Unit 3, Lesson 9

Applying Area of Circles

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

9.1 Math Talk: Expressions with Variables

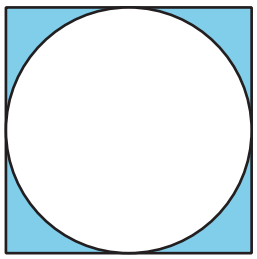
For each expression, find an equivalent expression with fewer terms.

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

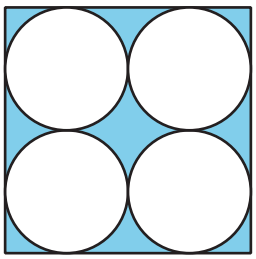
9.2 Comparing Areas Made of Circles

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.

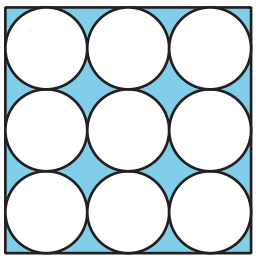
A



B

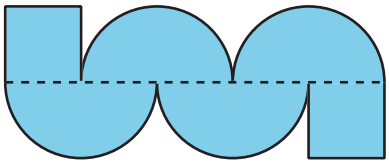


C

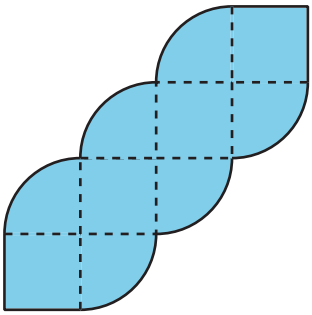


2. Each square in Figures D and E has a side length of 1 unit. Compare the area of the two figures. Which figure has more area? How much more? Explain or show your reasoning.

D



E



Are you ready for more?

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

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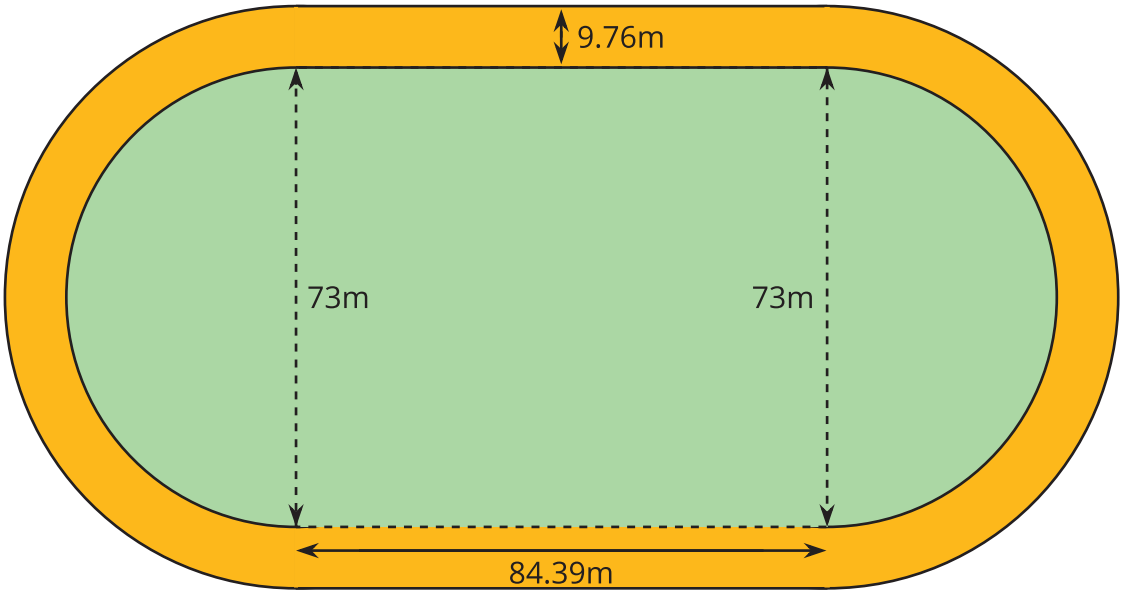
9.3 The Running Track Revisited

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.

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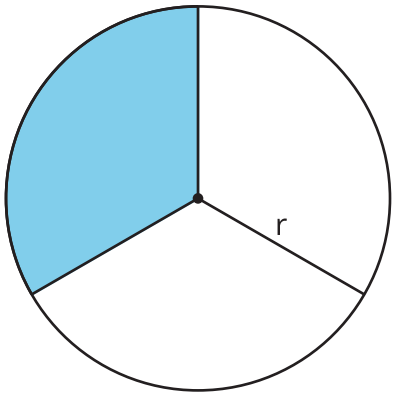
Lesson 9 Summary

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 $\frac{1}{3}\pi r^2$.



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