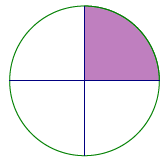
Lesson 22: Area Problems with Circular Regions

Classwork

Example 1

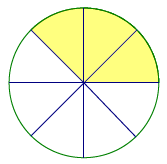
* 1. The circle to the right has a diameter of cm. Calculate the area of the shaded region.
  2. Sasha, Barry, and Kyra wrote three different expressions for the area of the shaded region. Describe what each student was thinking about the problem based on their expression.

Sasha’s expression:

Barry’s expression:

Kyra’s expression:

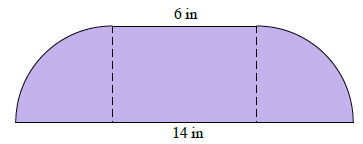
Exercise 1

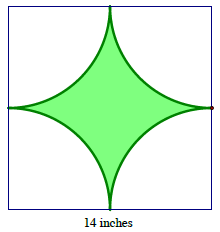


1. Find the area of the shaded region of the circle to the right.
2. Explain how the expression you used represents the area of the shaded region.

Exercise 2

Calculate the area of the figure below that consists of a rectangle and two quarter circles, each with the same radius. Leave your answer in terms of pi.



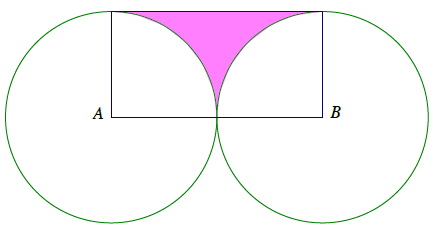
Example 2

The square in this figure has a side length of inches. The radius of the quarter circle is inches.

1. Estimate the shaded area.
2. What is the exact area of the shaded region?
3. What is the approximate area using ?

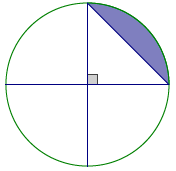
Exercise 3

The vertices and of rectangle are centers of circles each with a radius of inches.

* 1. Find the exact area of the shaded region.
  2. Find the approximate area using .
  3. Find the area to the nearest hundredth using your key on your calculator.

Exercise 4

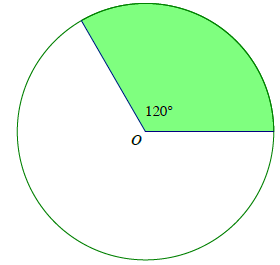
The diameter of the circle is in. Write and explain a numerical expression that represents the area.



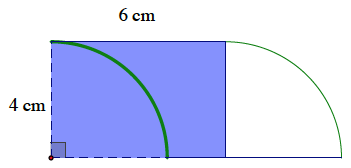
Problem Set

1. A circle with center has an area of in2. Find the area of the shaded region.

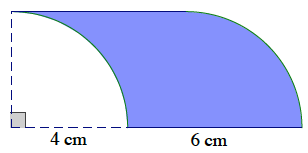
|  |  |
| --- | --- |
| Peyton’s Solution | Monte’s Solution |
|  |  |



1. The following region is bounded by the arcs of two quarter circles each with a radius of cm and by line segments cm in length. The region on the right shows a rectangle with dimensions cm by cm. Show that both shaded regions have equal areas.

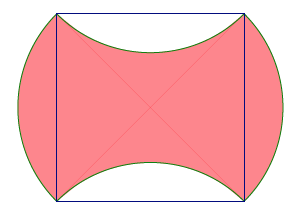


**6 cm**

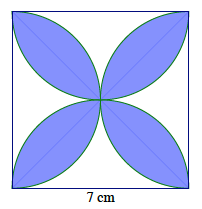


**4 cm**

1. A square is inscribed in a paper disc (i.e., a circular piece of paper) with a radius of cm. The paper disc is red on the front and white on the back. Two edges of the square are folded over. Write and explain a numerical expression that represents the area of the figure. Then find the area of the figure.

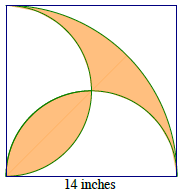


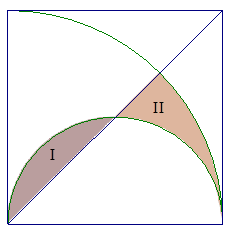
1. The diameters of four half circles are sides of a square with a side length of cm.



* 1. Find the exact area of the shaded region.
  2. Find the approximate area using .
  3. Find the area using the button on your calculator and rounding to the nearest thousandth.

1. A square with a side length of inches is shown below, along with a quarter circle (with a side of the square as its radius) and two half circles (with diameters that are sides of the square). Write and explain a numerical expression that represents the area of the figure.



1. Three circles have centers on segment . The diameters of the circles are in the ratio . If the area of the largest circle is ft2, find the area inside the largest circle but outside the smaller two circles.
2. A square with a side length of ft. is shown, along with a diagonal, a quarter circle (with a side of the square as its radius), and a half-circle (with a side of the square as its diameter). Find the exact, combined area of regions and .