10-7 Areas of Circles and Sectors

Vocabulary

Review

1. Explain how the *area* of a figure is different from the perimeter of the figure.

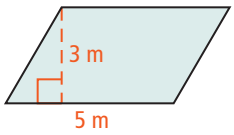
_____

_____

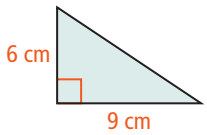
2. Circle the formula for the *area* of a parallelogram.

$A = bh$ $A = \frac{1}{2}bh$ $A = \frac{1}{2}h(b_1 + b_2)$ $A = \frac{1}{2}d_1d_2$

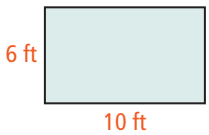
3. Find the *area* of each figure.



$A =$ ____ m^2



$A =$ ____ cm^2



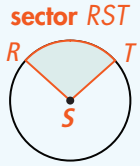
$A =$ ____ ft^2

Vocabulary Builder

sector (noun) SEK tur

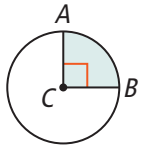
Definition: A **sector** of a circle is a region bounded by an arc of the circle and the two radii to the arc's endpoints.

Main Idea: The area of a **sector** is a fractional part of the area of a circle.



Use Your Vocabulary

4. Name the arc and the radii that are the boundaries of the shaded *sector*.



arc ____ radii ____ and ____

5. Circle the name of the shaded *sector*.

sector *ABC* sector *ACB* sector *BAC*

6. The shaded *sector* is what fractional part of the area of the circle? Explain.

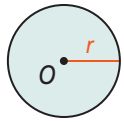
_____

take note

Theorem 10-11 Area of a Circle

The area of a circle is the product of π and the square of the radius.

$$A = \pi r^2$$



Complete each statement.

7. If the radius is 5 ft, then $A = \pi \cdot \square \cdot \square$.

8. If the diameter is 1.8 cm, then $A = \pi \cdot \square \cdot \square$.

Problem 1 Finding the Area of a Circle

Got It? **What is the area of a circular wrestling region with a 42-ft diameter?**

9. The radius of the wrestling region is $\square$ ft.

10. Complete the reasoning model below.

Think	Write
I can use the formula for the area of a circle.	$A = \pi r^2$
I can subtitute the radius into the formula and then simplify.	$= \pi \cdot \square^2$ $= \square \cdot \pi$
I can use a calculator to find the approximate area.	$\approx \square$

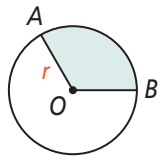
11. The area of the wrestling region is about $\square$ ft^2.

take note

Theorem 10-12 Area of a Sector of a Circle

The area of a sector of a circle is the product of the ratio $\frac{\text{measure of the arc}}{360}$ and the area of the circle.

$$\text{Area of sector } AOB = \frac{m\overset{\frown}{AB}}{360} \cdot \pi r^2$$



Complete.

	measure of the arc	$\frac{\text{measure of the arc}}{360}$	area of the sector
12.	60	$\frac{60}{360} = \frac{1}{\square}$	$\frac{1}{\square} \cdot \square \cdot r^2$
13.	120	$\frac{\square}{360} = \frac{\square}{\square}$	$\frac{\square}{\square} \cdot \square \cdot r^2$

Problem 2 Finding the Area of a Sector of a Circle

Got It? **A circle has a radius of 4 in. What is the area of a sector bounded by a 45° minor arc? Leave your answer in terms of π.**

14. At the right is one student's solution. What error did the student make?

area of sector $= \frac{45}{360} \cdot \pi(4)$

$= \frac{1}{8} \cdot \pi(4)$

$= \frac{1}{2}\pi$

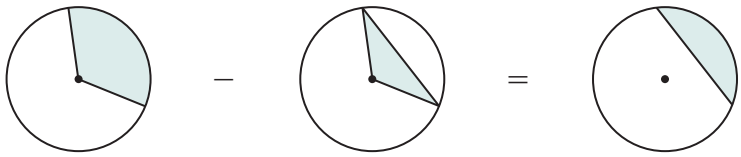
15. Find the area of the sector correctly.

16. The area of the sector is _____ $in.^2$.

take note

Key Concept Area of a Segment

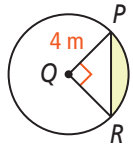
The area of a segment is the difference of the area of the sector and the area of the triangle formed by the radii and the segment joining the endpoints.



Area of sector — Area of triangle = Area of segment

Problem 3 Finding the Area of a Segment of a Circle

Got It? **What is the area of the shaded segment shown at the right? Round your answer to the nearest tenth.**



17. Use the justifications below to find the area of sector PQR.

area of sector $PQR = \frac{m\overset{\frown}{PR}}{\quad} \cdot \pi r^2$ Use the formula for the area of a sector.

$= \frac{90}{360} \cdot \pi(\quad)^2$ Substitute.

$= \quad \cdot \pi$ Simplify.

18. $\triangle PQR$ is a right triangle, so the base is _____ m and the height is _____ m.

19. Find the area of $\triangle PQR$.

20. Complete to find the area of the shaded segment. Use a calculator.

area of shaded segment $=$ area of sector PQR $-$ area of $\triangle PQR$

$= \square \cdot \pi - \square$

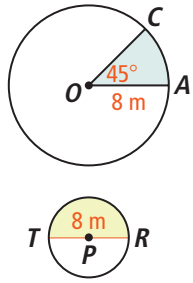
$\approx \square$

21. To the nearest tenth, the area of the shaded segment is $\square$ m^2.

Lesson Check • Do you UNDERSTAND?

Reasoning **Suppose a sector in $\odot P$ has the same area as a sector in $\odot O$. Can you conclude that $\odot P$ and $\odot O$ have the same area? Explain.**

Use the figures at the right for Exercises 22–24.



22. Find the area of sector AOC in $\odot O$.

23. Find the area of sector RPT in $\odot P$.

24. Do the sectors have the same area? Can you conclude that the circles have the same area? Explain.

Math Success

Check off the vocabulary words that you understand.

☐ sector of a circle ☐ segment of a circle ☐ area of a circle

Rate how well you can *find areas of circles, sectors, and segments.*

Need to review 0 2 4 6 8 10 Now I get it!