

# Read About Area Of Polygons

## WHAT IS THE AREA OF POLYGONS?

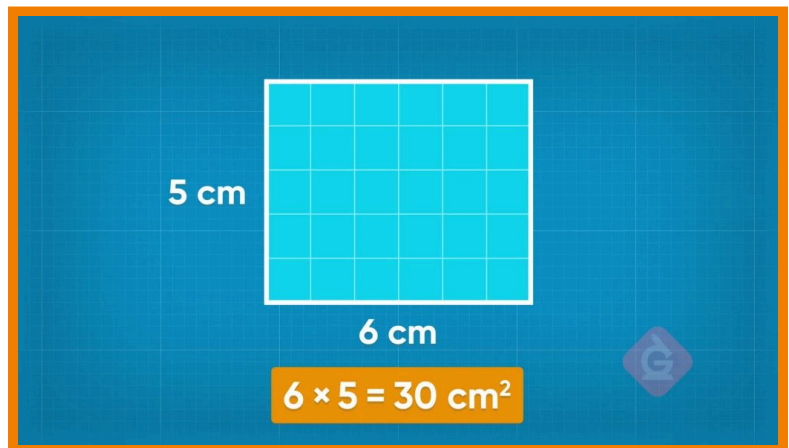
A polygon is a closed shape with straight sides. You can use the area of a rectangle to find the area of other polygons. Decompose (break apart) polygons into other shapes to find the area.

*To better understand the area of polygons...*

## LET'S BREAK IT DOWN!

### Review the area of a rectangle.

Area is the space inside a 2D shape. We measure area in square units. You know that the area of a rectangle is its length multiplied by its width. For example, a rectangle that is 6 cm wide and 5 cm long has area  $5 \times 6 = 30$  square centimeters. You can use the area of a rectangle to find the area of other polygons.



## Find the area of a triangle on a skateboard ramp.

The side of a skateboard ramp is in the shape of a right triangle. A right triangle has one angle that is 90 degrees. You can make a right triangle by taking a rectangle and dividing it along the diagonal. One rectangle makes 2 right triangles with equal area. A 10 cm by 5 cm rectangle has area 50 cm<sup>2</sup>. Divide

the rectangle along to diagonal to make 2 right triangles that have base and height 10 cm and 5 cm. The area is half of 50, or 25 cm<sup>2</sup>. The area of a triangle is  $\frac{1}{2} \times \text{base} \times \text{height}$ . The triangle of the skateboard ramp has base 100 cm and height 30 cm. The area is  $\frac{1}{2} \times 100 \times 30 = 1,500 \text{ cm}^2$ .

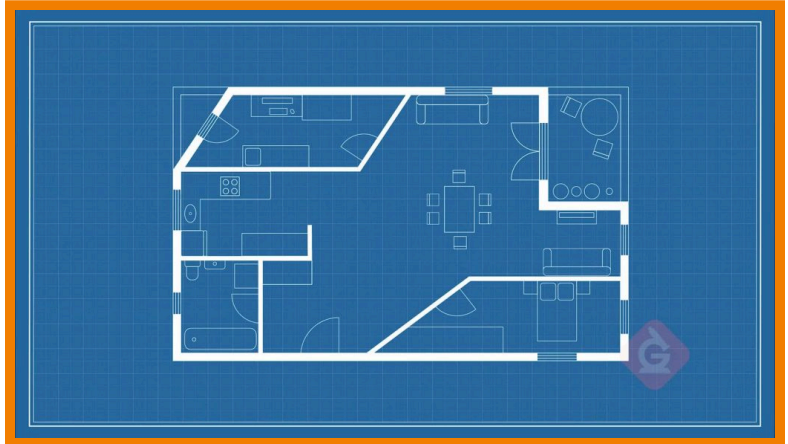


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## Find the area of polygons in blueprints.

A blueprint is a 2D plan that shows the walls of a building. A blueprint you have has a room in the shape of a trapezoid and a room in the shape of a parallelogram. You need to find the area of these rooms to estimate how much flooring to buy. You can decompose polygons into triangles and rectangles to find their area. The

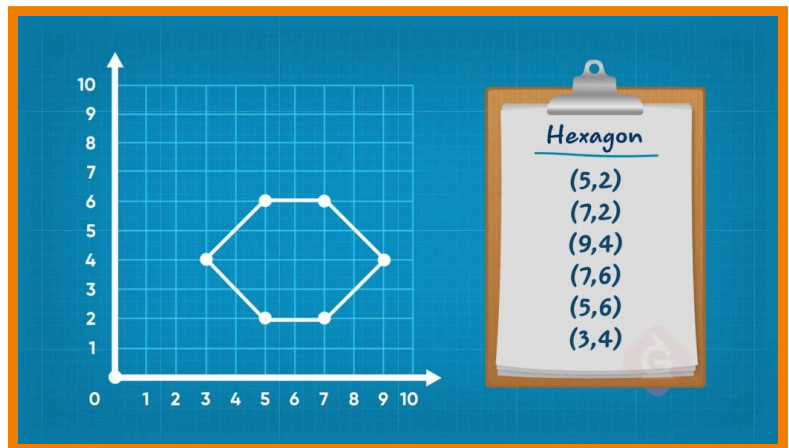
trapezoid shape can be divided into one rectangle and one right triangle. The rectangle is 6 meters by 3 meters, so the area is  $6 \times 3 = 18 \text{ m}^2$ . The triangle has base 4 meters and height 3 meters, so the area is  $\frac{1}{2} \times 4 \times 3 = 6 \text{ m}^2$ . The total area is  $18 + 6 = 24 \text{ m}^2$ . The parallelogram can be divided into one rectangle and two right triangles. The rectangle has area  $5 \times 3 = 15 \text{ m}^2$ . Each triangle has area  $\frac{1}{2} \times 3 \times 2 = 3 \text{ m}^2$ . So, the total area is  $15 + 3 + 3 = 21 \text{ m}^2$ .



## Draw polygons on a coordinate plane.

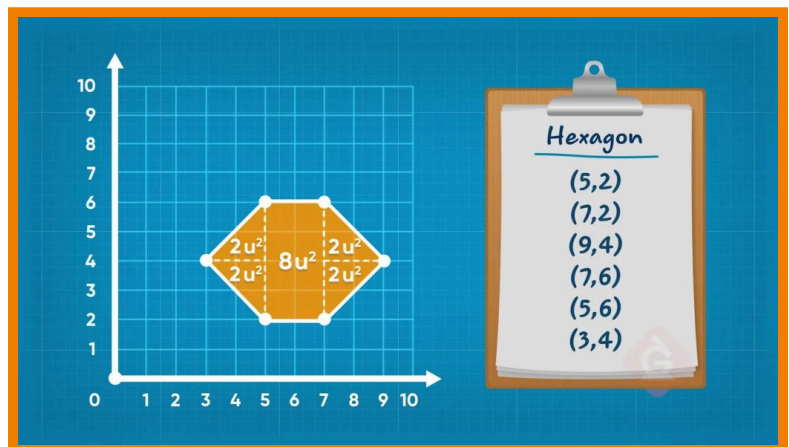
You can plot points on a coordinate plane. A coordinate plane has two axes: the x-axis and the y-axis. A coordinate pair tells you where to plot a point on each axis. The point  $(8, 5)$  has x-coordinate 8 and y-coordinate 5. So, you should plot the point 8 units right on the x-axis and 5 units up the y-axis. You can plot

points to help you design a video game. To draw a hexagon, you need to plot each point of the shape. To plot the point  $(5, 2)$ , for example, go right on the x-axis 5 units then go up 2 units. After plotting all of the points, you can draw lines to connect the dots and make the shape.



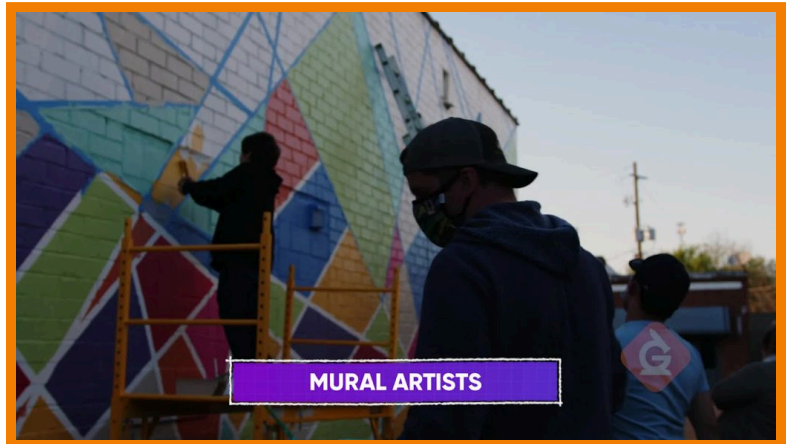
## Find the area of shapes on a coordinate plane.

You can find the area of shapes you plot on a coordinate plane. You have a hexagon plotted on the coordinate plane. It has 6 straight sides, and you can divide this hexagon into one rectangle and four right triangles. The area of the rectangle is  $5 \times 2 = 8$  square units. All four triangles have the same area:  $\frac{1}{2} \times 2 \times 2 = 2$ . The total area is  $8 + 2 + 2 + 2 + 2 = 16$  square units.



## There are many careers that use area.

Wildlife ecologists are scientists who study animals and how they interact in the wild. It is important to know how much area animals have, to ensure they have what they need. Aerospace engineers calculate the area of designs they make, like the shapes needed to build an airplane. Mural artists use area to plan how to construct their paintings.



### AREA OF POLYGONS VOCABULARY

<b>Area</b>	The measure of the space enclosed by the sides of a shape.
<b>Decompose (a shape)</b>	Breaking a shape into smaller shapes.
<b>Polygon</b>	A closed shape with straight sides.
<b>Rectangle</b>	A closed shape with 4 straight sides with 4 right angles.
<b>Triangle</b>	A closed shape with 3 straight sides.
<b>Right triangle</b>	A triangle where one angle measures 90 degrees.

### AREA OF POLYGONS DISCUSSION QUESTIONS

#### How is the area of a right triangle related to the area of a rectangle?

The area of a right triangle is half the area of a rectangle with the same base and height.

## **How is the area of a parallelogram related to the area of a rectangle?**

I can break a parallelogram into two identical right triangles and a rectangle. When I combine the two triangles it forms a new rectangle. The area of this set of shapes is the same as the area of a rectangle with a length and width the same as the length and height of the parallelogram.

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## **How can you find the area of a polygon?**

I can divide a polygon into rectangles and right triangles. Then I can find the area of each of the smaller shapes and add them together to find the total area.

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## **How do you plot points on a coordinate plane to make a polygon?**

First I plot each point. The coordinates tell me the position of the point on the x-axis and the y-axis. After I plot each point, I connect the points to make a polygon. I need to connect the points with straight lines and make a closed shape.

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## **How does finding the area of a polygon on a coordinate grid compare to finding the area of a polygon drawn off of a grid?**

I can find the area in the same way, by dividing the shape into rectangles and triangles and finding the total area of those shapes.

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