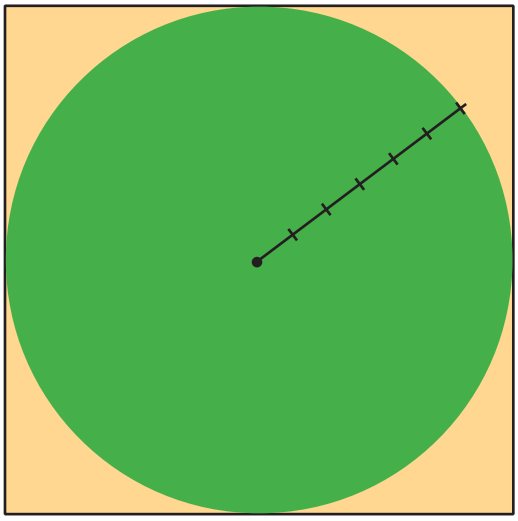
Relating Area to Circumference

Let's rearrange circles to calculate their areas.

8.1 Irrigating a Field

A circular field is set into a square with an 800-m side length.



What is the field's area? Record an estimate that is:

too low	about right	too high

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8.2 Making a Polygon out of a Circle

Your teacher will give you a page with two circles on it and a piece of paper that is a different color.

Follow these instructions to create a visual display:

1. Cut out both circles, cutting around the thick outline.
2. Fold and cut *one* of the circles into fourths.
3. Arrange the fourths so that straight sides are next to each other, but the curved edges are alternately on top and on bottom.
   Pause here so your teacher can review your work.
4. Fold and cut the fourths in half to make eighths. Arrange the eighths next to each other, like you did with the fourths.
   Pause here so your teacher can review your work.
5. Glue the remaining circle and the new shape onto a piece of paper that is a different color.

After you finish gluing your shapes, answer the following questions.

1. How do the areas of the two shapes compare?

2. What polygon does the shape made of the circle pieces most resemble?

3. How could you find the area of this polygon?

8.3 Making Another Polygon out of a Circle

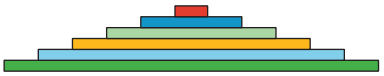
Imagine a circle made of rings that can bend, but not stretch.



A circle is made of rings.



The rings are cut and unrolled.



The circle has been made into a new shape.

1. What polygon does the new shape resemble?

2. How does the area of the polygon compare to the area of the circle?

3. How can you find the area of the polygon?

4. Show, in detailed steps, how you could find the polygon's area in terms of the circle's measurements. Show your thinking. Organize it so it can be followed by others.

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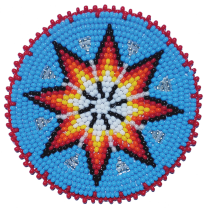
8.4 Objects for a Powwow

Here are some special objects that might be seen at a Lakota powwow, or *wacipi* (wah-CHEE-pee).

1. A hoop drum has a radius of 7 inches. What is the area of the drum?



2. A beaded medallion has a diameter of 6 centimeters. What is the area of the medallion?



Are you ready for more?

If each bead covers about 3.5 mm^2, how many beads are there on the medallion?

Lesson 8 Summary

If C is a circle's circumference and r is its radius, then $C = 2\pi r$. The area of a circle can be found by taking the product of half the circumference and the radius.

If A is the area of the circle, this gives the equation:

$$A = \frac{1}{2}(2\pi r) \cdot r$$

This equation can be rewritten as:

$$A = \pi r^2$$

Remember that when we have $r \cdot r$ we can write r^2, and we can say "r **squared**."

This means that if we know the radius, we can find the area. For example, if a circle has a radius of 10 cm, then its area is about $(3.14) \cdot 100$, which is 314 cm^2.

If we know the diameter, we can figure out the radius, and then we can find the area. For example, if a circle has a diameter of 30 ft, then the radius is 15 ft, and the area is about $(3.14) \cdot 225$, which is approximately 707 ft^2.