LESSON MAKER PRO

Circle Pieces

Use rearranged sectors to find circle area.

GRADE 7 · 7.GM.B.20.a

7.GM.B.20.a "Informally derive the formula for area of a circle."

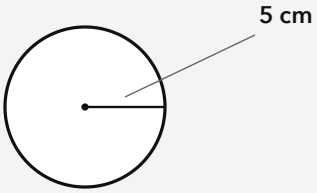
NAME _____ DATE _____

FROM CIRCLE TO RECTANGLE

Imagine cutting a circle into many thin sectors and placing them in alternating directions. The pieces nearly form a rectangle with a height equal to the circle's radius and a base equal to half its circumference, or π × radius. Multiplying the base by the height gives $A = \pi r^2$.

WORKED EXAMPLE

Use the circle shown to find its area by thinking of its sectors as a nearly rectangular shape.

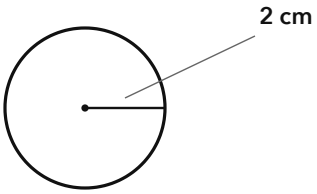


1. Half the circumference is (2 × π × 5)/2 = 5π cm.
2. The rearranged shape has a base of 5π cm and a height of 5 cm.
3. Area = 5π × 5 = 25π cm^2.

Answer: 25π cm^2

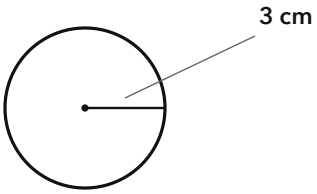
PRACTICE 6 problems

1 What is half the circumference of the circle shown? This length becomes the base when its thin sectors are rearranged.



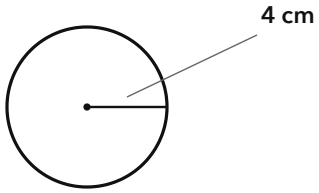
ANSWER _____

2 Imagine rearranging thin sectors of the circle shown into a nearly rectangular shape. What are its base and height?



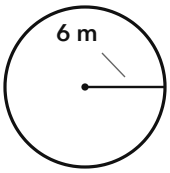
ANSWER _____

3 Use the rearranged-sector rectangle to find the area of the circle shown. Write the multiplication you use.



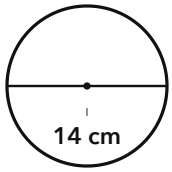
ANSWER _____

4 Find the area of the circle shown using half its circumference as a base and its radius as a height.



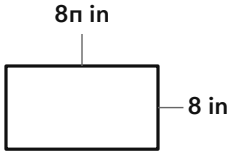
ANSWER _____

5 Imagine rearranging thin sectors of the circle shown into a nearly rectangular shape. What are its base and height?



ANSWER _____

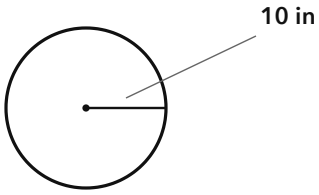
6 Thin sectors from a circle have been rearranged into a shape that is nearly the rectangle shown. What is the area of the original circle?



ANSWER _____

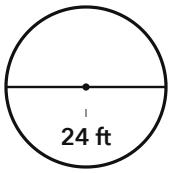
APPLY IT Show your work

1 A round pizza has the radius shown. What area does its top cover? Use the rearranged-sector idea to show how you know.



ANSWER _____

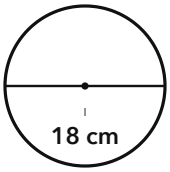
2 Students are painting a circular mural at a skate park. Use the diameter shown to find the area they will paint. Give the base and height of the rearranged sectors.



ANSWER _____

CHALLENGE One step up

If the diameter of the circle shown is doubled, how many times as large is the new area? Explain using the base and height of a rearranged-sector rectangle.



WORK SPACE AND ANSWER

ANSWER KEY

Circle Pieces

GRADE 7 · 7.GM.B.20.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	What is half the circumference of the circle shown? This length becomes the base when its thin sectors are rearranged.	**2π cm**
2	Imagine rearranging thin sectors of the circle shown into a nearly rectangular shape. What are its base and height?	**Base: 3π cm. Height: 3 cm.**
3	Use the rearranged-sector rectangle to find the area of the circle shown. Write the multiplication you use.	**4π × 4 = 16π cm^2**
4	Find the area of the circle shown using half its circumference as a base and its radius as a height.	**36π m^2**
5	Imagine rearranging thin sectors of the circle shown into a nearly rectangular shape. What are its base and height?	**Base: 7π cm. Height: 7 cm.**
6	Thin sectors from a circle have been rearranged into a shape that is nearly the rectangle shown. What is the area of the original circle?	**64π in^2**

PART 2 · APPLY IT

1. **100π in^2** The rearranged sectors have a base of 10π inches and a height of 10 inches. Their area is 10π × 10 = 100π square inches.
2. **144π ft^2; base: 12π ft; height: 12 ft** The radius is 12 feet, so the rearranged sectors have a base of 12π feet and a height of 12 feet. The area is 12π × 12 = 144π square feet.

CHALLENGE

The new area is 4 times as large. Doubling the diameter doubles the radius, so both the rectangle's base and its height double; 2 × 2 = 4.

Accept equivalent expressions with correct units. For explanations, accept a description of rearranged sectors forming a nearly rectangular shape.