Area of a Parallelogram

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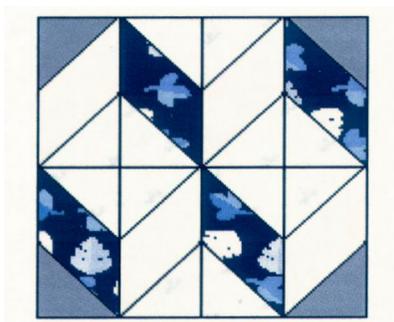
CONCEPT 1

Area of a Parallelogram

Here you'll learn to find the area of parallelograms given a base and a height.

Jillian's grandmother is coming to spend the summer with Jillian and her family. Jillian is very excited. Not only does Jillian love talking and visiting with her grandmother, but she loves to watch her sew. Jillian's grandmother is a quilter and has been for some time. When Jillian visited during the holidays she told Jillian that she would help her make a quilt over the summer. Jillian can hardly wait to begin!!

The day after Jillian's grandmother arrived, she and Jillian began planning for the first square of Jillian's quilt. Her grandmother has selected a 12" quilt square for Jillian to start with. The square is made up of parallelograms and right triangles.

Jillian knows about parallelograms from school, but transferring the information to the quilt square has her puzzled. Here is a picture of the square that Jillian is going to make.

The quilt square is made up of 8 parallelograms. Each one has a base length of $3\frac{1}{2}$ inches, sides 3 inches long, and a height of 2 inches.

Here is a picture of what one looks like.

3"

2"

3 1/2"

Jillian needs to figure out the area of each parallelogram and then multiply that number by 8 so she will know how much material she will need for the 8 parallelograms in this first square.

Jillian is puzzled. She can't remember how to figure this out. She knows that the area of a parallelogram is related to the area of a rectangle, but she can't remember how to connect them.

This is where you can help. This Concept will teach you how to help Jillian. Pay close attention and we will come back to this problem at the end of the Concept.

Guidance

In the opening problem, Jillian knew that the area of a *parallelogram* was related to the area of a *rectangle* but she couldn't remember how to make the connection. Let's begin by looking at the area of a rectangle and then see if we can connect this to the area of a parallelogram.

First, what is area?

Area is the space that is contained within the perimeter of a shape. When we talk about area we are referring to the surface or covering of something.

How do we find the area of a rectangle?

To find the area of a rectangle, we need to find the measurement for the inside of a rectangle.
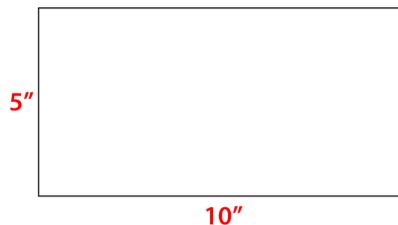
Here is a rectangle. It has a width and a length. We can find the area of a rectangle by multiplying the length times the width.

$5 \times 10 = 50$ square inches

Notice that we multiplied units, so our answer is in square inches not just inches.

Oh, I remember how to do this!

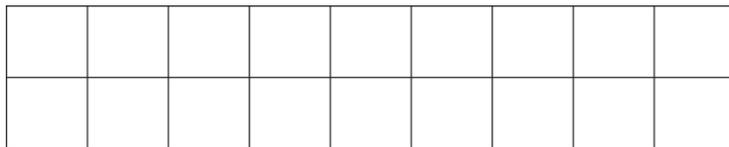Many of us remember how to do this with a little review. Now let's relate this to finding the area of a parallelogram.

We can look at the area of the rectangle in square units.

This rectangle is 18 units. We multiply the width of two times the length of 9 and get the area of 18 square units.

Next, we look at a parallelogram.

If we take off the two triangles on the ends, you can see that the parallelogram is a lot like the rectangle.

The big difference is in the angles. The rectangle has right angles in it so multiplying by the length and the width is challenging. The parallelogram has a height instead.

In this parallelogram we have a base of 8 and a height of 2.

$8 \times 2 = 16$

The area of the parallelogram is 16 square units.
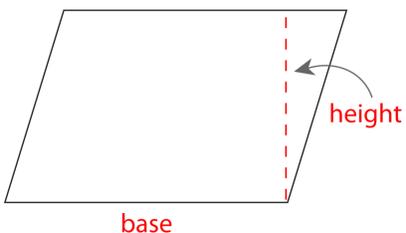
How did we do that?

Well, in figuring out the area of a rectangle, we multiplied the length times the width.

To find the area of a parallelogram, we multiply the base times the height.

Area of Rectangle = l x w

Area of Parallelogram = b x h

We can also find the area of a parallelogram if we know the base and the height.

If we have the base of the parallelogram and its height, we can figure out the area of the parallelogram. We multiply one by the other. In this way, the formula is very much like the one we use for rectangles, where we multiply the length times the width.

To find the area of this parallelogram, we multiply the base times the height.

$$A = bh$$
$$A = (3)(8)$$
$$A = 24 \text{ sq. inches}$$

Practice a few of these on your own. Find the area of the following parallelograms.

Example A

Solution: 12 sq. cm.

Example B

Base = 9 inches, Height = 3.5 inches

Solution: 31.5 sq. in

4

Example C

Base = 5 inches, Height = 3 inches

Solution: 15 sq. in

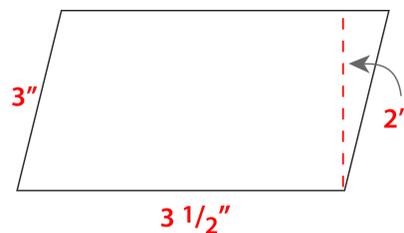Remember Jillian and her quilt square? Here is the problem once again.

Jillian's grandmother is coming to spend the summer with Jillian and her family. Jillian is very excited. Not only does Jillian love talking and visiting with her grandmother, but she loves to watch her sew. Jillian's grandmother is a quilter and has been for some time. When Jillian visited during the holidays she told Jillian that she would help her make a quilt over the summer. Jillian can hardly wait to begin!!

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Jillian is puzzled. She can't remember how to figure this out. She knows that the area of a parallelogram is related to the area of a rectangle, but she can't remember how to connect them.

Next, we can help Jillian figure out the area of one of the parallelograms by using the formula that we learned in this Concept.

$$A = bh$$
$$A = 3.5(2)$$
$$A = 7 \text{ square inches}$$

Each parallelogram will be seven square inches.

Now we need 8 parallelograms. Let's multiply our result by 8.

$7 \times 8 = 56$ square inches

Jillian will need 56 square inches of fabric. If we convert that to feet, 1 foot = 12 inches, so 1 foot x 1 foot = 12 inches x 12 inches = 144 square inches in every square foot. Jillian will need between 1/3 and 1/2 square feet of fabric to have enough for the 8 parallelograms.

Vocabulary

Area
the space within the perimeter of a figure or place. Area often refers to the surface or covering, the middle of a figure. Area is measured in square units.

Parallelogram
a quadrilateral with two pairs of opposite congruent sides.

Rectangle
a parallelogram with two pairs of opposite congruent sides and four 90 degree angles.

Guided Practice

Here is one for you to try on your own.

What is the area of a parallelogram with a base of 4.5 feet and a height of 2.5 feet?

Answer

To find this out, we use the formula.

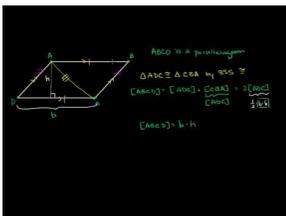$$A = bh$$

Now we substitute in the given values.

$$A = (4.5)(2.5)$$

$$A = 11.25$$

sq. feet

This is our answer.

Video Review

MEDIA
Click image to the left for more content.

KhanAcademy, Area of a Parallelogram

Practice

Directions: Find the area of each parallelogram using the given dimensions.

1. Base = 7 inches

Height = 4 inches

2. Base = 8 cm

Height = 2 cm

3. Base = 9 inches

Height = 4 inches

4. Base = 10 feet

Height = 5 feet

5. Base = 7 inches

Height = 6 inches

6. Base = 10 meters

Height = 8 meters

7. Base = 11 feet

Height = 9 feet

8. Base = 12 meters

Height = 10 meters

9. Base = 5 inches

Height = 4.5 inches

10. Base = 8.5 feet

Height = 2.5 feet

11. Base = 9.5 feet

Height = 3 feet

12. Base = 6.5 feet

Height = 3.5 feet

13. Base = 9.5 cm

Height = 2 cm

14. Base = 15 feet

Height = 12 feet

15. Base = 150 miles

Height = 20 miles