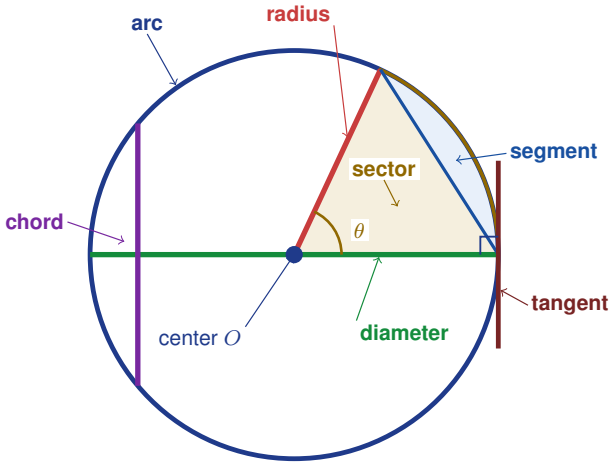
# Parts of a Circle

| Name: _____ | Date: _____ | Score: _____ / 17 |
|---|---|---|

A circle has many named parts, and each name describes a different geometric idea—think of it as learning the vocabulary of circles! The center, radius, diameter, chord, arc, sector, segment, tangent, and secant all show up in diagrams and formulas. Knowing what each word means helps you read problems accurately and understand what a picture is really showing. It also sets up for topics like arc length and sector area that are coming next!




## Key Concepts & Quick Review

- **Radius:** centre to edge. **Diameter:** across the circle ($d = 2r$).
- **Chord:** any segment joining two points on the circle.
- **Arc:** part of the circumference. **Sector:** pie-slice region (two radii + arc).
- **Segment:** region between a chord and its arc.
- **Tangent:** line touching circle at exactly one point. **Secant:** line through two points.

**Arc length:** $\ell = \frac{\theta}{360} \times 2\pi r$. **Sector area:** $A = \frac{\theta}{360} \times \pi r^2$. ($\theta$ = central angle in degrees)

## Examples

① A circle has radius $9\ cm$ and central angle $120°$. Find (a) the arc length and (b) the sector area.

**Think It Through:** Both arc length and sector area use the fraction of the full circle, $\frac{\theta}{360}$. Here $\frac{120}{360} = \frac{1}{3}$, so we want one third of the whole circumference and one third of the whole area. The full circumference is $2\pi(9) = 18\pi$, so the arc length is $\frac{1}{3} \cdot 18\pi = 6\pi$. The full circle area is $\pi(9)^2 = 81\pi$, so the sector area is $\frac{1}{3} \cdot 81\pi = 27\pi$.

**Answer:** *Arc* $\approx 18.9\ cm$; *sector* $\approx 84.8\ cm^2$

② A pizza with diameter $32\ cm$ is cut into $8$ equal slices. Find the arc length of one slice's curved edge and the area of one slice.

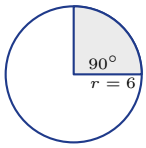
**Think It Through:** Eight equal slices means each slice is one eighth of the circle, so the central angle is $360° \div 8 = 45°$. The diameter is $32\ cm$, so the radius is $16\ cm$. For the curved edge, take one eighth of the full circumference: $\frac{1}{8} \cdot 2\pi(16) = 4\pi \approx 12.57\ cm$. For the area, take one eighth of the full circle area: $\frac{1}{8} \cdot \pi(16)^2 = 32\pi \approx 100.5\ cm^2$.

**Answer:** *Arc* $\approx 12.6\ cm$; *slice area* $\approx 100.5\ cm^2$

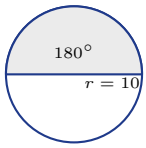
## Practice Problems

*Identify the circle part or find arc length / sector area ($\pi \approx 3.14$).*

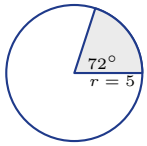
**1.** Find arc length.



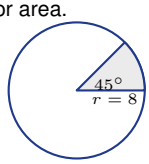

**2.** Find arc length.



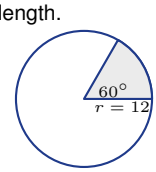

**3.** Find sector area.



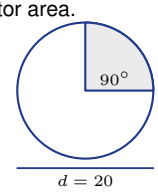

**4.** Find sector area.



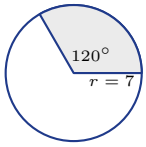

**5.** Find arc length.



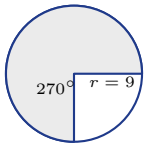

**6.** Find sector area.



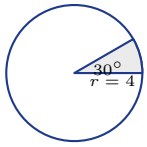

**7.** Find arc length.



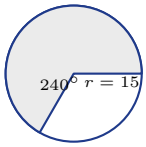

**8.** Find sector area.



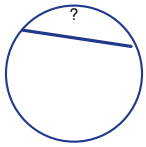

**9.** Find arc length and sector area.



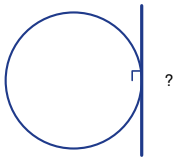

**10.** Find arc length.




**11.** Name this segment.

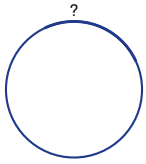



**12.** Name this line.

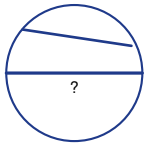



**13.** Name this region.


**14.** Name the curved part.




**15.** Is the diameter also a chord?



## Study Tips

- Arc length and sector area both use the **fraction** $\frac{\theta}{360}$ of the full circle. Use this fraction as a multiplier every time.
- A **diameter is a special chord** — the longest possible chord of a circle.
- At the point of tangency, the tangent is always **perpendicular** to the radius. This right angle is key in many geometry proofs.

## Word Problems

**16.** A sprinkler at point $O$ waters a sector-shaped lawn. The radius (sprinkler range) is $12\,m$ and it rotates through an angle of $150°$. Find the arc length of the watered edge and the area of the watered lawn. If water costs $\$0.05$ per $m^2$, what does one watering cycle cost?

_____

**17.** A clock has a minute hand $14\,cm$ long. How far does the tip of the minute hand travel in $20\,min$? What area does it sweep in $20\,min$? If a spider sits at the tip and walks at the same rate the hand moves, how far does it travel in one full hour?

_____

# Answer Keys

1) 9.42
2) 31.4
3) 15.7
4) 25.12
5) 12.56
6) 78.5
7) 14.65
8) 190.76
9) arc 2.09; sector 4.19
10) 62.8
11) chord
12) tangent
13) sector
14) arc
15) yes
16) Arc $10\pi \approx 31.4\,m$; area $60\pi \approx 188.5\,m^2$; cost about \$9.42
17) Arc about $29.3\,cm$; area about $205.3\,cm^2$; one-hour distance about $87.96\,cm$

## Step-by-Step Explanations

**Strategy:** For Similar Figures and Proportional Sides, match corresponding sides before writing a proportion; a wrong match gives a wrong scale factor even when the arithmetic is neat. Students should check that each side pair really corresponds before trusting the proportion.

**Practice 1:** $\triangle ABC \sim \triangle DEF$ with $AB \leftrightarrow DE$. If $AB = 4$ and $DE = 8$, find the scale factor from $\triangle ABC$ to $\triangle DEF$. **Answer:** 2

For the first worked item, compare corresponding sides in the stated order; the scale factor is image over original.

**Practice 15:** In similar figures, side $x+1$ corresponds to $6$ and side $4$ corresponds to $8$. Use $\frac{x+1}{4} = \frac{6}{8}$ to find $x$. **Answer:** 2

Near the end of this topic, solve the proportion first, then subtract $1$ because the side is written as $x + 1$.

**Word-problem notes:**

**16. Answer:** At 3 PM: $\frac{5}{8} = \frac{15}{x} \Rightarrow x = 24\,ft$; later: $\frac{5}{12} = \frac{15}{x} \Rightarrow x = 36\,ft$.

At the same time of day, the student and flagpole form similar triangles with the ground and their shadows. At $3{:}00$ PM, write the proportion $\frac{5}{8} = \frac{15}{x}$. Cross-multiplying gives $5x = 120$, so $x = 24$ feet. Later, the student has a $12$-foot shadow, so write $\frac{5}{12} = \frac{15}{x}$. Now $5x = 180$, so $x = 36$ feet. Longer shadows mean the sun is lower in the sky.

**17. Answer:** Plot B: $9, 12, 15\,m$; perimeters: $48\,m$ and $36\,m$; cost difference: $(48 - 36) \times 8 = \$96$.

A scale factor of $\frac{3}{4}$ means every side in Plot B is $\frac{3}{4}$ of the matching side in Plot A. So the new side lengths are $12 \cdot \frac{3}{4} = 9$, $16 \cdot \frac{3}{4} = 12$, and $20 \cdot \frac{3}{4} = 15\,m$. The perimeter of Plot A is $12+16+20 = 48\,m$, and the perimeter of Plot B is $9 + 12 + 15 = 36\,m$. At \$8 per meter, the cost difference is $(48 - 36) \times 8 = 96$ dollars.

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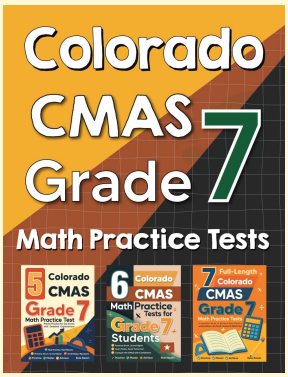


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