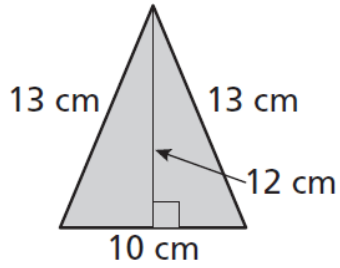
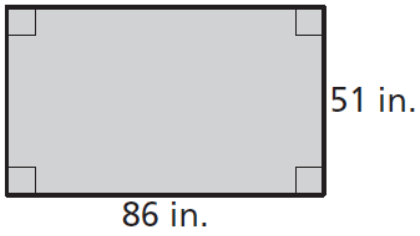
Find the perimeter and area of the polygon.

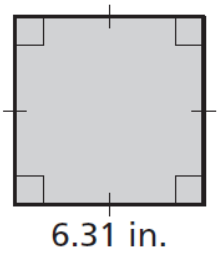
1.



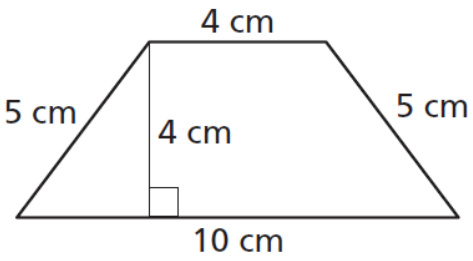
2.



3.

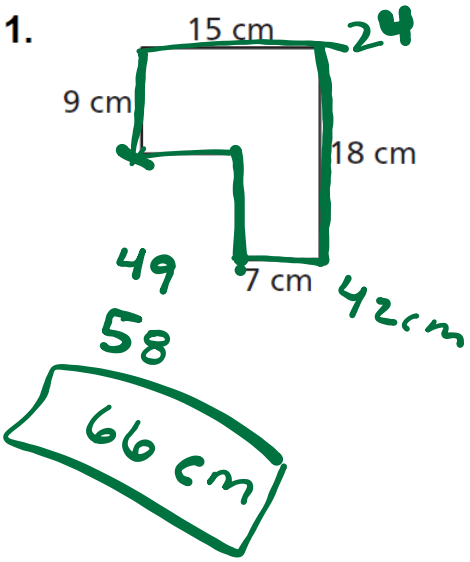


4.

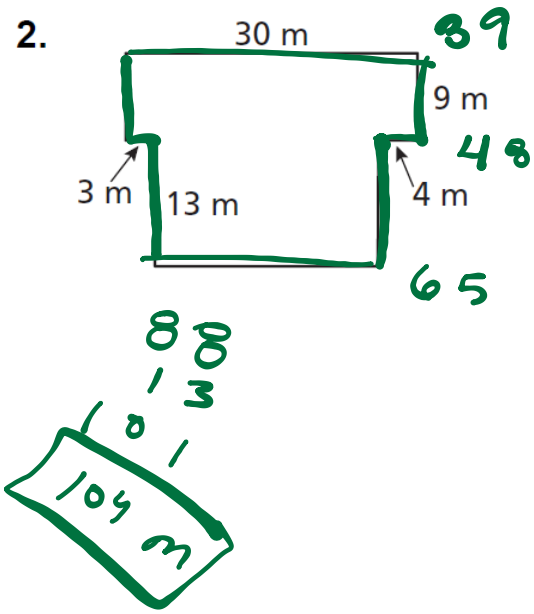


Find the perimeter of the figure.

1.



2.



Essential Question

How can you find the perimeter and area of a polygon in a coordinate plane?

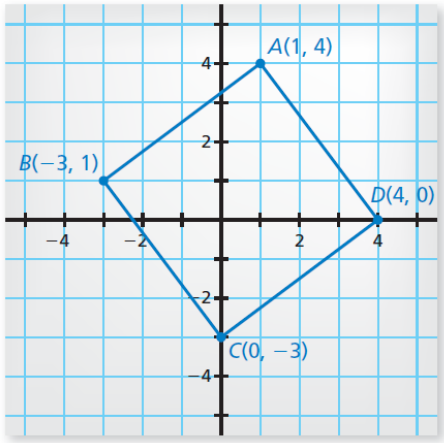
Work with a partner.

a. On a piece of centimeter graph paper, draw quadrilateral *ABCD* in a coordinate plane. Label the points *A*(1, 4), *B*(−3, 1), *C*(0, −3), and *D*(4, 0).

b. Find the perimeter of quadrilateral *ABCD*.

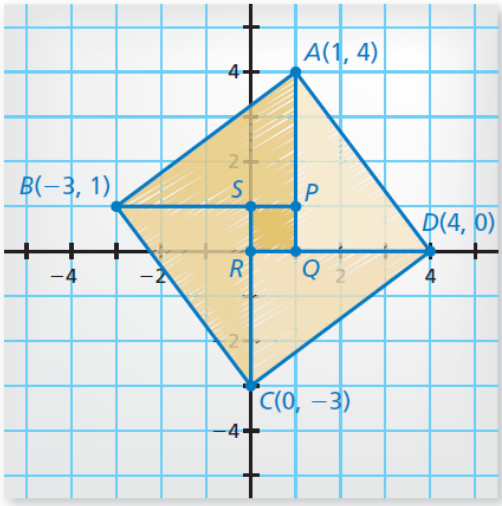
c. Are adjacent sides of quadrilateral *ABCD* perpendicular to each other? How can you tell?

d. What is the definition of a square? Is quadrilateral *ABCD* a square? Justify your answer. Find the area of quadrilateral *ABCD*.



Work with a partner.

a. Partition quadrilateral *ABCD* into four right triangles and one square, as shown. Find the coordinates of the vertices for the five smaller polygons.



b. Find the areas of the five smaller polygons.

Area of Triangle *BPA*:

Area of Triangle *AQD*:

Area of Triangle *DRC*:

Area of Triangle *CSB*:

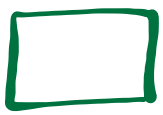
Area of Square *PQRS*:

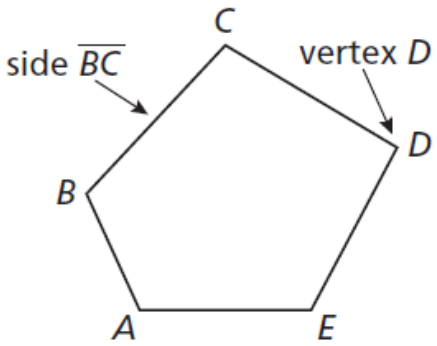
c. Is the sum of the areas of the five smaller polygons equal to the area of quadrilateral *ABCD*? Justify your answer.

Core Concept

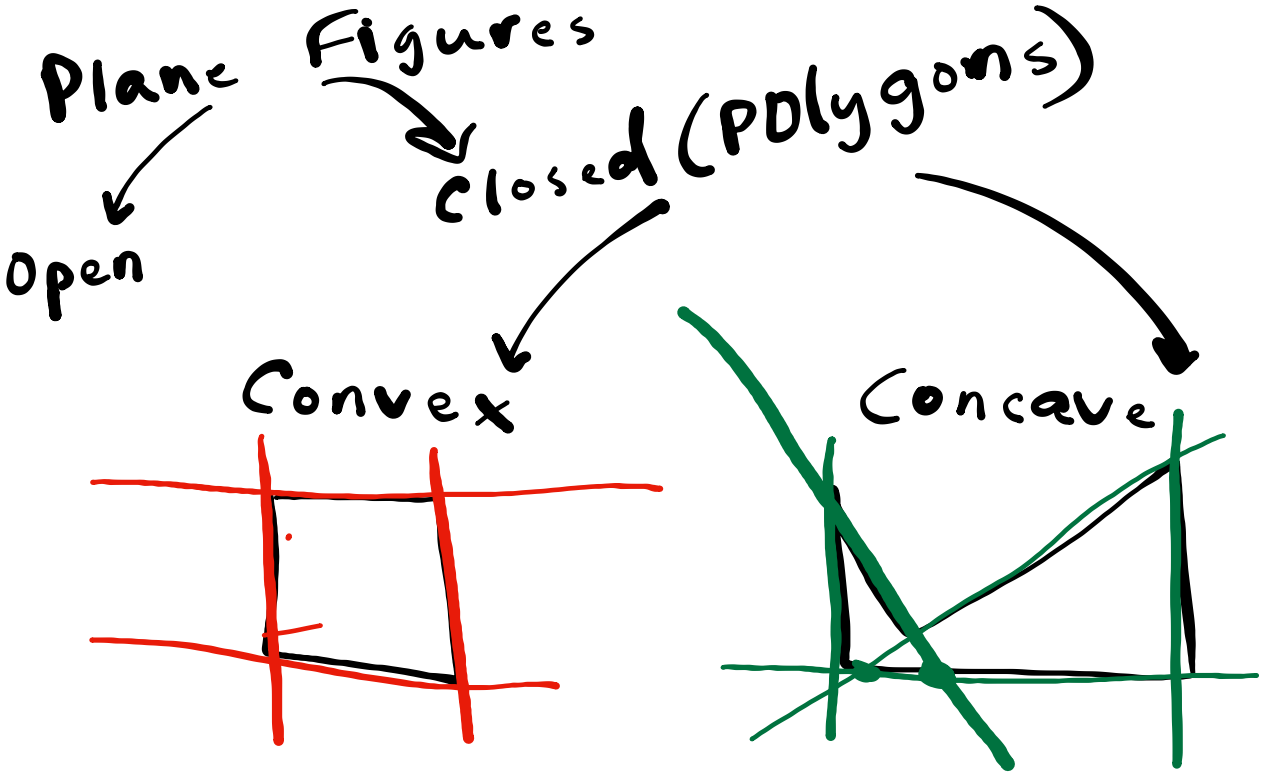
Polygons

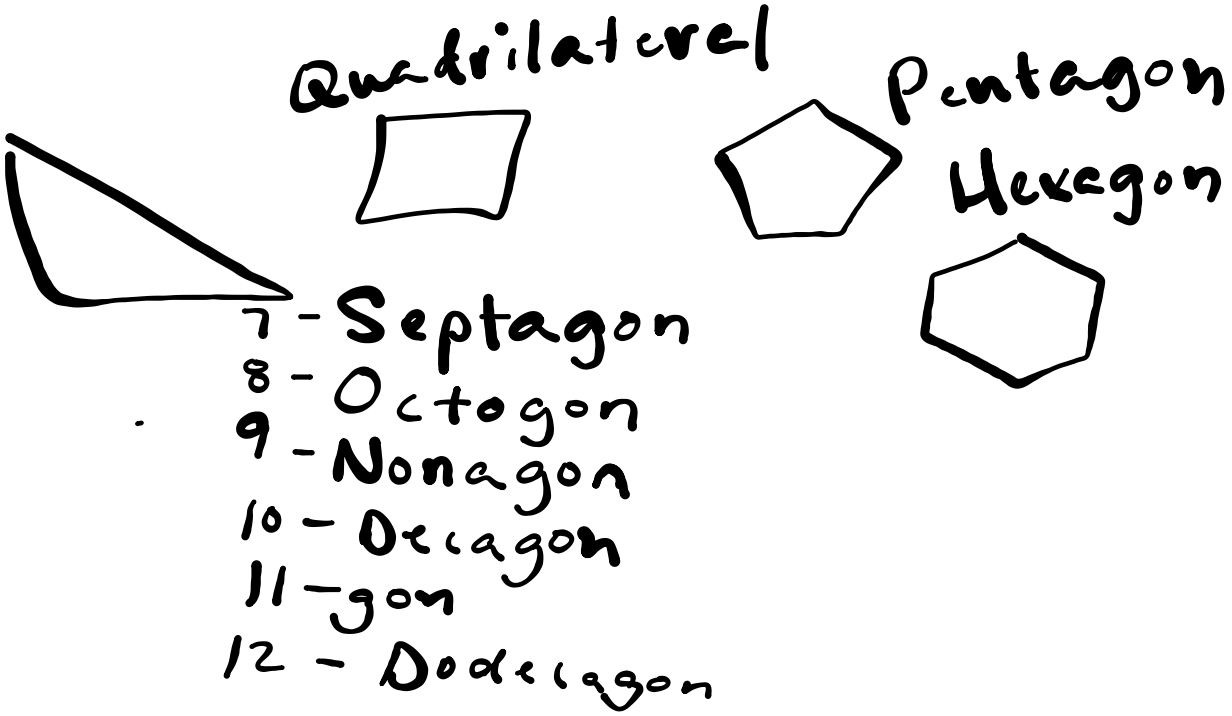
In geometry, a figure that lies in a plane is called a plane figure. Recall that a *polygon* is a closed plane figure formed by three or more line segments called *sides*. Each side intersects exactly two sides, one at each *vertex*, so that no two sides with a common vertex are collinear. You can name a polygon by listing the vertices in consecutive order.





polygon *ABCDE*


Plane
Figures
Open
Closed (Polygons)
Convex
Concave


Quadrilateral
Pentagon
Hexagon
7 - Septagon
8 - Octogon
9 - Nonagon
10 - Decagon
11 - gon
12 - Dodecagon

Classify each polygon by the number of sides. Tell whether it is *convex* or *concave*.

a. 

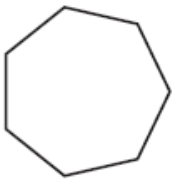
Quadrilateral
Concave

b 

Hexagon
Convex

Classify the polygon by the number of sides. Tell whether it is *convex* or *concave*.

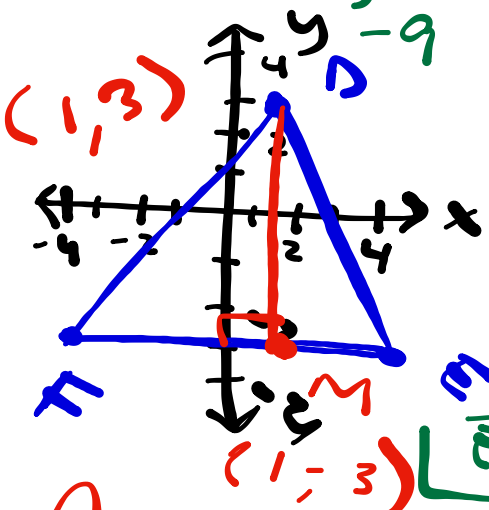
1. 

2. 

Find the perimeter of $\triangle ABC$ with vertices $A(-2, 3)$, $B(3, -3)$, and $C(-2, -3)$.

6. $Q(-4, -1)$, $R(1, 4)$, $S(4, 1)$, $T(-1, -4)$

Find the area of $\triangle DEF$ with vertices $D(1, 3)$, $E(4, -3)$, and $F(-4, -3)$.



Perimeter

-3^2

-9

Perimeter = 22.5 units

$\overline{DE}^2 = (1-4)^2+(3--3)^2$

$\overline{DE} = \sqrt{(-3)^2+(6)^2} = \sqrt{9+36}$

$= \sqrt{45}$

36

$\overline{DF}^2 = (1--4)^2+(3--3)^2$

$\overline{DF} = \sqrt{(5)^2+(6^2)} = \sqrt{61}$

25

$\overline{EF} = 8 \quad 3\sqrt{5}$

$\overline{DM} = 6$ units

Area =

$\frac{1}{2} \cdot b \cdot h = \frac{1}{2}(8)(6) = 24$ units^2

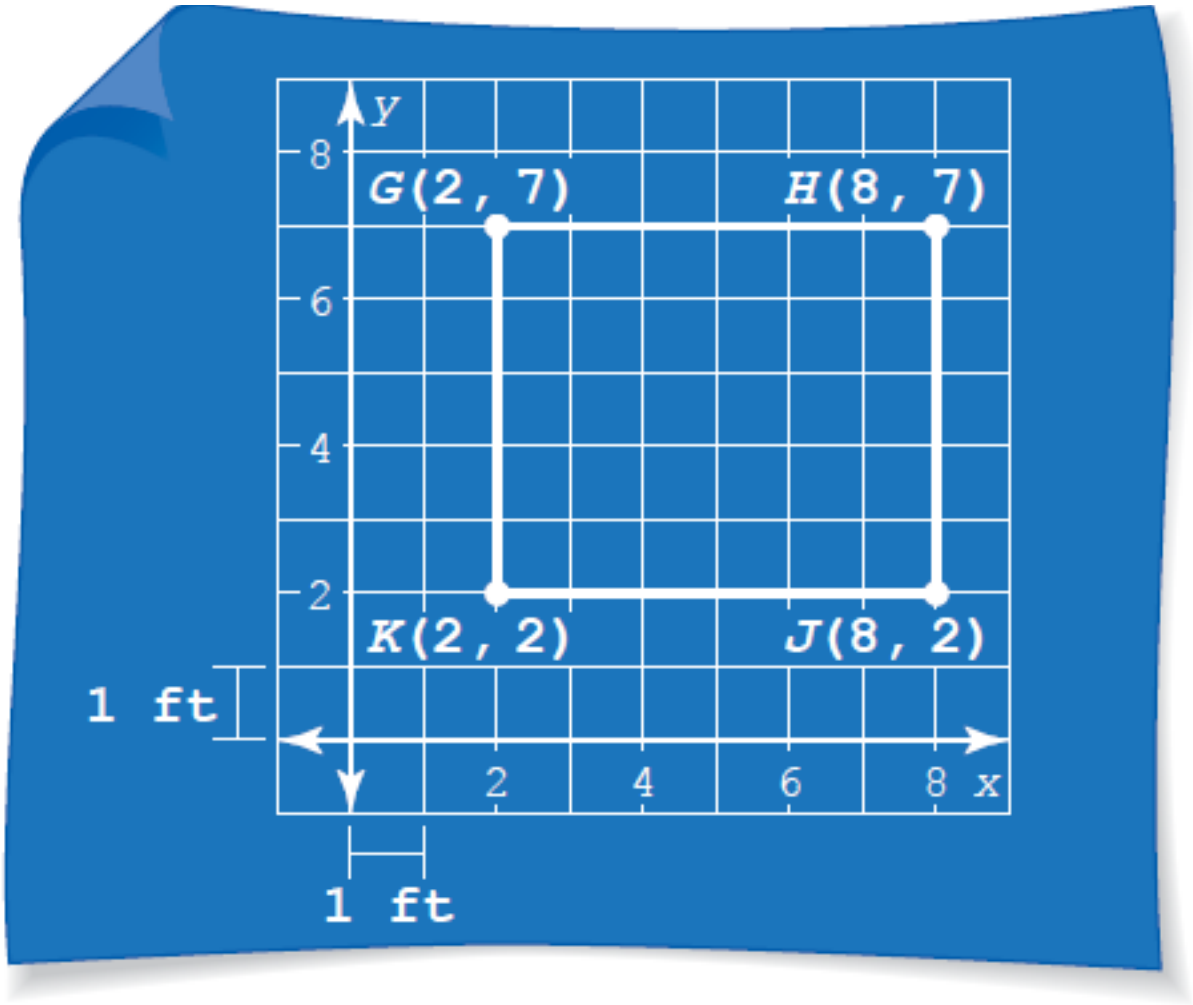
Find the area of the polygon with the given vertices.

7. $G(2, 2)$, $H(3, -1)$, $J(-2, -1)$

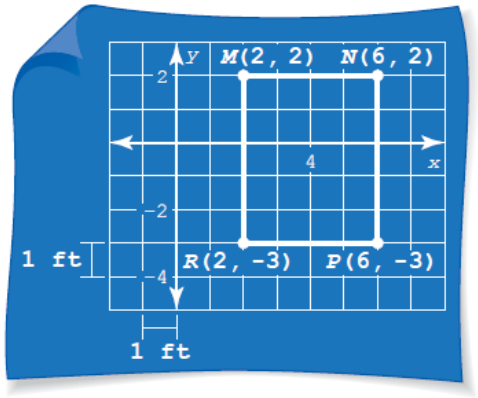
8. $N(-1, 1)$, $P(2, 1)$, $Q(2, -2)$, $R(-1, -2)$

9. $F(-2, 3)$, $G(1, 3)$, $H(1, -1)$, $J(-2, -1)$

10. $K(-3, 3)$, $L(3, 3)$, $M(3, -1)$, $N(-3, -1)$


y
8
6
4
2
G(2, 7)
H(8, 7)
K(2, 2)
J(8, 2)
1 ft
2
4
6
8 x
1 ft

11. You are building a patio in your school's courtyard. In the diagram, the coordinates represent the four vertices of the patio. Each unit in the coordinate plane represents 1 foot. Find the area of the patio.



I Used to Think … But Now I Know: Summarize the skills and strategies you are confident in as a result of today's lesson.