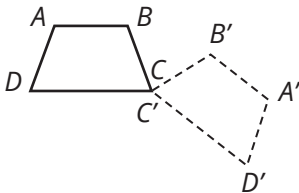


10.

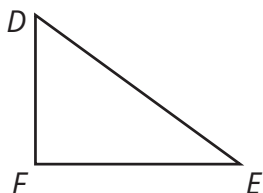
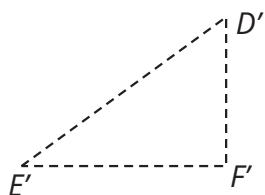


D. Draw and describe the sequence of isometries which shows that the two figures in each pair are congruent.

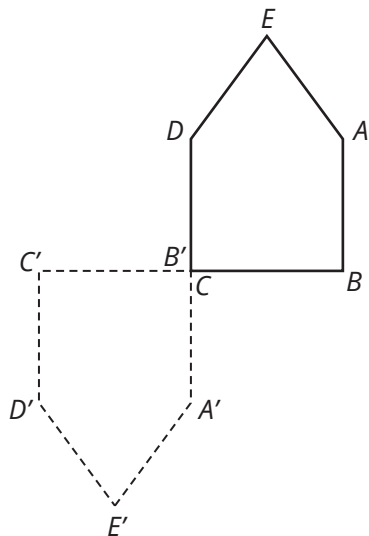
1.



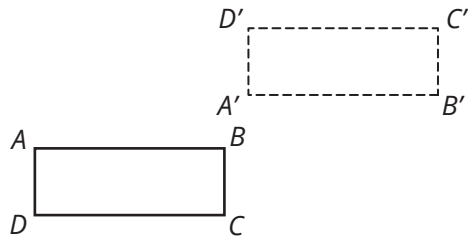
2.



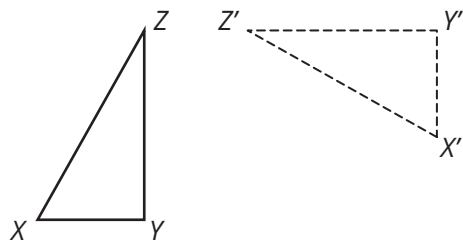
3.



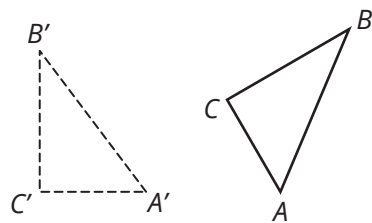
4.



5.



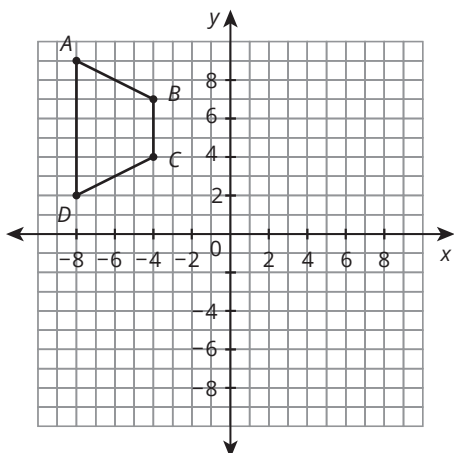
6.



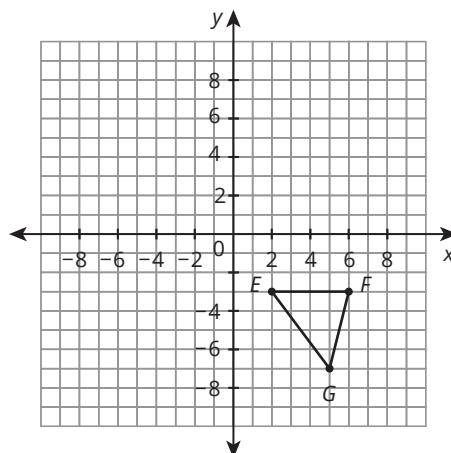
V. Translations, Rotations, and Reflections on the Coordinate Plane

A. Transform each given geometric figure on the coordinate plane as described. Then describe the transformation using coordinate notation.

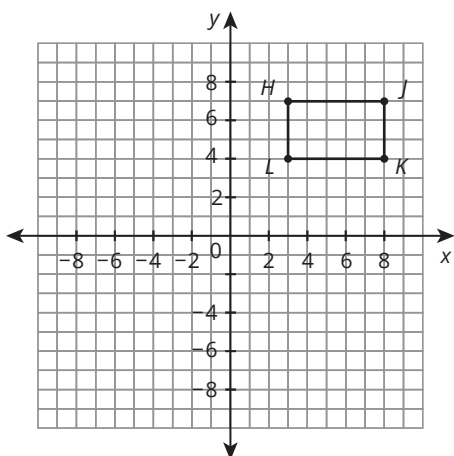
- 1.** Translate trapezoid $ABCD$ 11 units to the right.



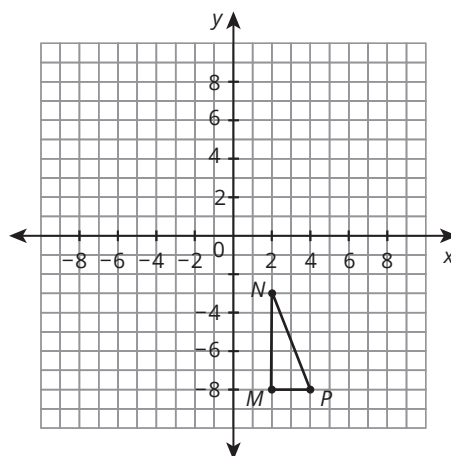
- 2.** Translate triangle EFG 8 units up.



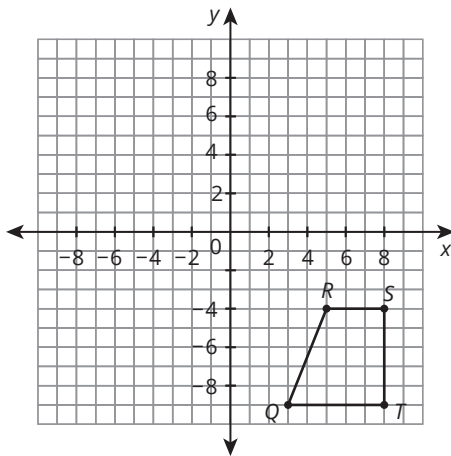
- 3.** Rotate rectangle $HJKL$ 90° counterclockwise about the origin.



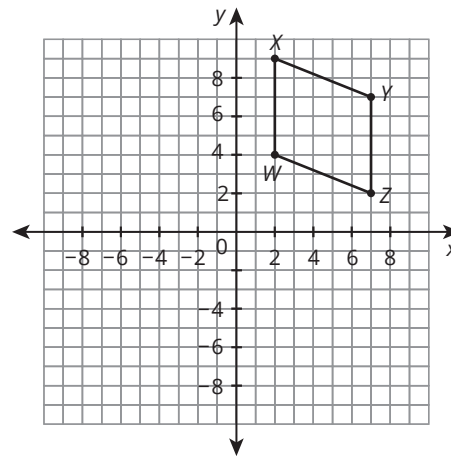
- 4.** Rotate triangle MNP 180° counterclockwise about the origin.



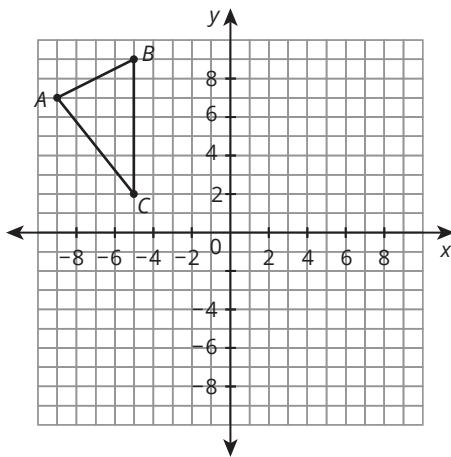
5. Rotate trapezoid $QRST$ 90° counterclockwise about the origin.



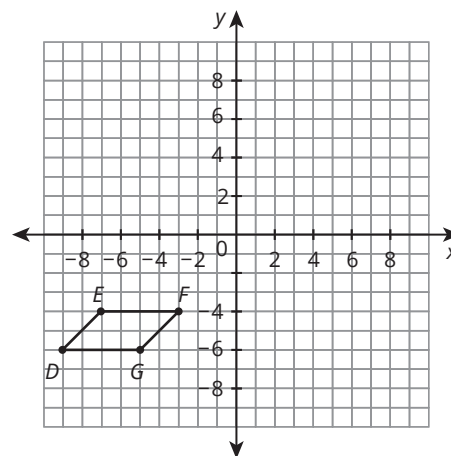
6. Rotate parallelogram $WXYZ$ 180° counterclockwise about the origin.



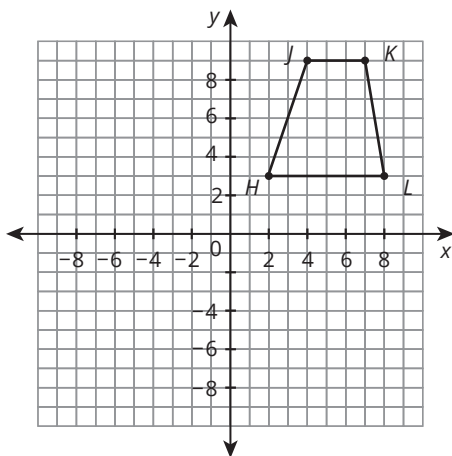
7. Reflect triangle ABC over the y -axis.



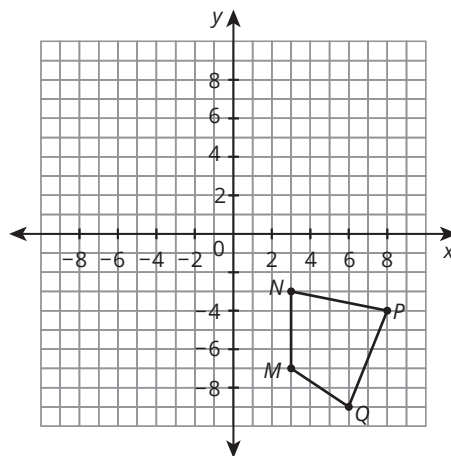
8. Reflect parallelogram $DEFG$ over the x -axis.



9. Reflect trapezoid $HJKL$ over the x -axis.

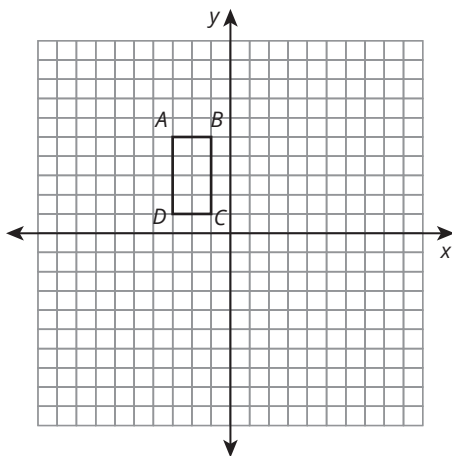


10. Reflect quadrilateral $MNPQ$ over the y -axis.

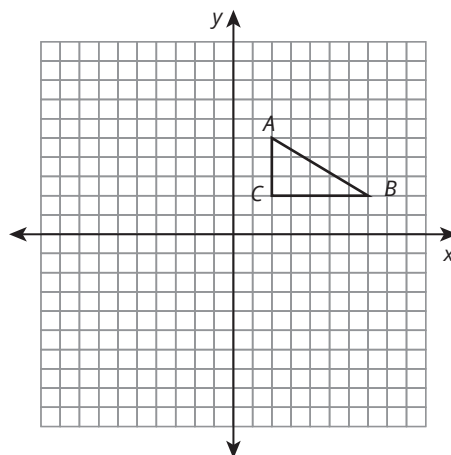


- B. Perform the series of transformations on the given geometric figure on the coordinate plane as described. Then describe the transformations using coordinate notation.

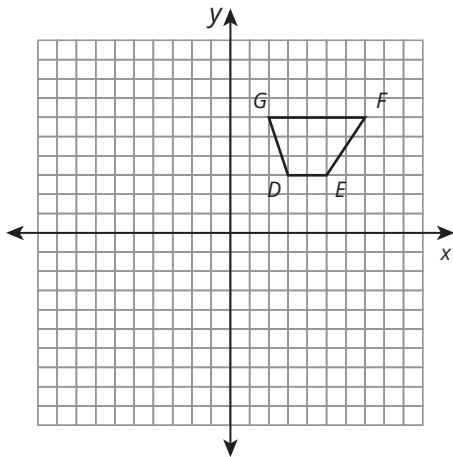
1. Translate rectangle $ABCD$ 5 units to the right. Then rotate the image 270° counterclockwise about the origin. Label the final image $A''B''C''D''$.



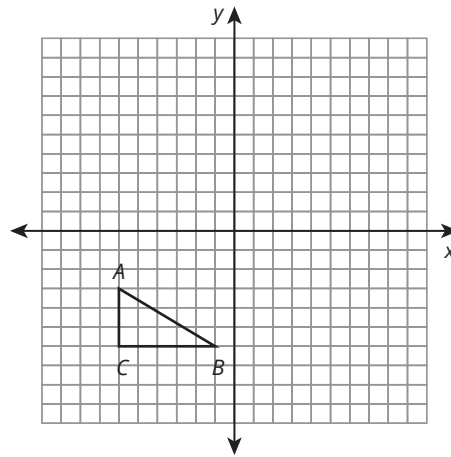
2. Reflect triangle ABC over the x -axis. Then translate the image 3 units up. Label the final image $A''B''C''$.



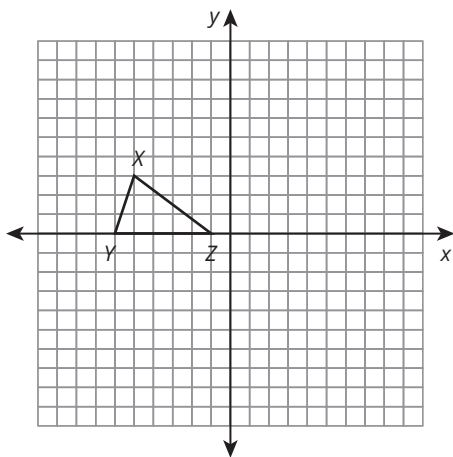
3. Rotate trapezoid $DEFG$ 180° counterclockwise about the origin. Then translate the image 6 units up. Label the final image $D''E''F''G''$.



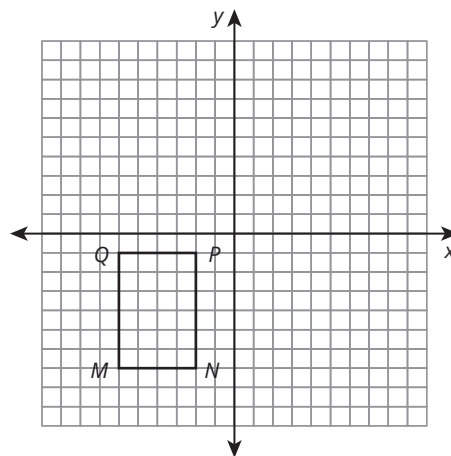
4. Translate triangle ABC 5 units up. Then reflect the image over the y -axis. Label the final image $A''B''C''$.



5. Translate triangle XYZ up 4 units, reflect the image over the y -axis, and then translate the second image left 2 units. Label the final image $X''Y''Z''$.



6. Rotate rectangle $MNPQ$ 270° counterclockwise about the origin, reflect the image over the y -axis, and then reflect the second image over the x -axis. Label the final image $M''N''P''Q''$.



C. Determine the coordinates of each translated image without graphing.

- 1.** The vertices of rectangle $DEFG$ are $D(-7, 1)$, $E(-7, 8)$, $F(1, 8)$, and $G(1, 1)$. Translate the rectangle 10 units down to form rectangle $D'E'F'G'$.
- 2.** The vertices of parallelogram $HJKL$ are $H(2, -6)$, $J(3, -1)$, $K(7, -1)$, and $L(6, -6)$. Translate the parallelogram 7 units up to form parallelogram $H'J'K'L'$.
- 3.** The vertices of trapezoid $MNPQ$ are $M(-6, -5)$, $N(0, -5)$, $P(-1, 2)$, and $Q(-4, 2)$. Translate the trapezoid 4 units to the right to form trapezoid $M'N'P'Q'$.
- 4.** The vertices of triangle RST are $R(0, 3)$, $S(2, 7)$, and $T(3, -1)$. Translate the triangle 5 units to the left and 3 units up to form triangle $R'S'T'$.
- 5.** The vertices of triangle ABC are $A(5, 3)$, $B(2, 8)$, and $C(-4, 5)$. Rotate the triangle about the origin 90° counterclockwise to form triangle $A'B'C'$.
- 6.** The vertices of rectangle $DEFG$ are $D(-7, 1)$, $E(-7, 8)$, $F(1, 8)$, and $G(1, 1)$. Rotate the rectangle about the origin 180° counterclockwise to form rectangle $D'E'F'G'$.
- 7.** The vertices of parallelogram $HJKL$ are $H(2, -6)$, $J(3, -1)$, $K(7, -1)$, and $L(6, -6)$. Rotate the parallelogram about the origin 90° counterclockwise to form parallelogram $H'J'K'L'$.
- 8.** The vertices of trapezoid $MNPQ$ are $M(-6, -5)$, $N(0, -5)$, $P(-1, 2)$, and $Q(-4, 2)$. Rotate the trapezoid about the origin 180° counterclockwise to form trapezoid $M'N'P'Q'$.

9. The vertices of rectangle $DEFG$ are $D(-7, 1)$, $E(-7, 8)$, $F(1, 8)$, and $G(1, 1)$. Reflect the rectangle over the y -axis to form rectangle $D'E'F'G'$.
10. The vertices of parallelogram $HJKL$ are $H(2, -6)$, $J(3, -1)$, $K(7, -1)$, and $L(6, -6)$. Reflect the parallelogram over the x -axis to form parallelogram $H'J'K'L'$.

D. Determine the coordinates of each image without graphing.

1. The vertices of triangle ABC are $A(-3, -2)$, $B(-5, -7)$, and $C(-7, -6)$. Reflect the triangle over the y -axis, and then translate it 6 units up to form triangle $A''B''C''$.
2. The vertices of rectangle $CDEF$ are $C(2, 1)$, $D(5, 1)$, $E(5, 6)$, and $F(2, 6)$. Rotate the rectangle 90° counterclockwise about the origin, and then translate it 5 units down to form rectangle $C''D''E''F''$.
3. The vertices of parallelogram $MNPQ$ are $M(3, -2)$, $N(7, -2)$, $P(6, -4)$, and $Q(2, -4)$. Translate the parallelogram 7 units up, and then reflect it over the y -axis to form parallelogram $M''N''P''Q''$.
4. The vertices of trapezoid $ABCD$ are $A(4, 5)$, $B(7, 5)$, $C(8, 2)$, and $D(2, 2)$. Rotate the trapezoid 270° counterclockwise about the origin, and then reflect it over the y -axis to form trapezoid $A''B''C''D''$.
5. The vertices of rectangle $WXYZ$ are $W(2, -1)$, $X(11, -1)$, $Y(11, -5)$, and $Z(2, -5)$. Translate the rectangle 8 units up, rotate it 90° counterclockwise about the origin, and then reflect it over the x -axis to form rectangle $W''X''Y''Z''$.
6. The vertices of triangle EFG are $E(-2, 7)$, $F(-1, -4)$, and $G(-6, 4)$. Translate the triangle 4 units right, reflect it over the x -axis, and then reflect it over the y -axis to form triangle $E''F''G''$.

E. Determine the coordinates of each pre-image without graphing.

- 1.** Triangle ABC was translated five units right to form triangle $A'B'C'$. The vertices of triangle $A'B'C'$ are $A' (1, 1)$, $B' (2, 5)$, and $C' (5, -1)$.
- 2.** Quadrilateral $WYXZ$ was rotated 90° counterclockwise to form quadrilateral $W'X'Y'Z'$. The vertices of quadrilateral $W'X'Y'Z'$ are $W' (-2, -4)$, $X' (-6, -1)$, $Y' (-2, 2)$, and $Z (4, -3)$.
- 3.** Rectangle $EFGH$ was reflected across the x -axis to form rectangle $E'F'G'H'$. The vertices of rectangle $E'F'G'H'$ are $E' (-2, -6)$, $F' (3, -6)$, $G' (3, -3)$, and $H' (-2, -3)$.
- 4.** Triangle LMN was translated up 2 units and left 3 units to create triangle $L'M'N'$. The vertices of triangle $L'M'N'$ are $L' (-5, 2)$, $M' (1, 2)$, and $N' (-3, -2)$.
- 5.** Square $JKLM$ was reflected over the x -axis and translated left 2 units to create square $J'K'L'M'$. The vertices of square $J'K'L'M'$ are $J' (-5, 1)$, $K' (-2, 1)$, $L (-2, 4)$, and $M (-5, 4)$.
- 6.** Trapezoid $RSTU$ was reflected over the y -axis and rotated 90° counterclockwise to create trapezoid $R'S'T'U'$. The vertices of trapezoid $R'S'T'U'$ are $R' (-5, -1)$, $S' (-3, -4)$, $T' (1, -4)$, and $U' (3, -1)$.

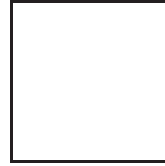
VI. Reflectional and Rotational Symmetry

A. Draw the lines of symmetry for each plane figure.

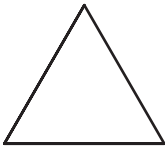
- 1.** Draw the line(s) of symmetry for the rectangle.



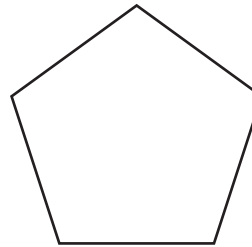
- 2.** Draw the line(s) of symmetry for the square.



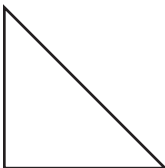
- 3.** Draw the line(s) of symmetry for the equilateral triangle.



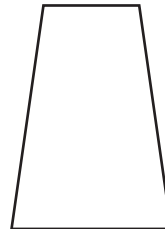
- 4.** Draw the line(s) of symmetry for the regular pentagon.



- 5.** Draw the line(s) of symmetry for the isosceles right triangle.

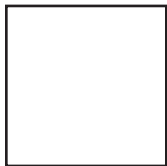


- 6.** Draw the line(s) of symmetry for the isosceles trapezoid.



- B.** Determine the rotational symmetries for each plane figure. Determine the number of degrees you can rotate each shape to carry it onto itself, if possible.

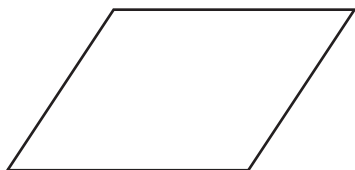
- 1.** Square



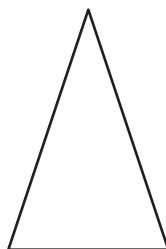
- 2.** Regular hexagon



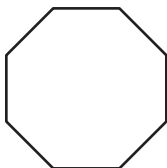
- 3.** Parallelogram



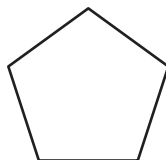
- 4.** Isosceles triangle



- 5.** Regular octagon

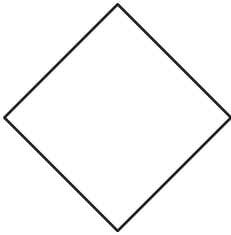


- 6.** Regular pentagon

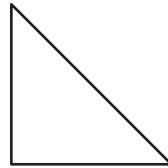


C. Describe the reflections and or rotations that will carry each figure onto itself.

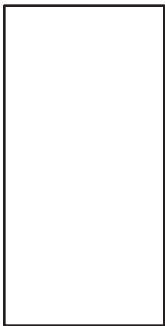
1. Square



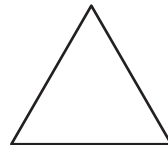
2. Isosceles right triangle



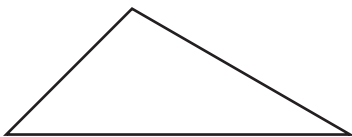
3. Rectangle



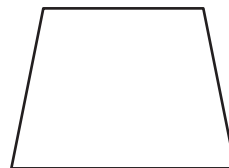
4. Equilateral triangle



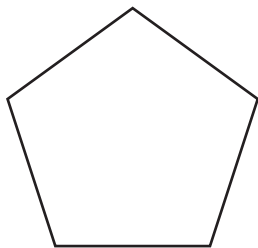
5. Scalene triangle



6. Isosceles trapezoid



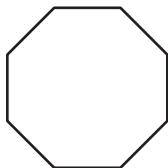
- 7.** Regular pentagon



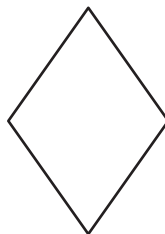
- 8.** Regular hexagon



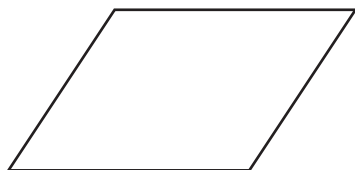
- 9.** Regular octagon



- 10.** Rhombus



- 11.** Parallelogram



- 12.** Circle

