Skills Practice

Name _____   **Date** _____

I. From Informal to Formal Geometric Thinking

A.   Sketch or draw each figure.

1.   Sketch a square.

2.   Draw a square.

3.   Sketch a rectangle.

4.   Draw a rectangle with an area of 12 cm^2.

5.   Sketch a right triangle.

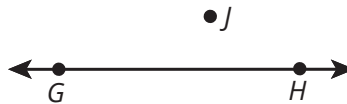**6.**   Draw a right triangle with side lengths 6 cm, 8 cm, and 10 cm.

II. Constructing a Coordinate Plane

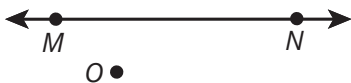**A.** Construct a line perpendicular to each given line and through the given point.

1. Construct a line that is perpendicular to $\overleftrightarrow{AB}$ and passes through point X.

2. Construct a line that is perpendicular to $\overleftrightarrow{GH}$ and passes through point J.

3. Construct a line that is perpendicular to $\overleftrightarrow{MN}$ and passes through point O.
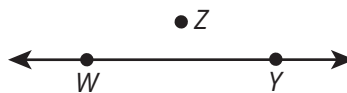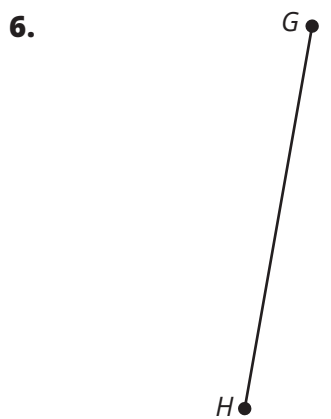

4. Construct a line that is perpendicular to $\overleftrightarrow{QR}$ and passes through point S.
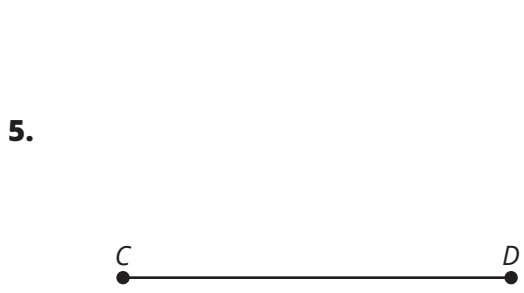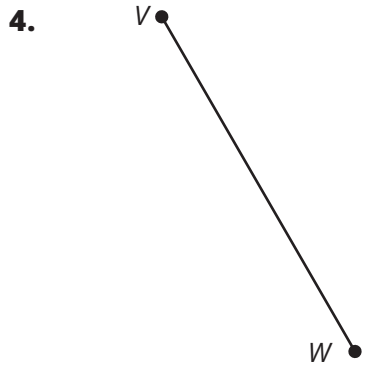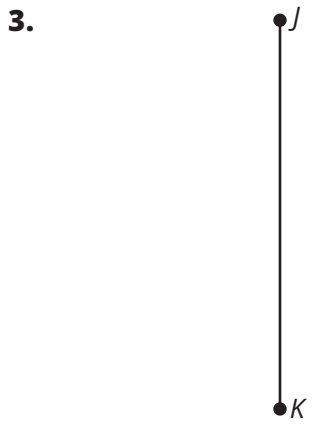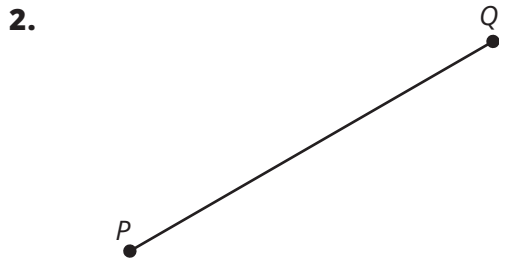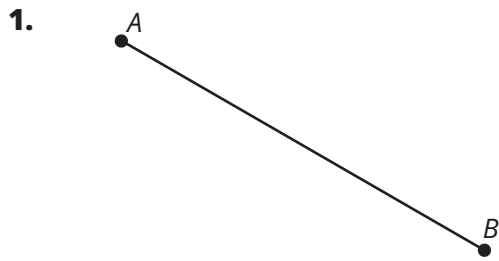

5. Construct a line that is perpendicular to $\overleftrightarrow{BC}$ and passes through point D.
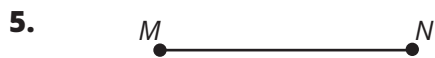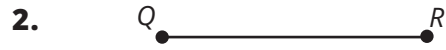

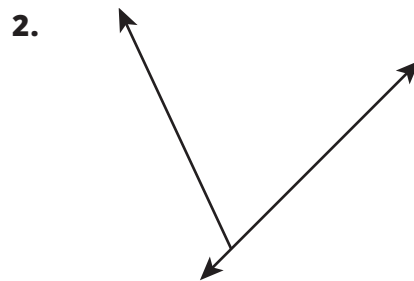**6.** Construct a line that is perpendicular to $\overleftrightarrow{WY}$ and passes through point Z.

B. Construct a perpendicular bisector for each line segment using construction tools and label the midpoint *M*.
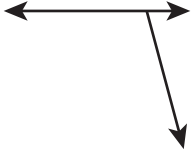
1.

A

B

2.

Q

P

3.

J

K

4.

V

W

5.

C   *D*

6.

G

H

C. Duplicate each line segment.

1.

A ●————————● B

2.

Q ●————————————● R

3.

X ●————————————————● Y

4.

S ●————————————● T

5.

M ●——————————● N

6.

J ●————————————————————● K

D. Duplicate each angle.

1.

2.
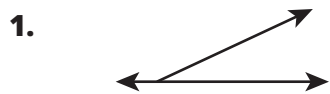
3.

4.
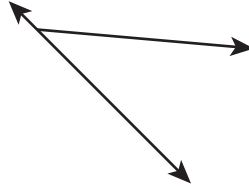
5.
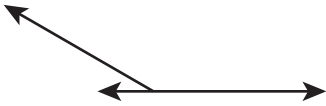
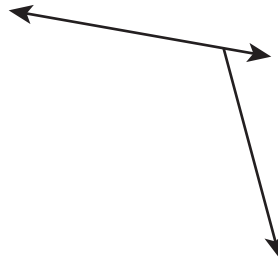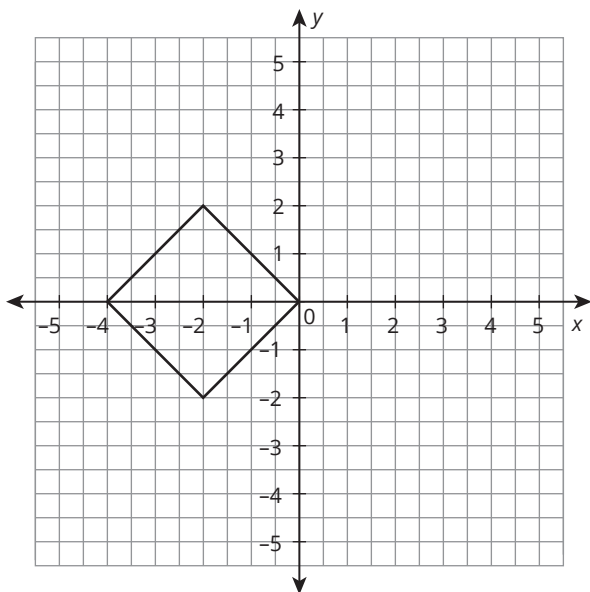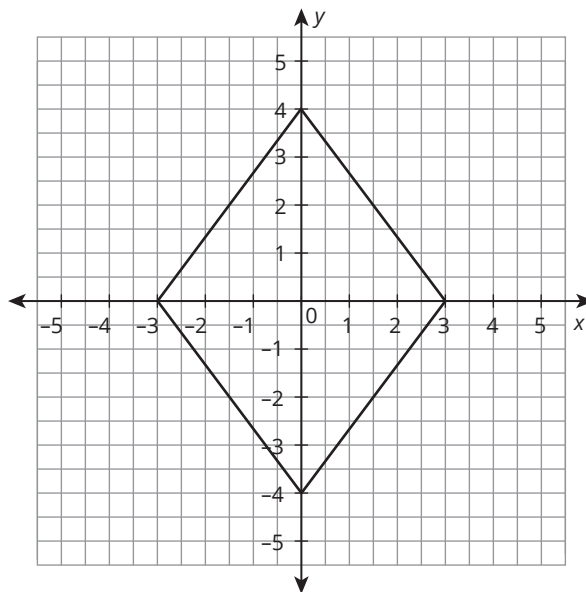**6.**

E. The figures shown were each constructed using rigid motions, starting with line segments constructed in one or more squares. Describe a sequence of transformations of a figure that could produce the resulting shape.
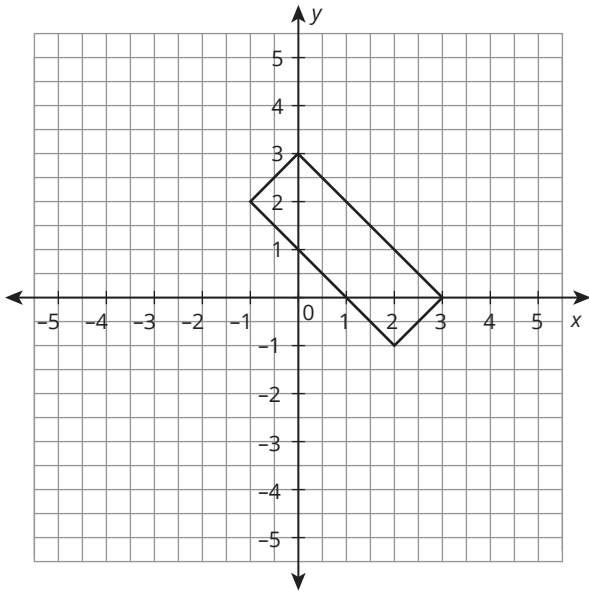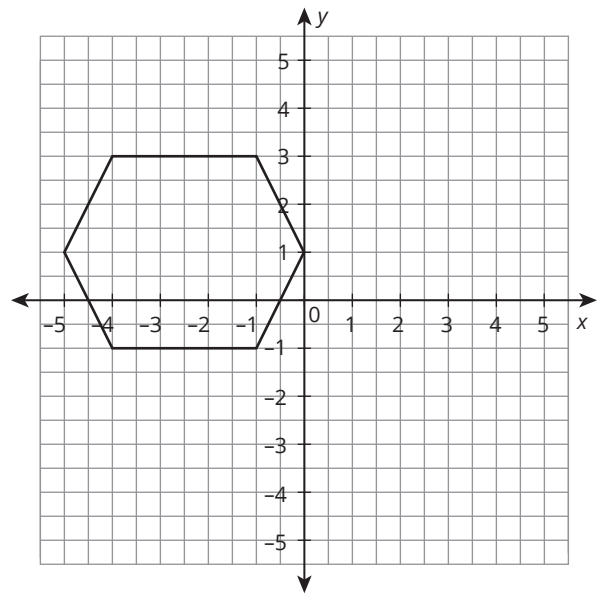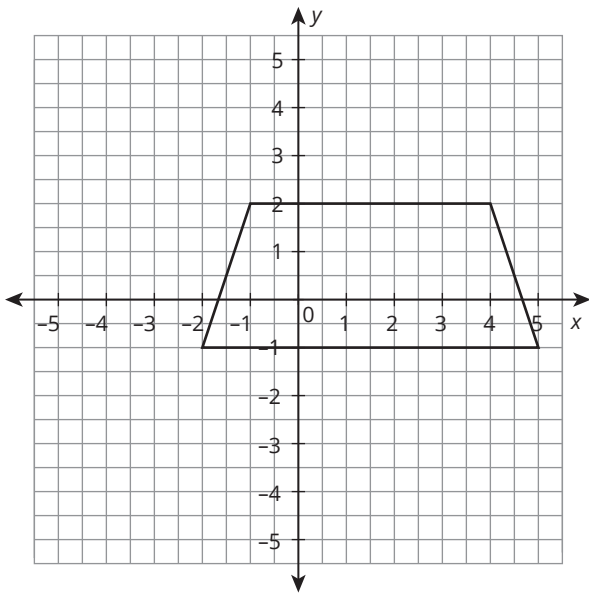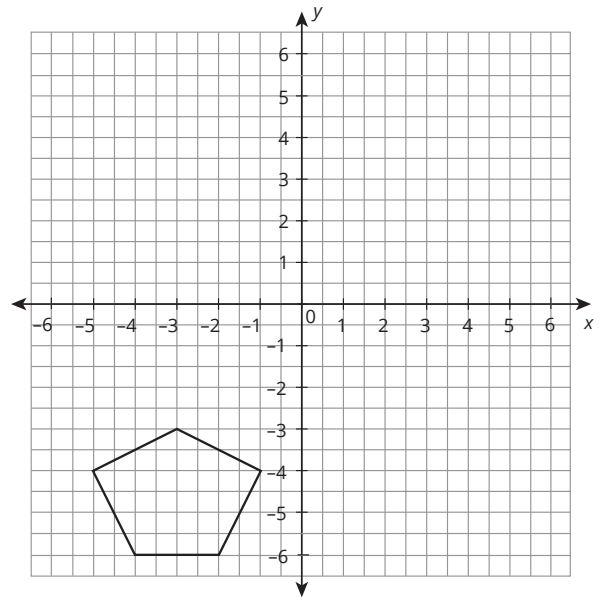
1.

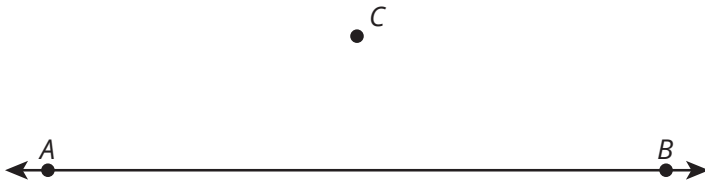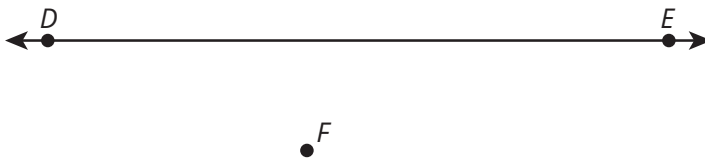**2.**

3.

4.

5.

6.

III. Parallel and Perpendicular Lines

A. Construct a line parallel to each given line and through the given point.

1. Construct a line that is parallel to $\overleftrightarrow{AB}$ and passes through point *C*.

2. Construct a line that is parallel to $\overleftrightarrow{DE}$ and passes through point *F*.

3. Construct a line that is parallel to $\overleftrightarrow{GH}$ and passes through point *J*.

G •

• J

H •

4. Construct a line that is parallel to $\overleftrightarrow{KL}$ and passes through point *M*.
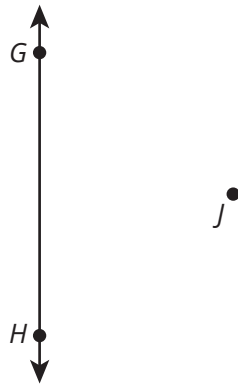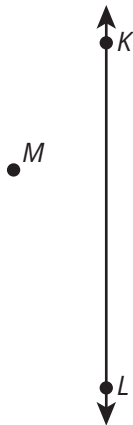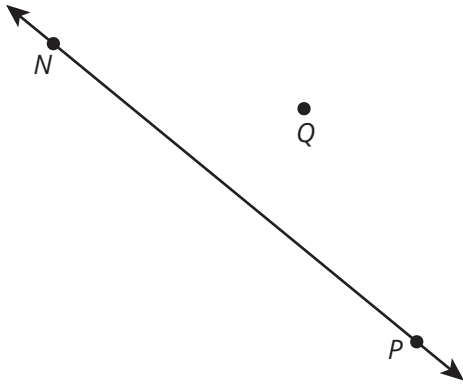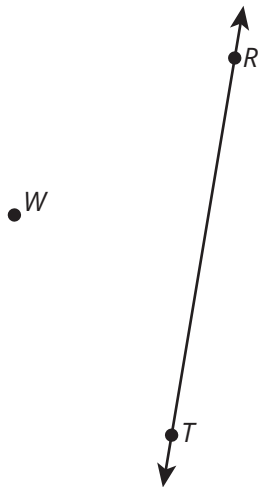
•K

•M

•L

5. Construct a line that is parallel to $\overleftrightarrow{NP}$ and passes through point *Q*.

6. Construct a line that is parallel to $\overleftrightarrow{RT}$ and passes through point *W*.

B. Determine an equation for each parallel line described.

1. What is the equation of a line parallel to $y = \frac{4}{5}x + 2$ that passes through (1, 2)?

2. What is the equation of a line parallel to $y = -5x + 3$ that passes through (3, 1)?

3. What is the equation of a line parallel to $y = 7x - 8$ that passes through (5, −2)?

4. What is the equation of a line parallel to $y = -\frac{1}{2}x + 6$ that passes through (−4, 1)?

5. What is the equation of a line parallel to $y = \frac{1}{3}x - 4$ that passes through (9, 8)?

6. What is the equation of a line parallel to $y = -4x - 7$ that passes through (2, −9)?

C. Determine an equation for each perpendicular line described.

1. What is the equation of a line perpendicular to $y = 2x - 6$ that passes through (5, 4)?

2. What is the equation of a line perpendicular to $y = -3x + 4$ that passes through (−1, 6)?

3. What is the equation of a line perpendicular to $y = -\frac{2}{5}x - 1$ that passes through (2, −8)?

4. What is the equation of a line perpendicular to $y = \frac{3}{4}x + 12$ that passes through (12, 3)?

5. What is the equation of a line perpendicular to $y = 6x - 5$ that passes through (6, −3)?

6. What is the equation of a line perpendicular to $y = \frac{5}{2}x - 1$ that passes through (−1, −4)?

D. Determine the equation of a vertical line that passes through each given point.

1. $(-2, 1)$

2. $(3, 15)$

3. $(9, -7)$

4. $(-11, -8)$

5. $(-5, -10)$

6. $(0, -4)$

E. Determine the equation of a horizontal line that passes through each given point.

1. $(4, 7)$

2. $(-6, 5)$

3. $(-8, -3)$

4. $(2, -9)$

5. $(-7, 8)$

6. $(6, -2)$

F. Determine an equation for each perpendicular or parallel line described.

1. Write an equation for a line that is parallel to the line given by $x = 5$ and passes through the point $(-1, 2)$.

2. Write an equation for a line that is perpendicular to the line given by $y = -3$ and passes through the point $(2, 4)$.

3. Write an equation for a line that is perpendicular to the x-axis and passes through the point $(4, 3)$.

4. Write an equation for a line that is parallel to the y-axis and passes through the point $(-1, 7)$.

5. Write an equation for a line that is parallel to the line given by $y = 4$ and passes through the point $(0, 5)$.

6. Write an equation for a line that is perpendicular to the line given by $x = 9$ and passes through the point $(-6, -3)$.
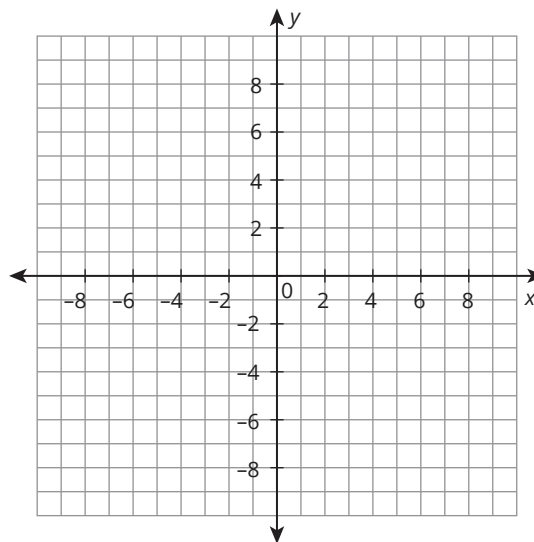
IV. Classifying Shapes on the Coordinate Plane

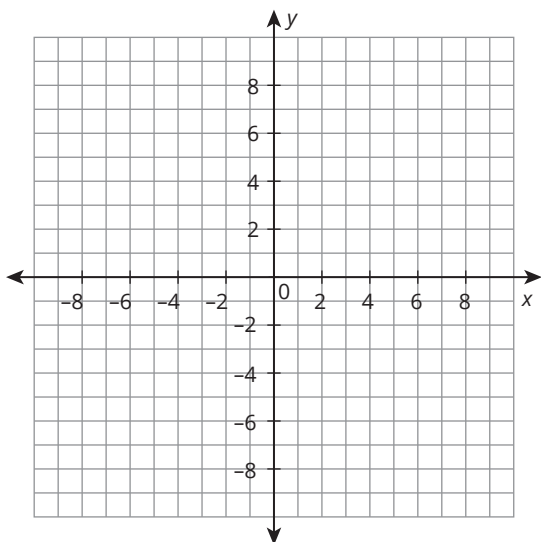**A.** Graph ∆*ABC* using each set of given points. Determine if ∆*ABC* is scalene, isosceles, or equilateral.

1. *A* (− 3, 1), *B* (− 3, − 3), *C* (1, 0)
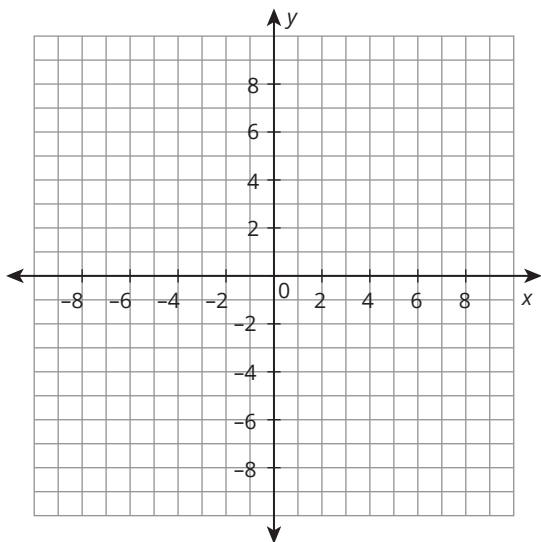
2. *A* (8, 5), *B* (8, 1), *C* (4, 3)

3. *A* (5, 8), *B* (5, 2), *C* (− 3, 5)

4. *A* (− 2, − 6), *B* (6, − 6), *C* (2, − 3)
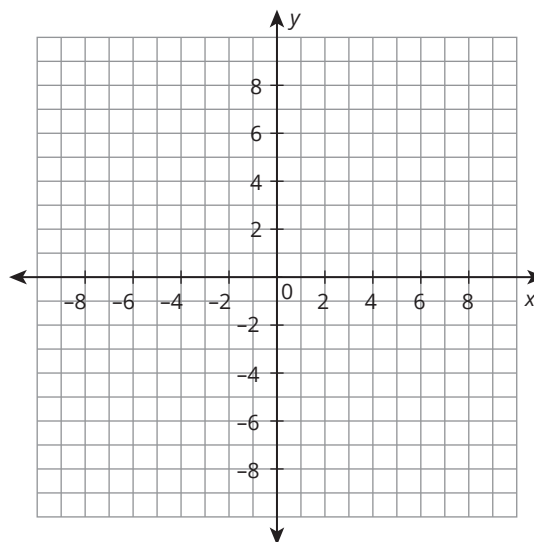
5.   *A* (0, 0), *B* (4, 0), *C* (3, 7)
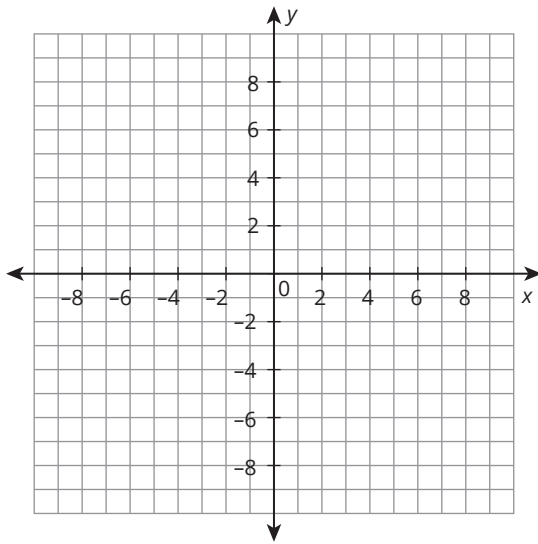
6.   *A* (− 6, 4), *B* (0, 4), *C* (− 2, − 2)
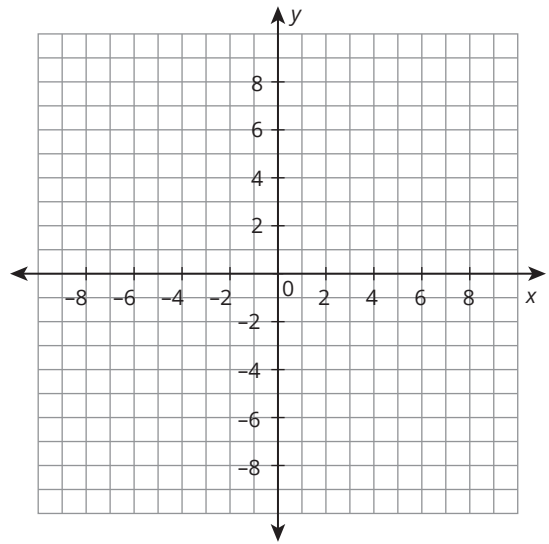
B.   Determine whether each set of side lengths creates an acute, right, or obtuse triangle. Explain your reasoning. If it is a right triangle, state whether it is a Pythagorean triple.

1.   3 m, 2.9 m, 5 m

2.   12 in., 16 in., 20 in.

3.   30 cm, 22 cm, 27 cm

4.   15 cm, 15 cm, $15\sqrt{2}$ cm

5. 6 ft, 3.1 ft, 9 ft

6. 7.4 in., 8.1 in., 9.8 in.

C. For each set of graphed vertices, determine the location of vertex *D* such that the described figure is created.

1. Quadrilateral *ABCD* is a square.
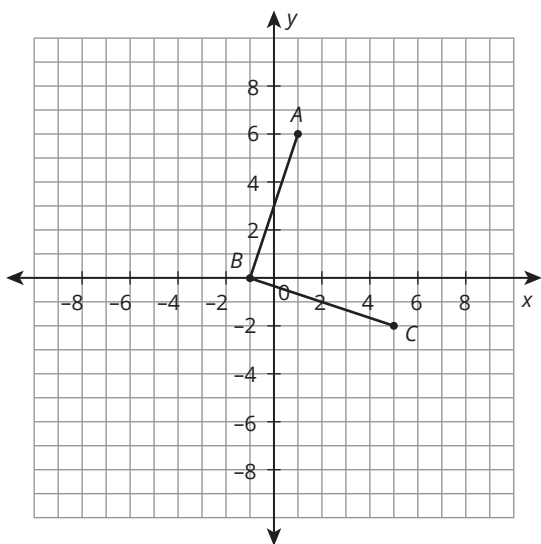
2. Quadrilateral *ABCD* is a square.
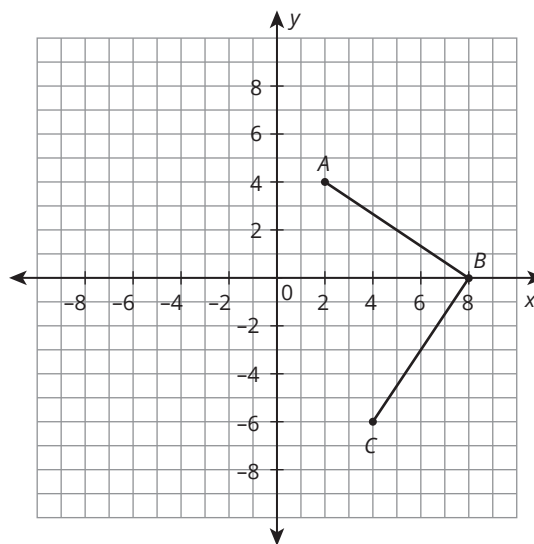
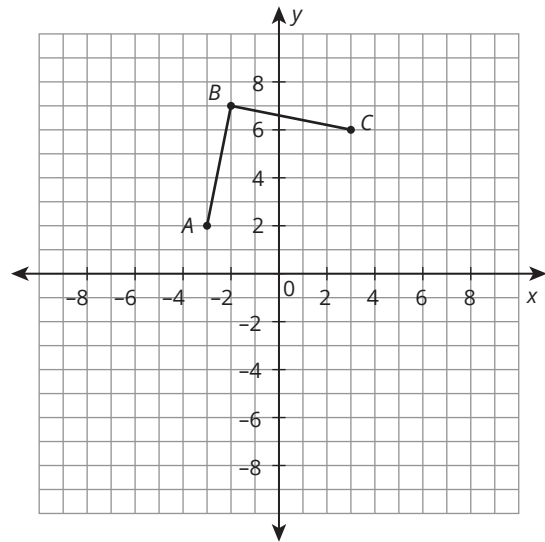**3.** Quadrilateral *ABCD* is a trapezoid with only one pair of parallel lines.
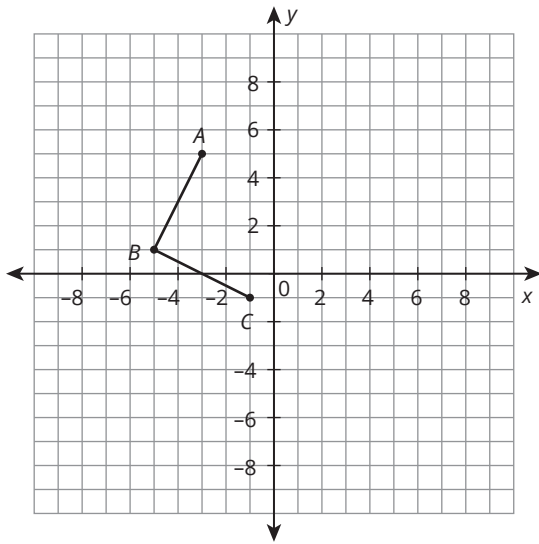
4. Quadrilateral *ABCD* is a trapezoid with only one pair of parallel lines.
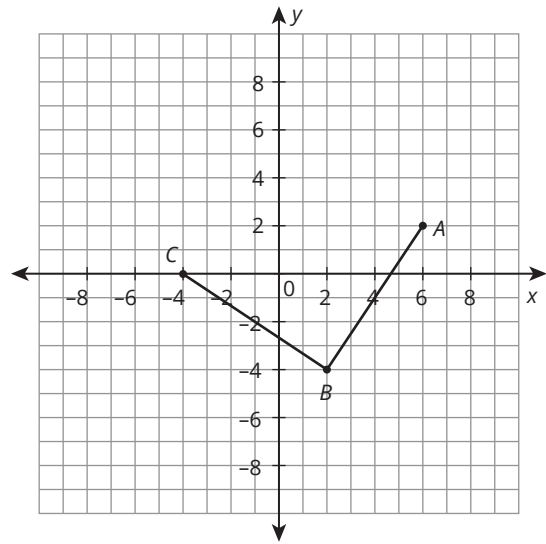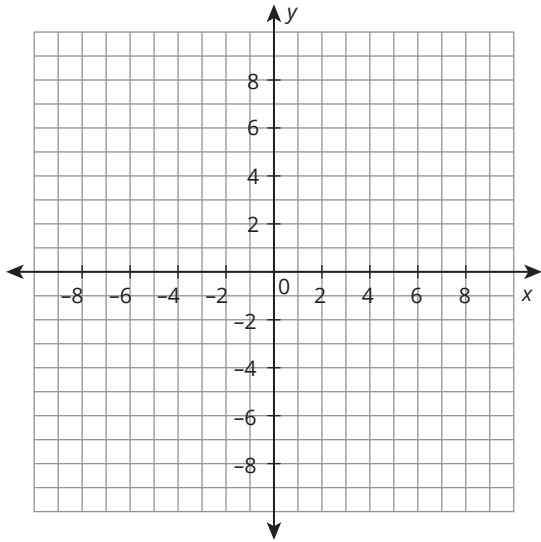
5. Quadrilateral *ABCD* is a square.
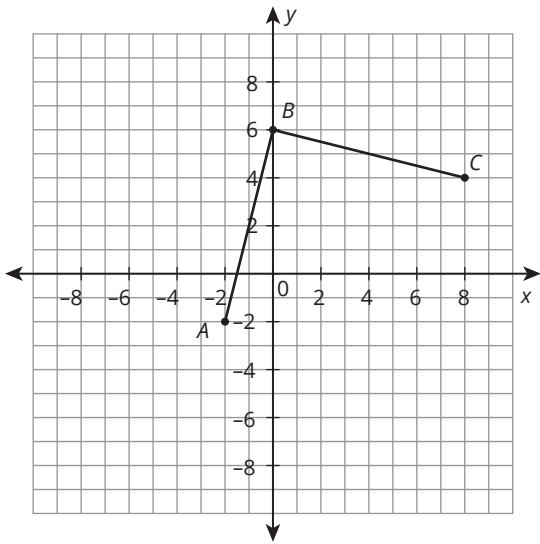
6. Quadrilateral *ABCD* is a trapezoid with only one pair of parallel lines.

D. Graph quadrilateral *ABCD* using each set of given points. Determine if quadrilateral *ABCD* can be best described as a trapezoid, a square, a rectangle, or a rhombus.

1. $A(-4, -2)$, $B(2, 4)$, $C(8, -2)$, $D(2, -8)$

2. $A(0, 6)$, $B(3, 4)$, $C(-1, -2)$, $D(-4, 0)$
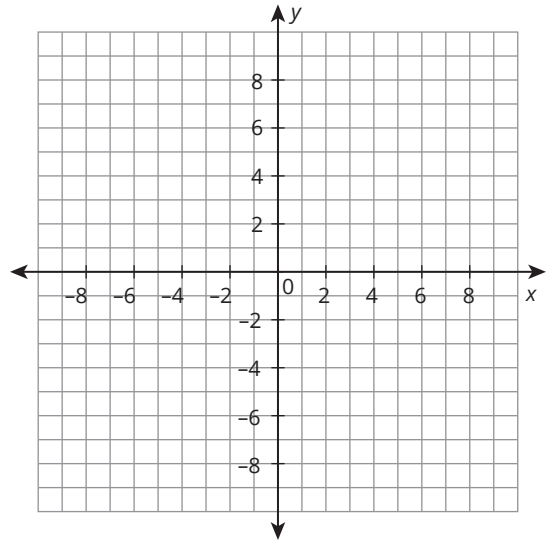
3. *A* (1, 0), *B* (2, 4), *C* (10, 2), *D* (5, −1)
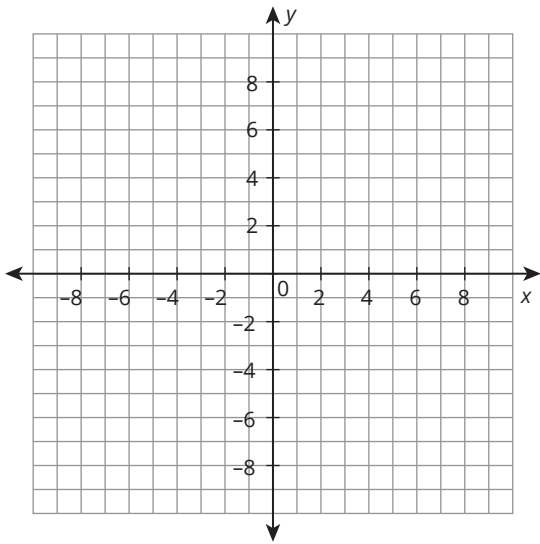
4. *A* (−5, 3), *B* (0, 6), *C* (5, 3), *D* (0, 0)
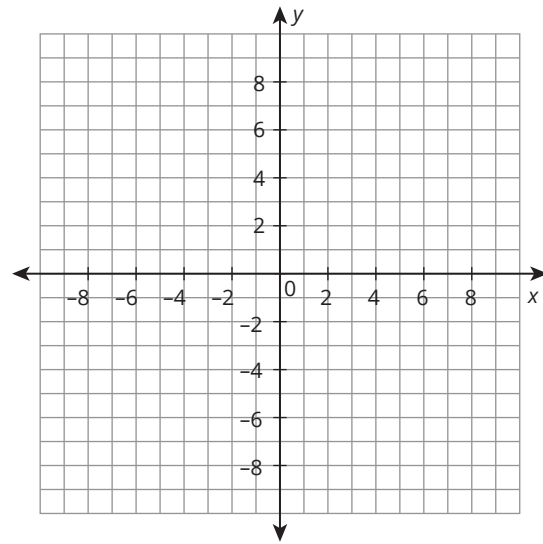
5. $A (-3, 3)$, $B (-1, 5)$, $C (6, -2)$, $D (4, -4)$
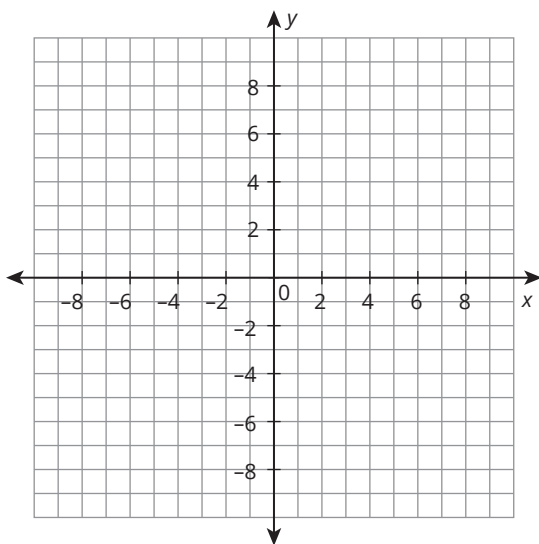
6. $A (-7, -7)$, $B (-4, -1)$, $C (5, -3)$, $D (4, -5)$
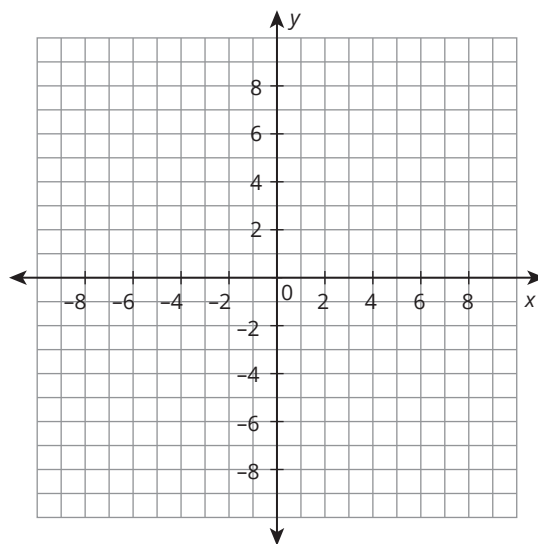
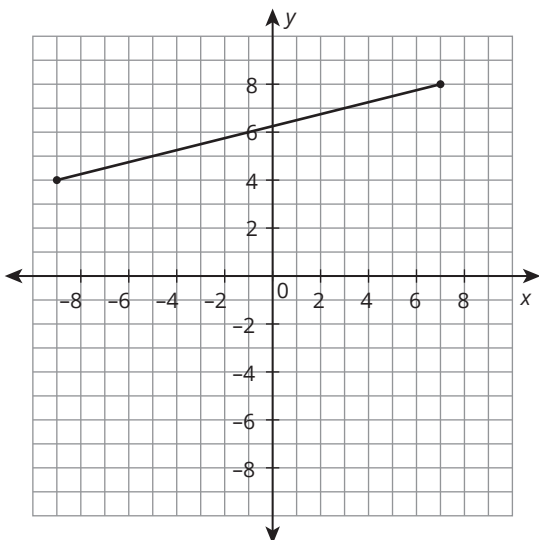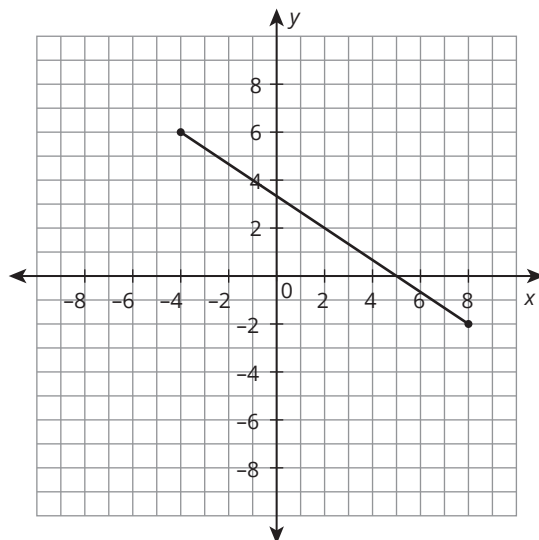**E.** Use the Midpoint Formula to determine the midpoint of the given line segment.

1.
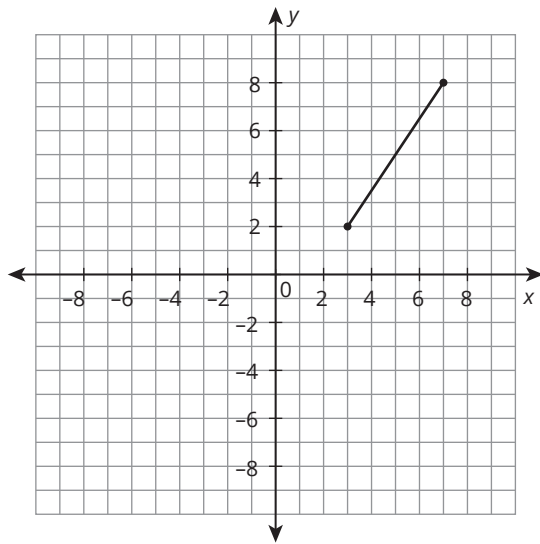
2.
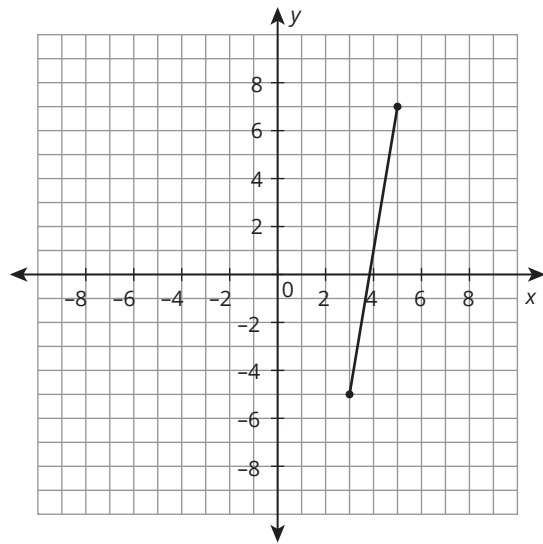
3.

4.

5. Line segment *AB* with endpoints *A* (−10, −3) and *B* (2, −8)

6. Line segment *CD* with endpoints *C* (−4, −8) and *D* (4, 8)

7. Line segment *EF* with endpoints *E* (−5.4, 7.2) and *F* (2.9, −1.6)

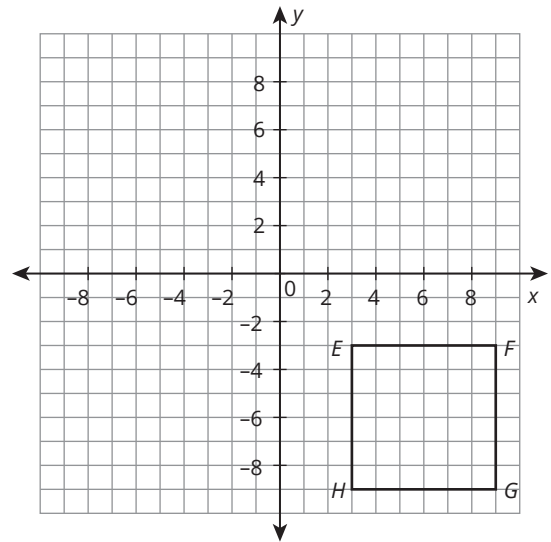**8.** Line segment *GH* with endpoints *G* $(-3\frac{1}{2}, -1\frac{3}{4})$ and *H* (7, 5)

V. Area and Perimeter on the Coordinate Plane

A. Translate each given rectangle or square such that one vertex of the image is located at the origin and label the vertices of the image. Calculate the perimeter and area of the image. Round your answer to the nearest hundredth, if necessary.
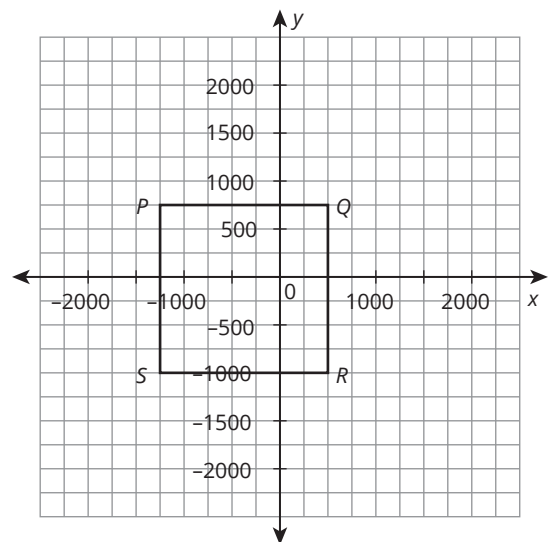
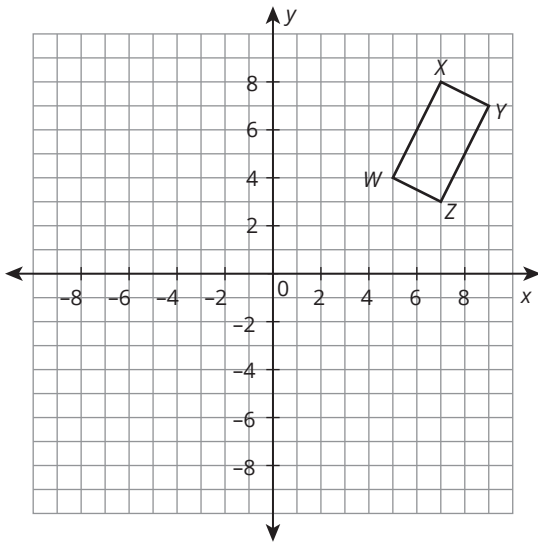**1.** Rectangle *ABCD*
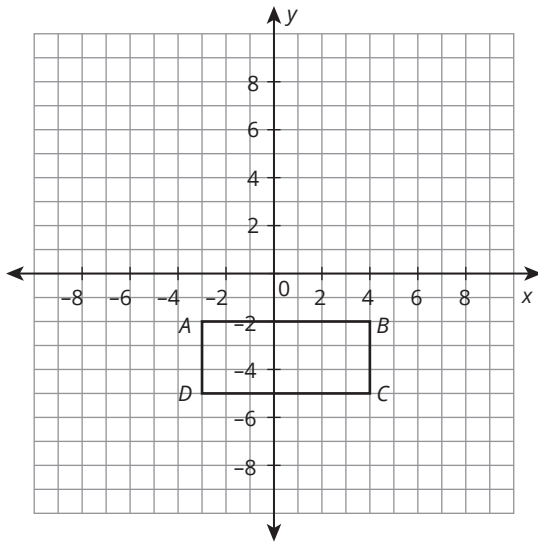
2. Square *EFGH*

3. Rectangle *JKLM*
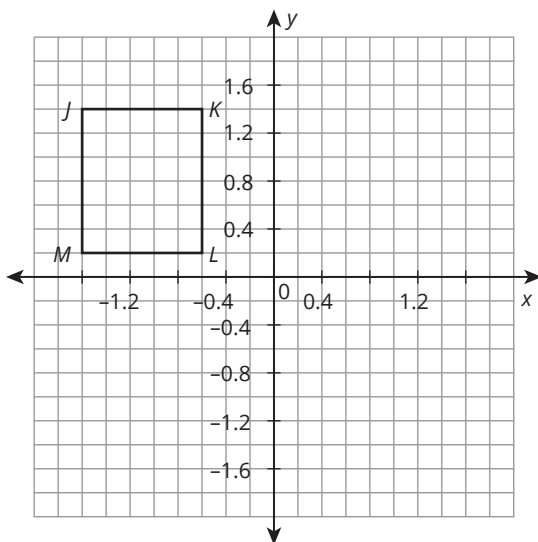
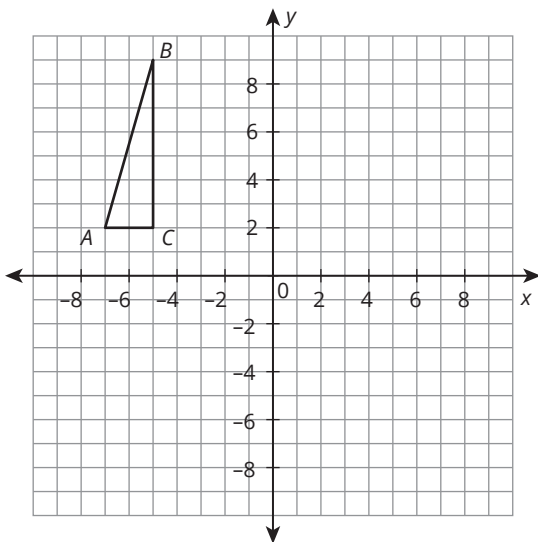**4.** Square *PQRS*

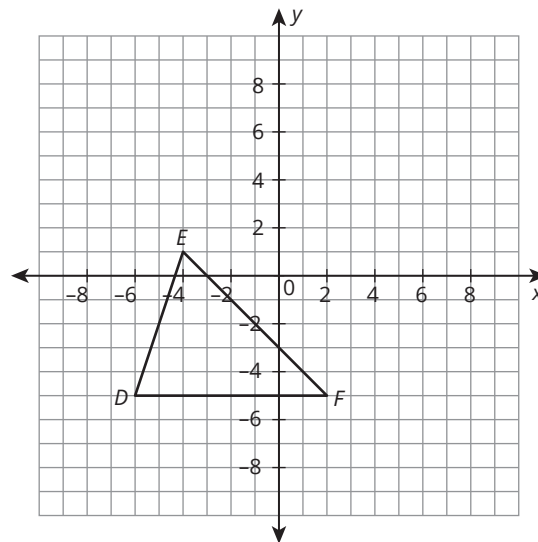**5.** Rectangle *WXYZ*

6. Square *AFTZ*
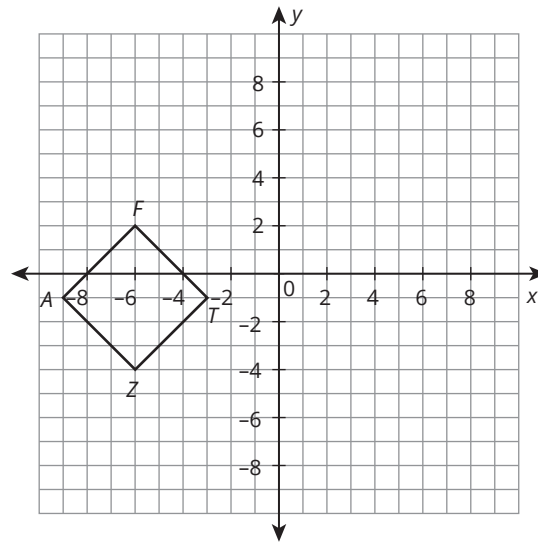
B. Determine the perimeter of each given figure on the coordinate plane. Round your answer to the nearest hundredth, if necessary.
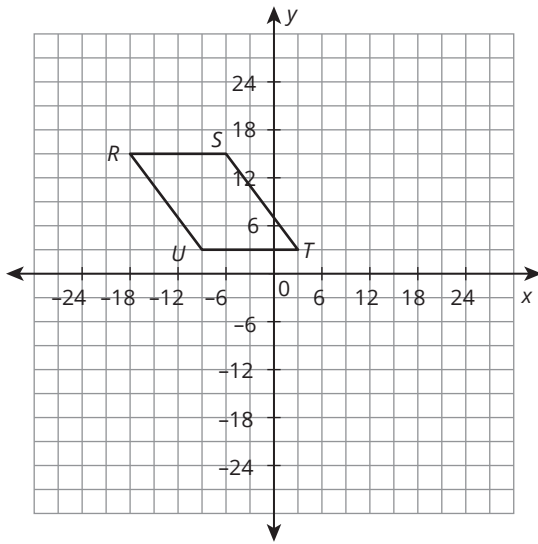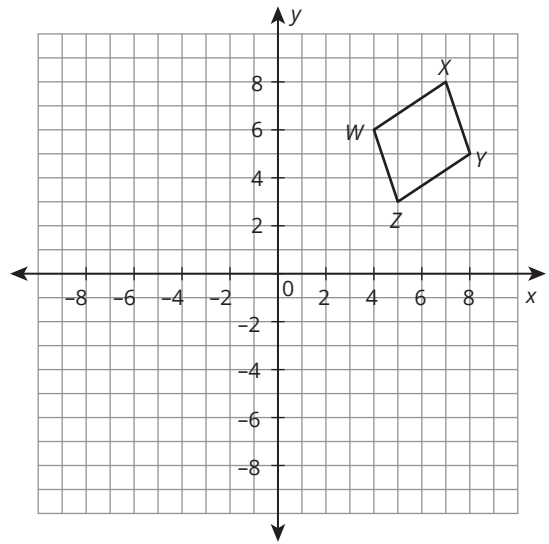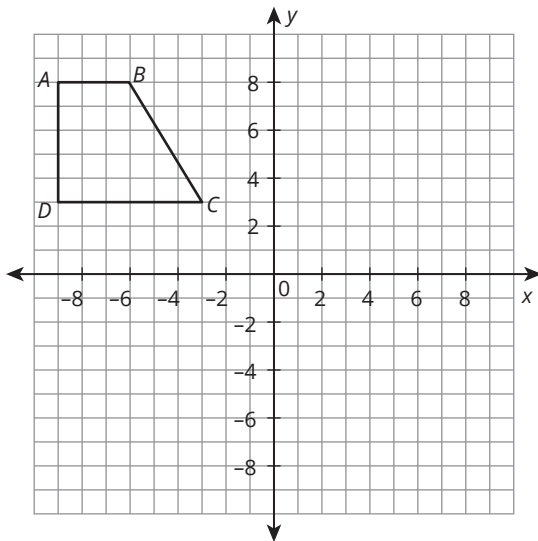
1. Triangle *ABC*

2. Triangle *DEF*

3. Parallelogram *RSTU*

4. Parallelogram *WXYZ*
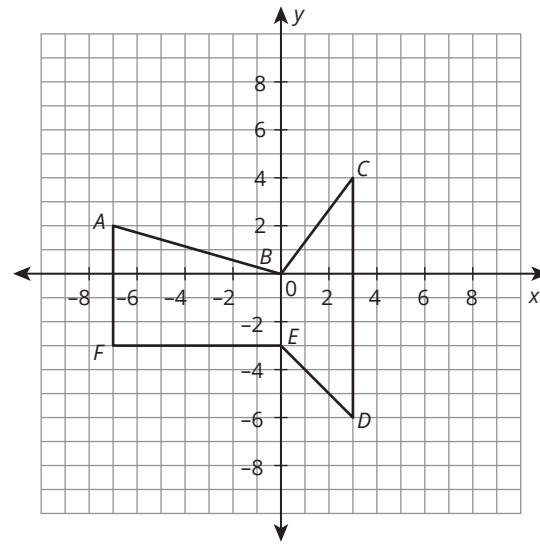

5. Trapezoid *ABCD*
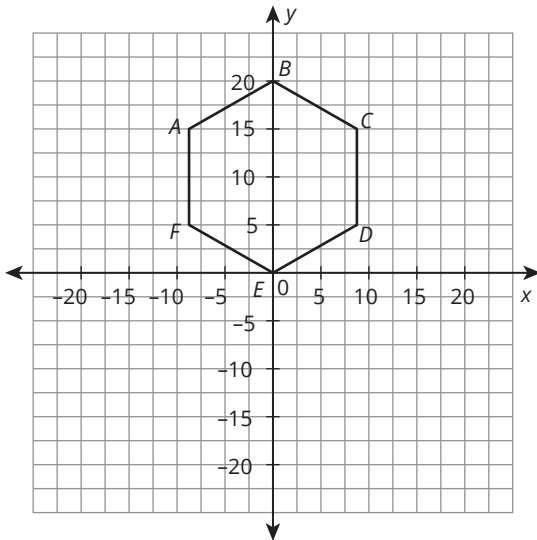

6. Trapezoid *EFGH*
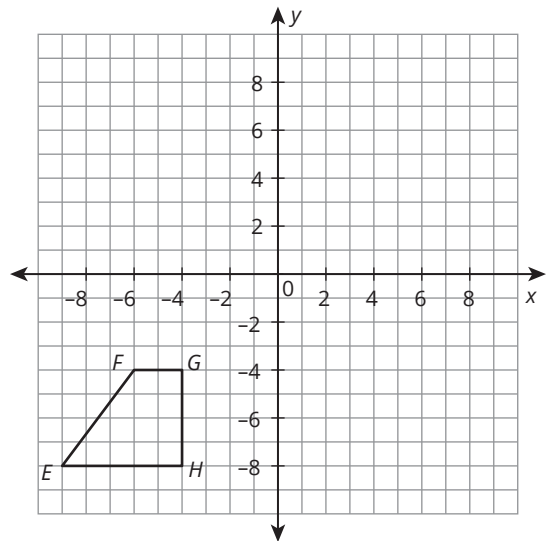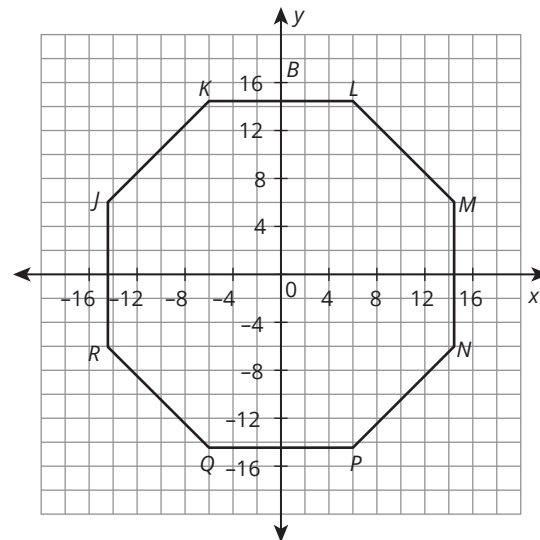
7. Figure *PQRST*
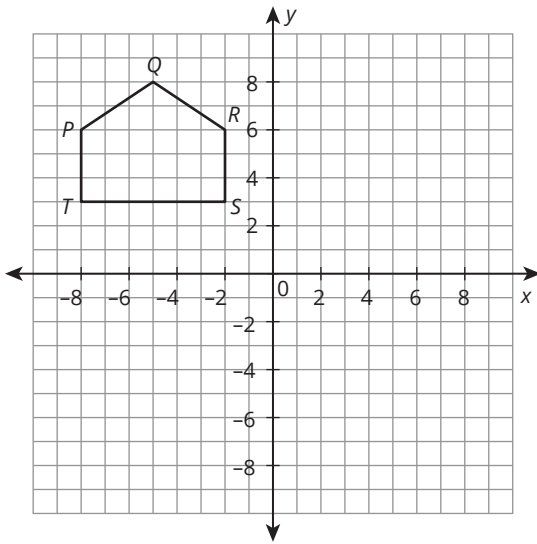
8. Figure *ABCDEF*

9. Regular hexagon *ABCDEF* with coordinates $A(-5\sqrt{3}, 15)$, $B(0, 20)$, $C(5\sqrt{3}, 15)$, $D(5\sqrt{3}, 5)$, $E(0, 0)$, and $F(-5\sqrt{3}, 5)$
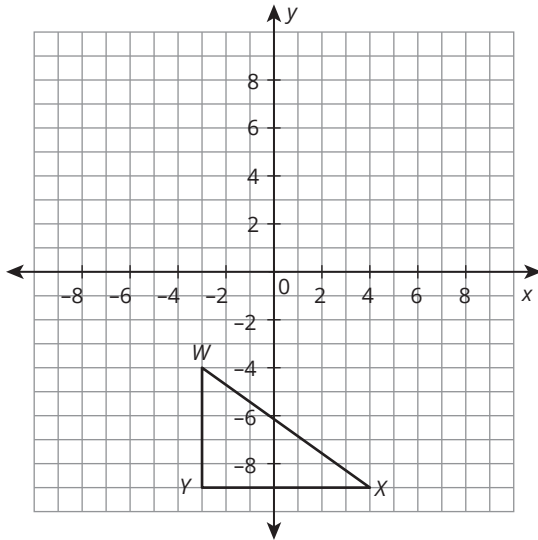

10. Regular octagon *JKLMNPQR* with coordinates $J(-6 - 6\sqrt{2}, 6)$, $K(-6, 6 + 6\sqrt{2})$, $L(6, 6 + 6\sqrt{2})$, $M(6 + 6\sqrt{2}, 6)$, $N(6 + 6\sqrt{2}, -6)$, $P(6, -6 - 6\sqrt{2})$, $Q(-6, -6 - 6\sqrt{2})$, and $R(-6 - 6\sqrt{2}, -6)$
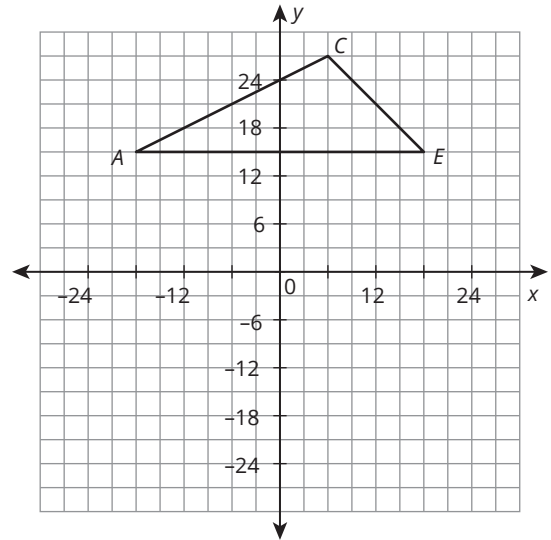
C. Determine the area of each given figure on the coordinate plane. Round your answer to the nearest hundredth, if necessary.
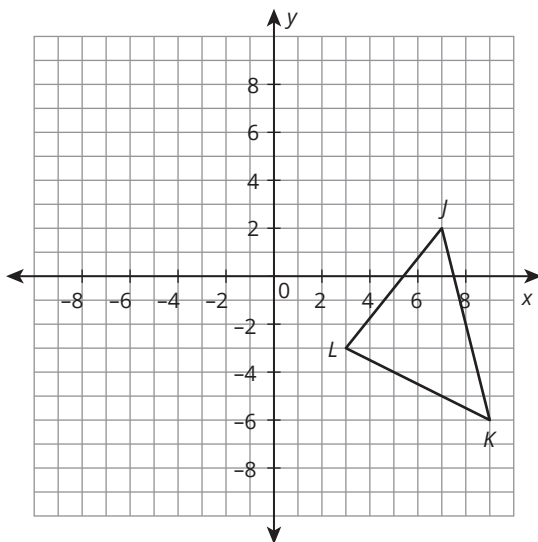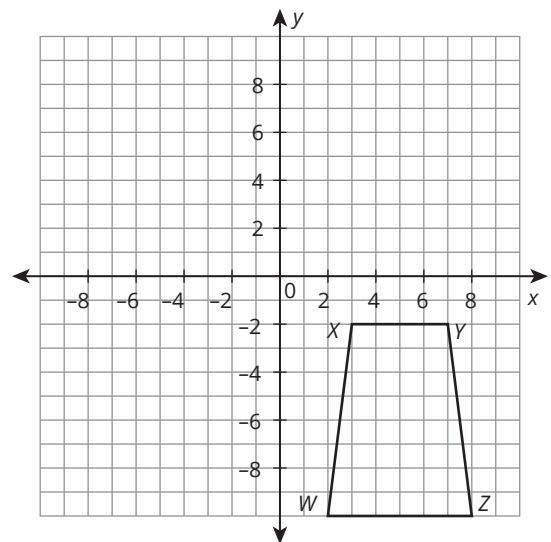
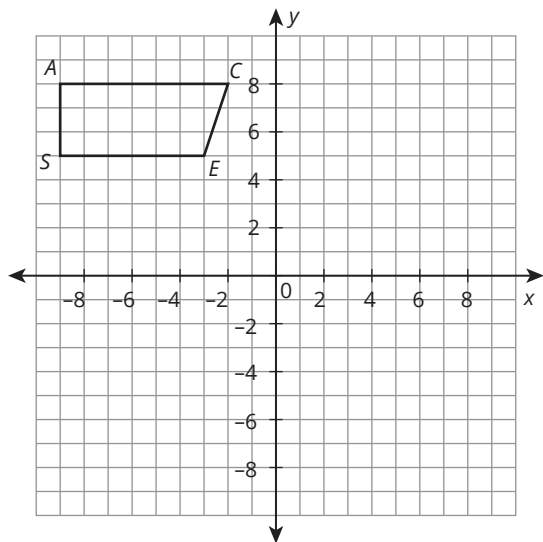**1.** Triangle *WXY*

2. Triangle *ACE*

3. Triangle *JKL*

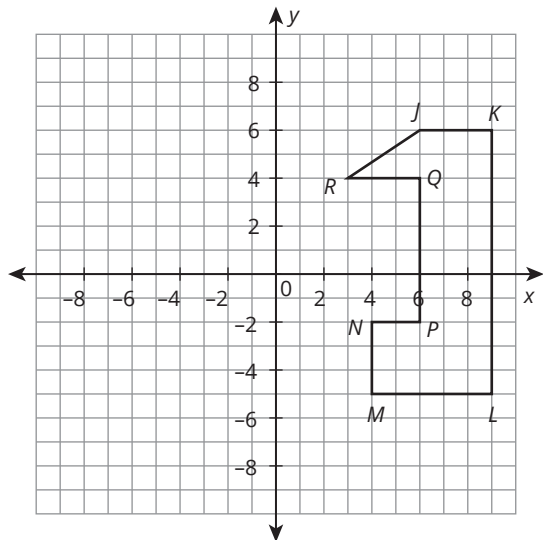

4. Trapezoid *WXYZ*

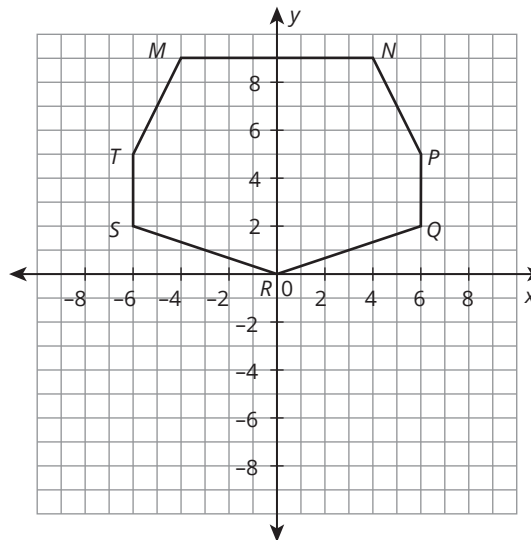**5.** Trapezoid *ACES*

6. Figure *ABCDEFGH*
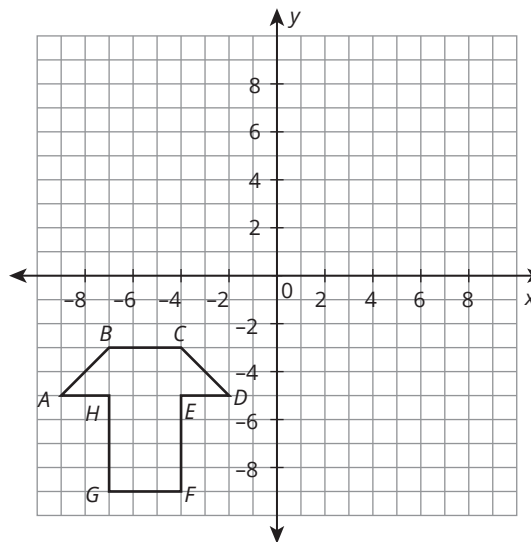
7. Figure *JKLMNPQR*

8. Figure *MNPQRST*

D. Describe how the given changes to the dimensions of the figure will affect its perimeter or area.

1. What happens to the area of a triangle with base 12 units and height 7 units when its dimensions are increased by a factor of 3?
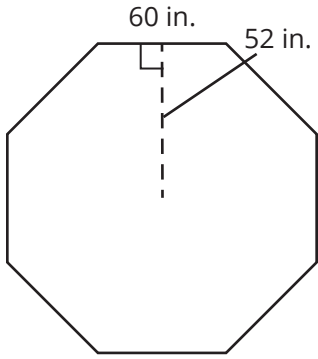
2. What happens to the perimeter of a triangle with side lengths of 3, 5, and 6 units when each side length is decreased by a factor of $\frac{1}{4}$?

3. What happens to the perimeter of a rectangle with length 29 units and width 18 units when its dimensions are increased by 10 units?
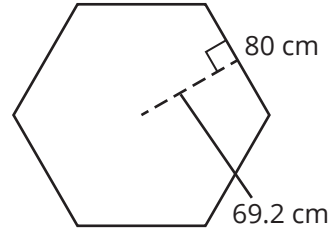
4. What happens to the perimeter of a regular hexagon with side lengths of 5 units when each side length is increased by a factor of 4?

5. What happens to the area of a rectangle with length 12 units and width 15 units when its dimensions are decreased by a factor of $\frac{1}{3}$?

6. What happens to the area of a triangle with base 10 units and height 9 units when its dimensions are decreased by 3 units?
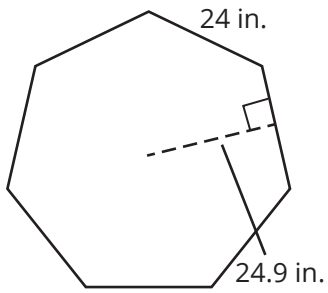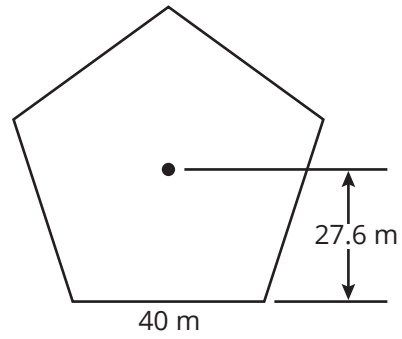
E. Calculate the area of each regular polygon.
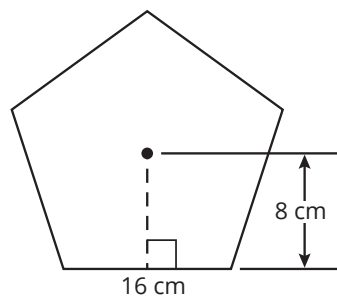
1.

60 in.

52 in.

2.

80 cm

69.2 cm

3.

24 in.

24.9 in.

4.

27.6 m

40 m

5.

8 cm

16 cm

6.

8.4 cm

10 cm