

Circles – Circumference and Area

Maths

Level 2

Exam-style practice · 10 questions · 30 marks · Calculator allowed

Remember

Circumference (distance around) = $\pi \times \text{diameter} = 2 \times \pi \times \text{radius}$. **Area** = $\pi \times \text{radius}^2$. Use the π button (or 3.14 if told to).

Radius is half the diameter. If the question gives a diameter and you need area, halve it first.

Semicircle: half the area; but its perimeter is half the circumference *plus* the diameter (the straight edge).

Wheels: distance travelled = circumference $\times$ number of turns.

Section A – The formulas

1. A circle has a radius of 6 cm. Find (a) its circumference and (b) its area, both to 1 decimal place. (4 marks)

2. A circular pond has a diameter of 3.6 m. What is its area, to 2 decimal places? (2 marks)

3. A circular table has a circumference of 4.4 m. What is its diameter, to the nearest cm? (2 marks)

4. A semicircular window has a diameter of 120 cm. Find (a) its area and (b) the length of its curved edge. (4 marks)

Section B – In context

5. A bicycle wheel has a diameter of 66 cm. How many complete turns does it make on a 2 km ride? (3 marks)

6. A circular pond of radius 2.5 m is to be fenced. Fencing costs £14.50 a metre and is sold by the whole metre. What does it cost? (3 marks)

7. A 12-inch pizza (diameter) costs £11.50. A 9-inch pizza costs £7.50. Which gives more pizza per pound? Show your working. (4 marks)

8. A round tablecloth of diameter 1.8 m is cut from a square of fabric 1.8 m by 1.8 m. What area of fabric is wasted, to 2 decimal places? (3 marks)

9. A trundle wheel has a circumference of exactly 1 m. What is its radius, to the nearest mm? (2 marks)

10. A running track has straights of 84.4 m and semicircular ends with a diameter of 73 m. Show that one lap is approximately 400 m. (3 marks)

Circles – Circumference and Area – Answers

Level 2 · Working shown so you can check your method, not just the final number.

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Section A

1. (a) $2 \times \pi \times 6 = \mathbf{37.7 \text{ cm}}$. (b) $\pi \times 36 = \mathbf{113.1 \text{ cm}^2}$.
2. $r = 1.8$. $\pi \times 1.8^2 = \mathbf{10.18 \text{ m}^2}$.
3. $4.4 \div \pi = 1.4006 \text{ m} = \mathbf{140 \text{ cm}}$.
4. $r = 60 \text{ cm}$. (a) $\frac{1}{2} \times \pi \times 60^2 = \mathbf{5,654.9 \text{ cm}^2}$ (accept 5,655). (b) $\frac{1}{2} \times \pi \times 120 = \mathbf{188.5 \text{ cm}}$.

Section B

5. Circumference = $\pi \times 66 = 207.3 \text{ cm}$. $200,000 \div 207.3 = 964.6 \rightarrow \mathbf{964 \text{ complete turns}}$.
6. $C = 2 \times \pi \times 2.5 = 15.7 \text{ m} \rightarrow \mathbf{16 \text{ m} \times 14.50 = \pounds 232}$.
7. 12-inch: area $\pi \times 36 = 113.1 \text{ in}^2$; $113.1 \div 11.50 = 9.8 \text{ in}^2$ per £. 9-inch: $\pi \times 20.25 = 63.6 \text{ in}^2$; $63.6 \div 7.50 = 8.5 \text{ in}^2$ per £. **The 12-inch pizza** is better value.
8. Square 3.24 m^2 . Circle $\pi \times 0.9^2 = 2.5447 \text{ m}^2$. Waste = $\mathbf{0.70 \text{ m}^2}$.
9. $r = 1 \div (2\pi) = 0.15915 \text{ m} = \mathbf{159 \text{ mm}}$.
10. Two straights = 168.8 m . Two semicircles = one full circle of diameter 73: $\pi \times 73 = 229.3 \text{ m}$. Total = $398.1 \text{ m} \approx \mathbf{400 \text{ m}}$ (lanes are measured slightly out from the kerb).

Where Level 2 students lose marks on this topic

- Using the diameter in the area formula. Area needs the radius, squared.
- Finding the area when the question is about fencing, edging or distance – those are circumference.
- Forgetting the straight edge when asked for the perimeter of a semicircle.