

Geometry - Arc Length and Sector Area - Answer Key

Common Core G-C.B.5 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on arc length and sectors. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-C.B.5**

Exercise 1 - Arc length 40 degrees

$$s = \frac{40}{360} \cdot 2\pi \cdot 9 = 2\pi.$$

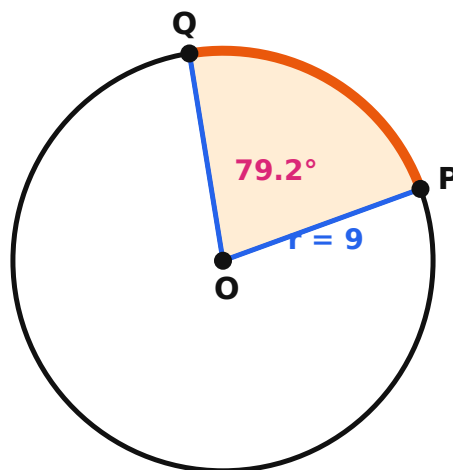
2π , about 6.28

Exercise 2 - Arc length 210 degrees

$$s = \frac{210}{360} \cdot 2\pi \cdot 9 = \frac{21\pi}{2}.$$

$21\pi/2$, about 32.99

Exercise 3 - Pie chart slice



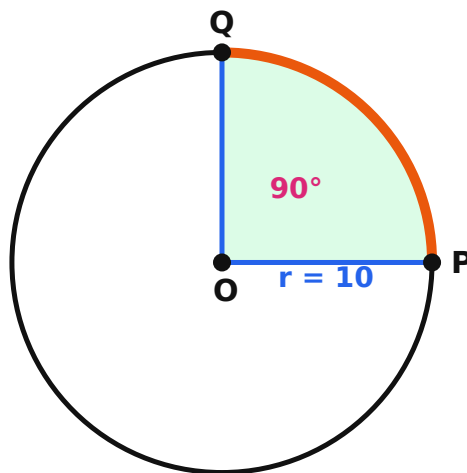
$$A = 17.82\pi.$$

Angle: $0.22 \cdot 360^\circ = 79.2^\circ$.

Area: $0.22 \cdot \pi \cdot 9^2 = 17.82\pi = 56.0$

79.2°; 17.82π, about 56.0 square centimeters

Exercise 4 - Sector area 90 degrees



Sector area = (90/360) of the circle's area = 25π .

$$A = \frac{90}{360} \cdot \pi \cdot 10^2 = 25\pi$$

25π, about 78.54

Exercise 5 - Find the central angle

circumference = $2\pi \cdot 14 = 28\pi$.

$\frac{7\pi}{28\pi} = \frac{1}{4}$ of the circle.

$\frac{1}{4} \cdot 360^\circ = 90^\circ$

90°

Exercise 6 - Find the radius

$$\frac{90}{360} \cdot \pi r^2 = 25\pi$$

$$\frac{1}{4} r^2 = 25$$

$$r^2 = 100, \text{ so } r = 10.$$

$$r = 10$$

Exercise 7 - Degrees to radians

$$60 \cdot \frac{\pi}{180} = \frac{\pi}{3}$$

$$135 \cdot \frac{\pi}{180} = \frac{3\pi}{4}$$

$\pi/3$ and $3\pi/4$

Exercise 8 - Radians to degrees (decimal)

$$2.5 \cdot \frac{180}{\pi} = 143.2$$

143.2°

Exercise 9 - Arc length in radians

$$s = 8 \cdot \frac{\pi}{4} = 2\pi, \text{ about } 6.28.$$

$$s = 10 \cdot 1.5 = 15.$$

2π (about 6.28) and 15

Exercise 10 - Sector area in radians

$$A = \frac{1}{2}r^2\theta = \frac{1}{2} \cdot 25 \cdot \frac{3\pi}{4} = \frac{75\pi}{8}$$

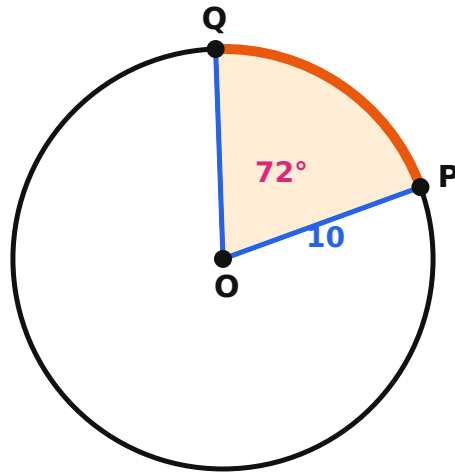
$75\pi/8$, about 29.45

Exercise 11 - Radian measure

$$\theta = \frac{s}{r} = \frac{12}{8} = 1.5$$

1.5 radians

Exercise 12 - Perimeter of a sector



$$\text{Perimeter} = 10 + 10 + \text{arc.}$$

$$\text{Arc: } \frac{72}{360} \cdot 2\pi \cdot 10 = 4\pi.$$

$$20 + 4\pi = 32.57.$$

$$\mathbf{20 + 4\pi, \text{ about } 32.57}$$

Exercise 13 - Area of a segment

$$\text{Sector: } \frac{90}{360} \cdot \pi \cdot 64 = 16\pi.$$

$$\text{Right triangle with legs 8 and 8: } \frac{1}{2} \cdot 8 \cdot 8 = 32.$$

$$16\pi - 32 = 18.27.$$

$$\mathbf{16\pi - 32, \text{ about } 18.27}$$

Exercise 14 - Full circle from a sector

$$\text{A } 60^\circ \text{ sector is } \frac{1}{6} \text{ of the circle, so the circle has area } 6 \cdot 24\pi = 144\pi.$$

$$r^2 = 144, \text{ so } r = 12.$$

$$\mathbf{144\pi; r = 12}$$

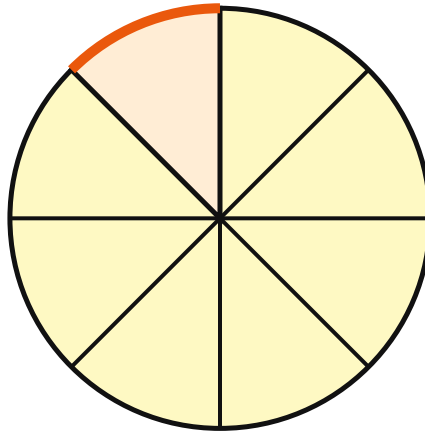
Exercise 15 - Same arc length, different circles

Arc in A: $\frac{54}{360} \cdot 2\pi \cdot 10 = 3\pi$.

$\frac{\theta}{360} \cdot 2\pi \cdot 15 = 3\pi$, so $\theta = \frac{3 \cdot 360}{30} = 36^\circ$.

36°

Exercise 16 - Pizza



A pizza cut into 8 equal slices: each slice is a sector of 45° .

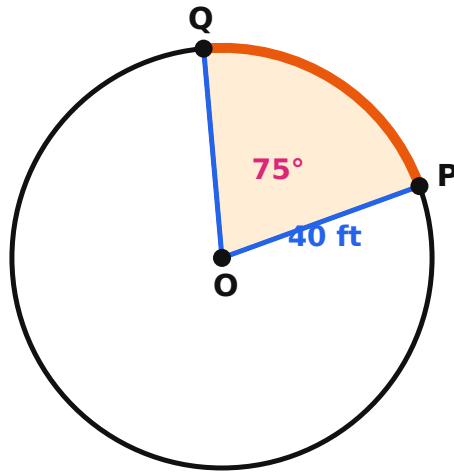
Radius 8. Each slice has central angle $360^\circ \div 8 = 45^\circ$.

Crust: $\frac{45}{360} \cdot 2\pi \cdot 8 = 2\pi = 6.28$ in.

Area: $\frac{45}{360} \cdot \pi \cdot 8^2 = 8\pi = 25.13$ sq in.

Crust 6.28 in; area 25.13 sq in

Exercise 17 - Garden sprinkler



Watered region.

$$\frac{75}{360} \cdot \pi \cdot 40^2 = \frac{1000}{3} \pi$$

About 1047 square feet

Exercise 18 - Minute hand

20 minutes is $\frac{20}{60} = \frac{1}{3}$ of a circle (120°).

$$s = \frac{1}{3} \cdot 2\pi \cdot 7 = \frac{14\pi}{3} = 14.66$$

14.66 inches

Exercise 19 - Track curve

A semicircle is half of the circumference: $\frac{1}{2} \cdot 2\pi \cdot 36.5 = 36.5\pi$.

114.7 meters

Exercise 20 - Windshield wiper

Area = large sector minus small sector.

$$\frac{100}{360} \cdot \pi (24^2 - 6^2) = \frac{100}{360} \cdot 540\pi = 150\pi$$

About 471 square inches