LESSON MAKER PRO

Circle Sector Shuffle

Turn a circle into a near-rectangle to find its area.

GRADE 7 · 7A.GM.B.36.a

7A.GM.B.36.a "Informally derive the formula for area of a circle."

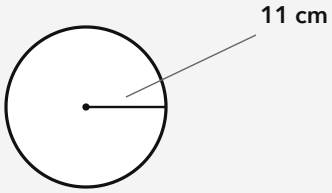
NAME _____ DATE _____

FROM SECTORS TO AREA

Imagine cutting a circle into many equal sectors and alternating them to make a shape close to a rectangle. Its height is the radius r, and its base is half the circumference, pi r, so the circle's area is $A = \text{pi } r^2$.

WORKED EXAMPLE

Use the circle shown to find the base and height of its rearranged-sector model. Then find the circle's exact area.

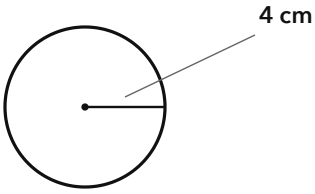


1. The base is half the circumference: pi × 11 = 11pi cm.
2. The height is the radius: 11 cm.
3. Area = base × height = 11pi × 11 = 121pi cm^2.

Answer: Base: 11pi cm; height: 11 cm; area: 121pi cm^2.

PRACTICE 6 problems

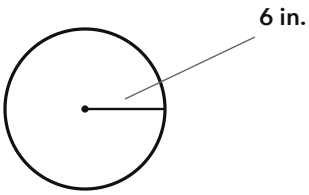
1 For the circle shown, find the base and height of its rearranged-sector model.



ANSWER _____

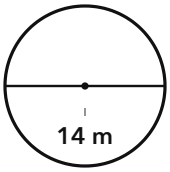
_____

2 Use the circle shown to find its exact area.



ANSWER _____

3 Find the radius and exact area of the circle shown.



ANSWER _____

_____

4 A circle has a radius of 8 ft. Find the base and height of its rearranged-sector model.

ANSWER _____

_____

5 A circle has a diameter of 10 yd. Find its exact area.

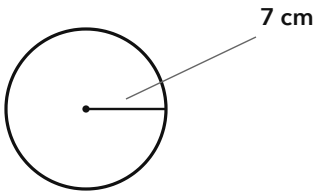
ANSWER _____

6 A rearranged-sector model has a base of 12pi mm and a height of 12 mm. Find the area of the original circle.

ANSWER _____

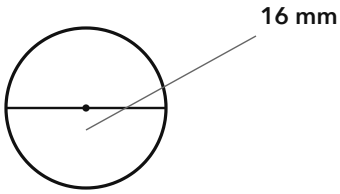
APPLY IT Show your work

1 A student paints the round logo shown on a skateboard deck. What area will be painted? Give an exact answer.



ANSWER _____

2 A gaming club makes round stickers in the size shown. What is the exact area of one sticker?



ANSWER _____

CHALLENGE One step up

A circle has a circumference of 20pi cm. Use the rearranged-sector idea to find its exact area. Explain how you found the model's base and height.

WORK SPACE AND ANSWER

ANSWER KEY

Circle Sector Shuffle

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For the circle shown, find the base and height of its rearranged-sector model.	**Base: 4pi cm; height: 4 cm.**
2	Use the circle shown to find its exact area.	**36pi in.^{2}**
3	Find the radius and exact area of the circle shown.	**Radius: 7 m; area: 49pi m^2.**
4	A circle has a radius of 8 ft. Find the base and height of its rearranged-sector model.	**Base: 8pi ft; height: 8 ft.**
5	A circle has a diameter of 10 yd. Find its exact area.	**25pi yd^2**
6	A rearranged-sector model has a base of 12pi mm and a height of 12 mm. Find the area of the original circle.	**144pi mm^2**

PART 2 · APPLY IT

1. **49pi cm^2** The radius is 7 cm. Multiply half the circumference, 7pi cm, by the radius to get 49pi cm^2.
2. **64pi mm^2** Half the diameter is 8 mm, so the radius is 8 mm. The area is pi × 8^2 = 64pi mm^2.

CHALLENGE

The base is half the circumference, or 10pi cm. Since 2pi r = 20pi, the radius and height are 10 cm, so the area is 10pi × 10 = 100pi cm^2.

Accept exact answers written with pi or π. In the challenge, the explanation should connect the base to half the circumference and the height to the radius.