

Circles: Circumference and Area Made Clear

Grade 7 math · Test Answer Key · Standards: 7.G.B.4

The answer key shows a complete solution for each question and a scoring guide. Award partial credit for correct setup even when a later arithmetic slip changes the final number, and take off a point when units are missing or the radius and diameter are mixed up.

Standards: 7.G.B.4 · **Level:** Grade 7

Question 1 Circumference and radius (2 points)

- a. $r = 22 \div 2 = \mathbf{11 \text{ cm}}$
- b. $C = \pi d = \mathbf{22\pi \text{ cm}}$

Scoring: 1 point for each part.

Question 2 Area of a circle (2 points)

$$A = 3.14 \times 15^2 = 3.14 \times 225 = 706.5.$$

$$\mathbf{A = 706.5 \text{ in}^2}$$

Scoring: 1 point for substituting correctly, 1 point for the answer with units.

Question 3 Area from the circumference (3 points)

$$d = 50.24 \div 3.14 = 16 \text{ m. } r = 8 \text{ m. } A = 3.14 \times 8^2 = 3.14 \times 64 = 200.96.$$

$$\mathbf{d = 16 \text{ m, } r = 8 \text{ m, } A = 200.96 \text{ m}^2}$$

Scoring: 1 point for the diameter, 1 point for the radius, 1 point for the area.

Question 4 Semicircle (2 points)

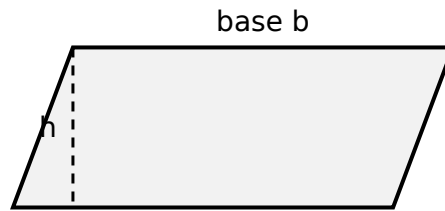
- a. $r = 10$. Half of $3.14 \times 100 = 314 \div 2 = \mathbf{157 \text{ cm}^2}$
- b. Curved edge: $3.14 \times 20 \div 2 = 31.4$. Add the 20 cm diameter: $\mathbf{51.4 \text{ cm}}$

Scoring: 1 point for each part.

Question 5 Explain the area formula (3 points)

- $b = \text{half of } 2\pi \times 6 = \mathbf{6\pi \text{ in}}$
- h equals the radius: **6 in**
- $\text{Area} = b \times h = 6\pi \times 6 = \mathbf{36\pi \text{ in}^2}$, the same as $\pi r^2 = \pi \times 6^2$.

Scoring: 1 point for each part.



The rearranged shape for a circle of radius 6 in.

Question 6 Wheel distance (2 points)

One turn: $3.14 \times 20 = 62.8 \text{ in}$. 300 turns: $62.8 \times 300 = 18,840 \text{ in}$. $18,840 \div 12 = 1,570$.

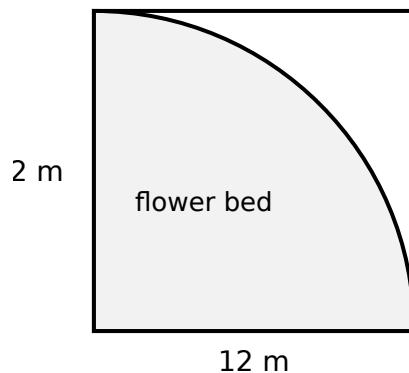
1,570 ft

Scoring: 1 point for the distance in inches, 1 point for converting to feet.

Question 7 Flower bed (3 points)

- Full circle: $3.14 \times 12^2 = 452.16$. One fourth: $452.16 \div 4 = \mathbf{113.04 \text{ m}^2}$
- Square: $12 \times 12 = 144$. $144 - 113.04 = \mathbf{30.96 \text{ m}^2}$

Scoring: part a, 1 point for the full-circle area and 1 point for dividing by 4; part b, 1 point.



Square lawn with a quarter-circle flower bed.

Question 8 Compare two circles (3 points)

- A: $2\pi \times 5 = \mathbf{10\pi \text{ ft}}$. B: $2\pi \times 10 = \mathbf{20\pi \text{ ft}}$.

b. $A: \pi \times 25 = \mathbf{25\pi \text{ ft}^2}$. $B: \pi \times 100 = \mathbf{100\pi \text{ ft}^2}$.

c. $100\pi \div 25\pi = 4$, so the area of B is **4 times** the area of A.

Scoring: 1 point for each part.