

Foundation GCSE: Area and Perimeter Problems

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (15). Working out should be shown where appropriate.

1. A rectangular garden measures 12 m by 8 m. Calculate the cost of fencing it at 5 per metre.
2. A room measures 5 m by 4 m. Carpet costs 14 per m². Calculate the total cost to carpet the room.
3. A composite shape consists of a rectangle (8 cm by 5 cm) with a triangle of base 8 cm and height 4 cm on top. Calculate the total area.
4. A painter needs to paint a wall measuring 6 m by 3 m. The wall contains a rectangular door measuring 2 m by 1 m. Calculate the area to be painted.
5. A rectangular lawn measures 15 m by 10 m. A path of uniform width 1 m surrounds the outside of the lawn. Calculate the area of the path.
6. A running track has two straight sides of 60 m and two semicircular ends of diameter 28 m. Calculate the total perimeter, using $\pi \approx \frac{22}{7}$.
7. A farmer has 40 m of fencing to enclose a rectangular vegetable patch against a straight brick wall. If the width is 8 m, calculate the maximum area of the patch.
8. A square of side 10 cm has four identical circles of radius 2 cm cut from its corners. Calculate the remaining area in terms of π .
9. A circular swimming pool of radius 5 m is surrounded by a circular paved patio of outer radius 8 m. Calculate the area of the patio in terms of π .
10. A compound shape is formed by a semicircle of diameter 10 cm mounted on top of a rectangle measuring 10 cm by 8 cm. Calculate the total area, giving your answer to 1 decimal place (use $\pi \approx 3.14$).
11. A metallic sheet is shaped as a trapezium with parallel sides 10 cm and 16 cm, and height 6 cm. A circular hole of radius 2 cm is punched out. Calculate the remaining area in terms of π .
12. A picture frame has an outer rectangle of 30 cm by 20 cm and an inner rectangular window of 24 cm by 14 cm. Calculate the area of the wooden frame.
13. A circle of radius 7 cm is inscribed inside a square. Calculate the area of the region inside the square but outside the circle, using $\pi \approx \frac{22}{7}$.
14. A floor plan consists of a rectangle measuring 8 m by 6 m joined to a semi-circular bay window of diameter 6 m. Calculate the total floor area to 1 decimal place (use $\pi \approx 3.14$).
15. A composite shape is made of a rectangle measuring 12 cm by 7 cm with a quarter-circle of radius 7 cm removed from one corner. Calculate the total area, giving your answer to 1 decimal place (use $\pi \approx 3.14$).

Answers & Worked Solutions

1. 200 : Perimeter = $2 \times (12 + 8) = 40$ m; Cost = $40 \times 5 = 200$.
2. 280 : Area = $5 \times 4 = 20$ m²; Cost = $20 \times 14 = 280$.
3. 56 cm² : Rectangle = $8 \times 5 = 40$; Triangle = $\frac{1}{2} \times 8 \times 4 = 16$; Total = $40 + 16 = 56$.
4. 16 m² : Wall area = $6 \times 3 = 18$; Door area = $2 \times 1 = 2$; Painted area = $18 - 2 = 16$.
5. 52 m² : Outer dimensions = 17 m by 12 m (area = 204); Lawn area = $15 \times 10 = 150$; Path area = $204 - 150 = 52$.
6. 208 m : Two straight sides = $60 + 60 = 120$; Two semicircles form circle circumference = $\frac{22}{7} \times 28 = 88$; Total = $120 + 88 = 208$.
7. 192 m² : Fencing length = 2 widths + length = $2(8) + l = 40 \implies l = 24$; Area = $24 \times 8 = 192$.
8. $(100 - 4\pi)$ cm² : Square area = 100; Four corner quarter-circles combine to form a full circle of radius 2 (area = 4π); Remaining = $100 - 4\pi$.
9. 39π m² : Outer circle area = $\pi \times 8^2 = 64\pi$; Pool area = $\pi \times 5^2 = 25\pi$; Patio = $64\pi - 25\pi = 39\pi$.
10. 119.3 cm² : Rectangle = $10 \times 8 = 80$; Semicircle radius = 5, area = $\frac{1}{2} \times 3.14 \times 5^2 = 39.25$; Total = $80 + 39.25 = 119.25 \approx 119.3$.
11. $(78 - 4\pi)$ cm² : Trapezium area = $\frac{1}{2}(10 + 16) \times 6 = 78$; Circle area = $\pi \times 2^2 = 4\pi$; Remaining = $78 - 4\pi$.
12. 264 cm² : Outer area = $30 \times 20 = 600$; Inner area = $24 \times 14 = 336$; Frame = $600 - 336 = 264$.
13. 42 cm² : Square side = 14 cm (area = 196); Circle area = $\frac{22}{7} \times 7^2 = 154$; Difference = $196 - 154 = 42$.
14. 62.1 m² : Rectangle = $8 \times 6 = 48$; Semicircle radius = 3, area = $\frac{1}{2} \times 3.14 \times 3^2 = 14.13$; Total = $48 + 14.13 = 62.13 \approx 62.1$.
15. 45.5 cm² : Rectangle = $12 \times 7 = 84$; Quarter-circle radius 7, area = $\frac{1}{4} \times 3.14 \times 7^2 = 38.465$; Remaining = $84 - 38.465 = 45.535 \approx 45.5$.