

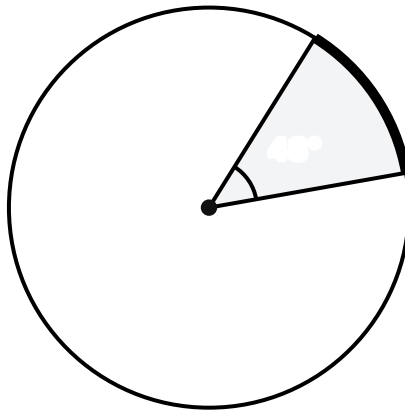
Geometry · Arc Length, Sector Area and Radians · Test Answer Key

Common Core G-C.B.5 · mathovore.fr

Use this key to score the 20-point test. Each answer shows full work, and the scoring note after it says how the points are awarded. Give partial credit for a correct setup even when the arithmetic has a slip, and take away no points for leaving the answer exact instead of rounded when the question allows it.

GeometryCommon Core: G-C.B.5

Question 1: Arc length (2 points)



Arc length 4π in.

Fraction: $\frac{48}{360} = \frac{2}{15}$. Circumference: $2\pi(15) = 30\pi$.

Arc: $\frac{2}{15} \cdot 30\pi = 4\pi \approx 12.57$ in.

Scoring: 1 point for the fraction of the circle, 1 point for the exact and rounded arc length with units.

Question 2: Sector area (2 points)



The sector is $\frac{5}{9}$ of the circle.

Fraction: $\frac{200}{360} = \frac{5}{9}$. Whole circle: $\pi(9)^2 = 81\pi$.

Sector: $\frac{5}{9} \cdot 81\pi = 45\pi \approx 141.37 \text{ cm}^2$.

Scoring: 1 point for the fraction and the area of the whole circle, 1 point for the exact and rounded sector area with square units.

Question 3: Angle and area from arc (3 points)

- a. Circumference 24π ; fraction $\frac{8\pi}{24\pi} = \frac{1}{3}$; angle $\frac{1}{3} \cdot 360^\circ = 120^\circ$.
- b. Area $\frac{1}{3} \cdot \pi(12)^2 = \frac{1}{3} \cdot 144\pi = 48\pi \approx 150.80 \text{ in}^2$.

Scoring: Part (a): 1 point. Part (b): 1 point for using the fraction $\frac{1}{3}$ of the area of the whole circle, 1 point for the correct exact and rounded area with units.

Question 4: Radian measure (2 points)

$$\theta = \frac{s}{r} = \frac{21}{7} = 3 \text{ radians.}$$

One radian is the angle whose arc is exactly as long as the radius, so this arc is 3 radii long.

Scoring: 1 point for 3 radians, 1 point for a correct explanation: the arc length equals the radius.

Question 5: Degrees to radians (2 points)

- a. $135 \cdot \frac{\pi}{180} = \frac{3\pi}{4}$
- b. $300 \cdot \frac{\pi}{180} = \frac{5\pi}{3}$
- c. $20 \cdot \frac{\pi}{180} = \frac{\pi}{9}$

Scoring: 2 points if all three are correct, 1 point if two are correct, 0 otherwise.

Question 6: Radians to degrees (2 points)

- a. $\frac{11\pi}{6} \cdot \frac{180}{\pi} = 330^\circ$
- b. $\frac{3\pi}{2} \cdot \frac{180}{\pi} = 270^\circ$
- c. $\frac{2\pi}{5} \cdot \frac{180}{\pi} = 72^\circ$

Scoring: 2 points if all three are correct, 1 point if two are correct, 0 otherwise.

Question 7: Radius from sector area (3 points)

- a. $\frac{150}{360}\pi r^2 = 60\pi$, so $\frac{5}{12}r^2 = 60$ and $r^2 = 144$, giving $r = 12$ ft.
b. $\frac{5}{12} \cdot 2\pi(12) = \frac{5}{12} \cdot 24\pi = 10\pi$ ft.

Scoring: Part (a): 1 point for setting up the equation with the fraction 5/12, 1 point for $r = 12$ ft.
Part (b): 1 point.

Question 8: Windshield wiper (2 points)

Treat the blade as a radius of 24 in. Fraction: $\frac{110}{360} = \frac{11}{36}$.

Area: $\frac{11}{36} \cdot \pi(24)^2 = \frac{11}{36} \cdot 576\pi = 176\pi \approx 552.92$, so about **553 square inches**.

Scoring: 1 point for the fraction and the area formula with radius 24, 1 point for 176π and the rounded value.

Question 9: Arc and area in radians (2 points)

Arc length: $s = r\theta = 10 \cdot \frac{2\pi}{5} = 4\pi$ in.

Area: $A = \frac{1}{2}r^2\theta = \frac{1}{2}(100) \cdot \frac{2\pi}{5} = 20\pi$ in².

Scoring: 1 point for the arc length 4π in, 1 point for the area 20π square inches.

Total
20 points