LESSON MAKER PRO

Curves and Slices

Find lengths along circles and areas inside them.

HIGH SCHOOL · GDA.GM.C.20

GDA.GM.C.20 "Derive and apply the formula for the length of an arc and the formula for the area of a sector."

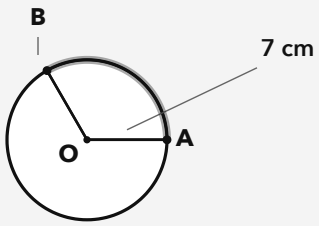
NAME _____ DATE _____

A FRACTION OF A CIRCLE

A central angle of θ degrees takes up θ/360 of a full circle. A circle has circumference $2\pi r$ and area πr^2, so multiply each formula by θ/360 to find an arc length or sector area.

WORKED EXAMPLE

Find the length of the highlighted arc and the area of the sector between the two radii.



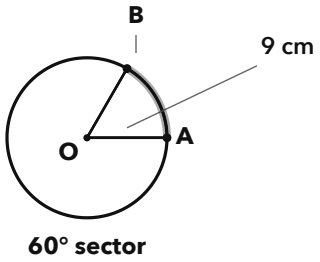
120° sector

1. The sector is 120/360 = 1/3 of the circle.
2. Arc length = (1/3)(2π)(7) = 14π/3 cm.
3. Sector area = (1/3)π(7^2) = 49π/3 cm^2.

Answer: Arc length: 14π/3 cm; sector area: 49π/3 cm^2

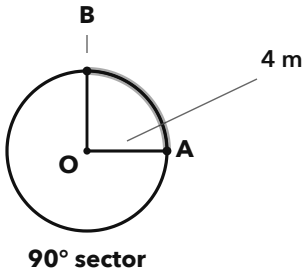
PRACTICE 6 problems

1 Find the length of the highlighted arc.



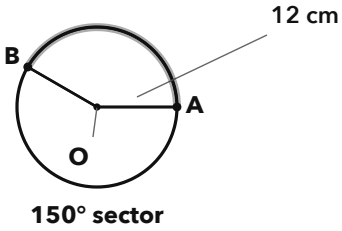
ANSWER _____

2 Find the area of the sector between the two radii.



ANSWER _____

3 Find the length of the highlighted arc and the area of its sector.



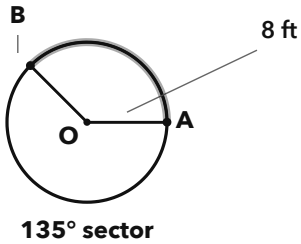
ANSWER _____

_____

4 A sector has a radius of 5 in. and a central angle of 72°. Find its arc length.

ANSWER _____

5 Find the area of the sector between the two radii.



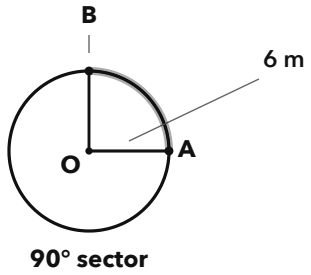
ANSWER _____

6 A sector has a radius of 10 cm and an arc length of 5π cm. Find its area.

ANSWER _____

APPLY IT Show your work

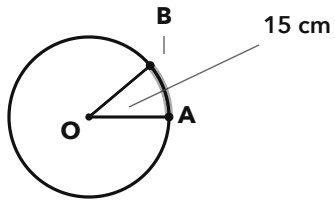
1 A skate park plans a curved rail along the highlighted arc. How many meters of rail are needed?



90° sector

ANSWER _____

2 A pizza place cuts a slice shaped like the sector between the two radii. What is the area of the slice?



40° sector

ANSWER _____

CHALLENGE One step up

A sector has a radius of 18 cm and an arc length of 9π cm. Find its central angle and area. Show how you know.

WORK SPACE AND ANSWER

Curves and Slices

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the length of the highlighted arc.	**3π cm**
2	Find the area of the sector between the two radii.	**4π m^2**
3	Find the length of the highlighted arc and the area of its sector.	**Arc length: 10π cm; sector area: 60π cm^2**
4	A sector has a radius of 5 in. and a central angle of 72°. Find its arc length.	**2π in.**
5	Find the area of the sector between the two radii.	**24π ft^2**
6	A sector has a radius of 10 cm and an arc length of 5π cm. Find its area.	**25π cm^2**

PART 2 · APPLY IT

1. **3π m** The arc is 90/360 = 1/4 of the circumference. Its length is (1/4)(2π)(6) = 3π m.
2. **25π cm^2** The slice is 40/360 = 1/9 of the pizza. Its area is (1/9)π(15^2) = 25π cm^2.

CHALLENGE

The arc is 9π/(36π) = 1/4 of the circumference, so the central angle is 90°. The sector area is (1/4)π(18^2) = 81π cm^2.

Accept equivalent exact expressions containing π. Arc lengths need linear units, and sector areas need square units.