Unit 5, Lesson 16

Applying Area of Circles

Let's find the areas of shapes made up of circles.

16.1 Math Talk: Expressions with Variables

For each expression, find an equivalent expression with fewer terms.

- $a + a + a + a$
- $a + a + a + b + b$
- $9x - x$
- $5 + 6x + 7$

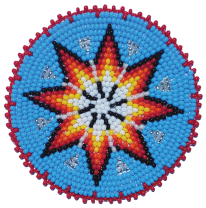
16.2 Objects for a Powwow

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?



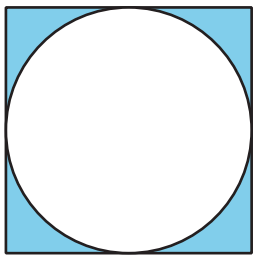
Are you ready for more?

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

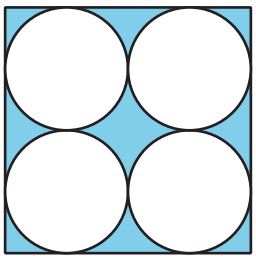
16.3 Comparing Areas Made of Circles

1. Each square has a side length of 12 units. Compare the areas of the shaded regions in the 3 figures. Which figure has the largest shaded region? Explain or show your reasoning.

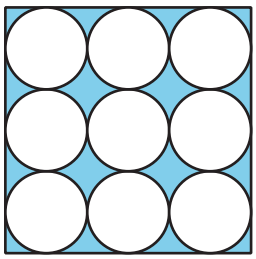
A



B

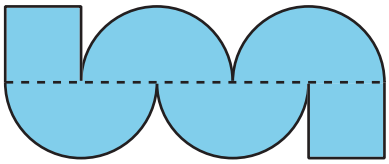


C

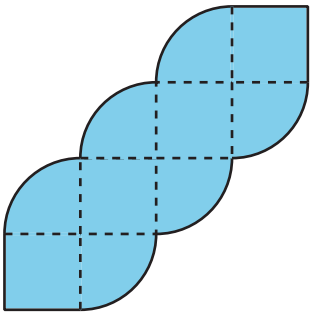


2. Each square in Figures D and E has a side length of 1 unit. Compare the area of the two figures. Which figure has more area? How much more? Explain or show your reasoning.

D



E

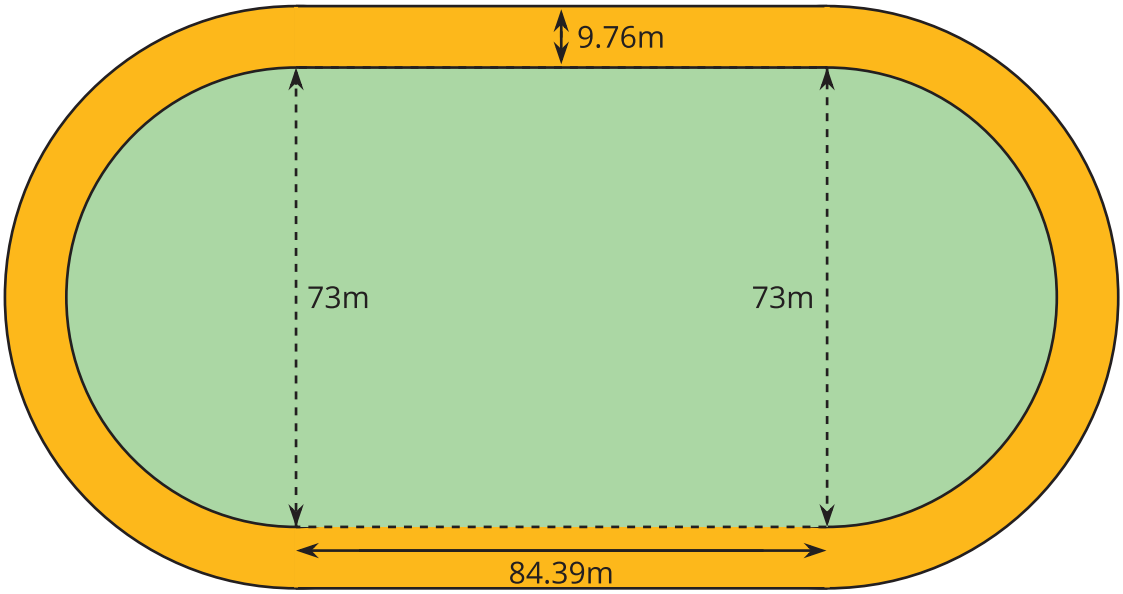


Are you ready for more?

Which figure has a longer perimeter, Figure D or Figure E? How much longer?

16.4 The Running Track Revisited

The field inside a running track is made up of a rectangle 84.39 m long and 73 m wide, together with a half-circle at each end. The running lanes are 9.76 m wide all the way around.



What is the area of the running track that goes around the field? Explain or show your reasoning.

Lesson 16 Summary

The relationship between A, the area of a circle, and r, its radius, is $A = \pi r^2$. We can use this to find the area of a circle if we know the radius. For example, if a circle has a radius of 10 cm, then the area is $\pi \cdot 10^2$, or 100π cm^2. We can also use the formula to find the radius of a circle if we know the area. For example, if a circle has an area of 49π m^2 then its radius is 7 m and its diameter is 14 m.

Sometimes instead of leaving π in expressions for the area, a numerical approximation can be helpful. For the examples above, a circle of radius 10 cm has an area of about 314 cm^2. In a similar way, a circle with an area of 154 m^2 has a radius of about 7 m.

We can also figure out the area of a fraction of a circle. For example, the figure shows a circle divided into 3 pieces of equal area. The shaded part has an area of $\frac{1}{3}\pi r^2$.

