Areas of Combined Figures Involving Circles

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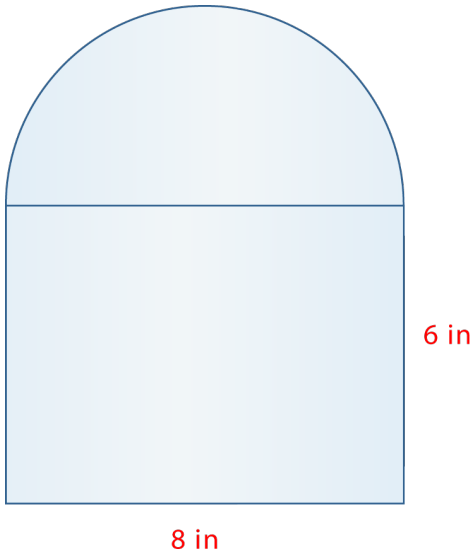
CONCEPT 1

Areas of Combined Figures Involving Circles

Here you'll learn to find areas of combined figures involving parts of circles.

Therese was working on her quilt at the table with the other quilters. When Jillian glanced at Therese's design, she saw the following drawing.



Therese is clearly making a pattern with parts of circles that are combined with rectangles.

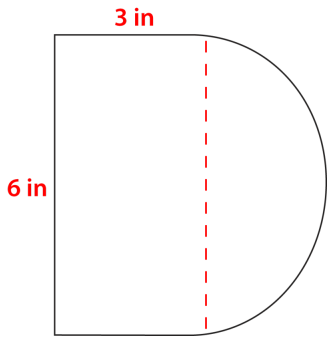
Can you figure out the area of this figure?

This Concept is all about figuring out the areas of combined figures. By the end of it, you will know how to accomplish this task.

Guidance

Sometimes, there will be figures that aren't quadrilaterals and they aren't circles either, they are combined figures. A combined figure is a figure that is made up of more than one type of polygon. You can still figure out the area of combined figures, but you will have to think about how to do it!!

What is the area of the figure?



To solve this problem, you first have to look at which figures have been combined. Here you have one-half of a circle and a rectangle.

We will need to figure out the area of the rectangle, the area of half of the circle and then add the two areas.

This will give us the area of the combined figure.

Let's start with the rectangle.

$$A = lw$$

The length of the rectangle is 6 inches. The width of the rectangle is 3 inches.

$$A = (6)(3)$$
$$A = 18\ in^2$$

Next, we find the area of the circle. We can start by noticing that the length of the rectangle is also the diameter of the circle. The diameter of the circle is 6 inches. We can start by figuring out the area of one whole circle and then divide that in half for the area of half of the circle.

If the diameter of the circle is 6 inches, then the radius is 3 inches. Remember that the radius is one-half of the diameter.

$$A = \pi r^2$$
$$A = (3.14)(3^2)$$
$$A = 28.26\ in^2$$

This is the area of the whole circle. Our figure only has half of a circle, so we divide this in half.

$28.26 \div 2 = 14.13$ in

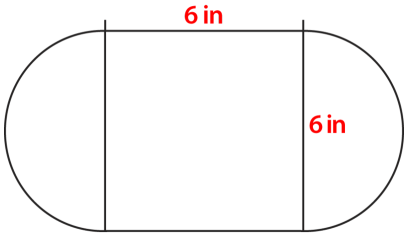
Now we combine the area of the rectangle with the area of the half circle. This will equal the area of the entire figure.

18 + 14.13 = 32.13

The area of the figure is 32.13 in^2**.**

Try these on your own. Remember, separate the figure and find the area of the parts, then combine the areas.

Example A



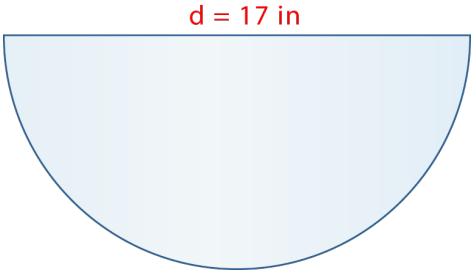
Solution: 149.04 sq. inches

Example B

Can you figure out the area of a figure made up of two congruent circles? How?

Solution: You would figure out the area of both circles and then add them together.

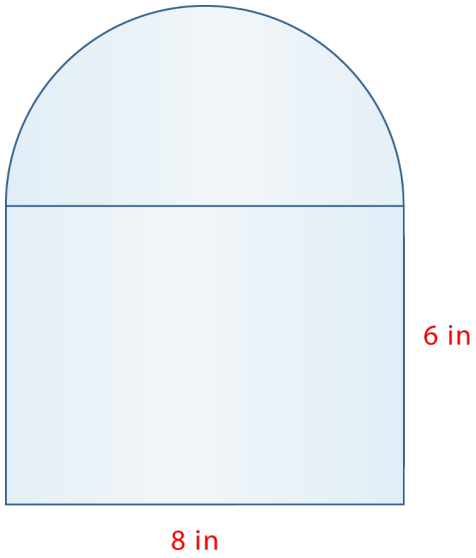
Example C



Solution: 113.43 sq. inches

Now back to the quilt design from the beginning of the Concept.

Therese was working on her quilt at the table with the other quilters. When Jillian glanced at Therese's design, she saw the following drawing.



Therese is clearly making a pattern with parts of circles that are combined with rectangles.

Can you figure out the area of this figure?

First, we have to find the area of the rectangle. We can do this by multiplying the length times the width. Then we can find the area of the circle. If you notice, the width of the rectangle is also the diameter of the circle. This will help us when we want to find the area of the circle.

Let's start with the rectangle.

$$A = lw$$
$$A = 6(8)$$
$$A = 48$$

The area is 48 square inches for the rectangle.

Now let's look at the semi-circle. If the diameter is the width which is 6 inches, then the radius is 3 inches. We can find the area of a circle now.

$$A = \pi r^2$$
$$A = 3.14(3^2)$$
$$A = 3.14(9)$$
$$A = 28.26\ sq.inches$$

Now this is the area of a whole circle. We only need the area of a semi-circle. Let's divide this value in half.

The area of the semi-circle is 14.13 square inches.

Now we add the two areas together.

48 +14.13 = 62.13 square inches

The area of the entire figure is 62.13 square inches.

Vocabulary

Here are the vocabulary words in this Concept.

Area
the surface or space of the figure inside the perimeter.

Radius
the measure of the distance halfway across a circle.

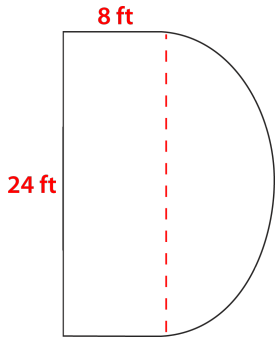
Diameter
the measure of the distance across a circle

Squaring
uses the exponent 2 to show that a number is being multiplied by itself. $3^2 = 3 \times 3$

Pi
the ratio of the diameter to the circumference. The numerical value of pi is 3.14.

Guided Practice

Here is one for you to try on your own.



Answer

First, we have to find the area of the rectangle.

$A = (8)(24) = 192$ sq. feet

Next we find the area of the circle as if it were a whole circle.

$A = (3.14)r^2$

$A = (3.14)12^2$

$A = (3.14)(144)$

$A = 452.16$ sq. feet

Next, we divide that in half.

$A = 226.08$ sq. feet

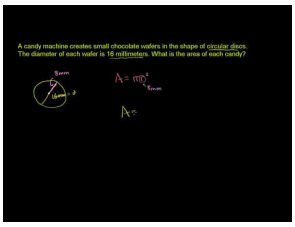
Now we can add the area of the rectangle with the area of half of the circle.

$192 + 226.08 = 418.08$ sq. feet

This is our final answer.

Video Review

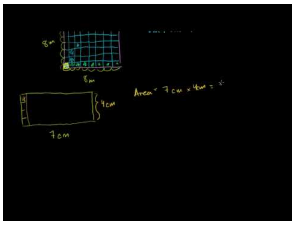
Here are videos for review.



MEDIA

Click image to the left for more content.

KhanAcademy: Area of a Circle



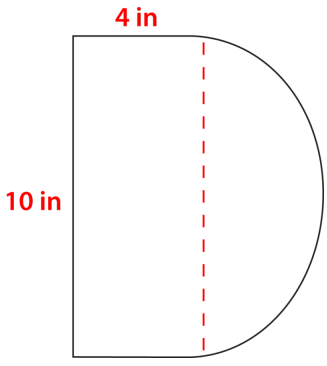
MEDIA

Click image to the left for more content.

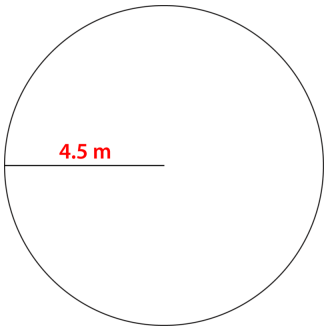
KhanAcademy: Area and Perimeter

Practice

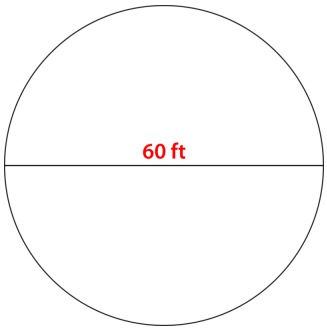
Directions: Use each image to answer the following questions.



1. Which two figures are pictured here?
2. What is the area of the rectangle?
3. What is the area of the circle if it were a whole circle?
4. What is the area of half of the circle?
5. What is the area of the whole figure?



6. What is the radius of this circle?
7. What is the diameter of this circle?
8. What is the circumference of this circle?
9. What is the area of the circle?
10. If this circle were half of a circle, what would the new area be?



11. What is the radius of this circle?
12. What is the diameter of this circle?
13. What is the circumference of this circle?
14. What is the area of the circle?
15. If this circle were half of a circle, what would the new area be?