Foundation GCSE: Area of a Circle

Name: _____ Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. Calculate the area of a circle with a radius of 5 cm. Give your answer in terms of π.

2. Calculate the area of a circle with a diameter of 8 cm. Give your answer in terms of π.

3. Calculate the area of a circle with a radius of 7 cm, using $\pi \approx \frac{22}{7}$.

4. Calculate the area of a circle with a radius of 4 cm, giving your answer to 1 decimal place (use $\pi \approx 3.14$).

5. Find the radius of a circle with an area of 25π cm^2.

6. Find the radius of a circle with an area of 81π cm^2.

7. Calculate the area of a semicircle with a diameter of 10 cm. Give your answer in terms of π.

8. Calculate the area of a semicircle with a radius of 7 cm, using $\pi \approx \frac{22}{7}$.

9. A circular lawn has a diameter of 12 m. Calculate its area, giving your answer to 1 decimal place (use $\pi \approx 3.14$).

10. A circular pizza has a radius of 14 cm. Calculate its surface area, using $\pi \approx \frac{22}{7}$.

11. Calculate the area of a quarter-circle with a radius of 6 cm. Give your answer in terms of π.

12. A circular table top has an area of 78.5 m^2. Calculate its radius, using $\pi \approx 3.14$.

13. Calculate the area of an annulus (ring) formed by a large circle of radius 9 cm and a concentric small circle of radius 5 cm. Give your answer in terms of π.

14. A circular garden of radius 8 m is surrounded by a uniform path of width 2 m. Calculate the total area of the garden and path in terms of π.

15. A composite shape consists of a rectangle measuring 10 cm by 6 cm with a semicircle attached to each of its 6 cm ends. Calculate the total area in terms of π.

16. A sprinkler waters a circular region of area 201.1 m^2. Calculate its diameter, using $\pi \approx 3.14$.

17. A metal disc has a radius of 10 cm. Four circular holes, each of radius 2 cm, are punched out. Calculate the remaining area in terms of π.

18. A square of side 10 cm has the largest possible circle cut out from it. Calculate the area of the waste material left over, giving your answer to 1 decimal place (use $\pi \approx 3.14$).

19. A running track consists of a rectangle of length 40 m and width 20 m, with a semicircle at each end. Calculate the total area, giving your answer to 1 decimal place (use $\pi \approx 3.14$).

20. An algebraic circle has a radius of $(x + 2)$ cm. If its area is 49π cm^2, calculate the exact value of x.

Answers & Worked Solutions

1. 25π cm^2 : Area $= \pi \times 5^2 = 25\pi$.

2. 16π cm^2 : Radius $= 4$; Area $= \pi \times 4^2 = 16\pi$.

3. 154 cm^2 : Area $= \dfrac{22}{7} \times 7^2 = 154$.

4. 50.2 cm^2 : Area $= 3.14 \times 4^2 = 50.24 \approx 50.2$.

5. 5 cm : $r^2 = 25 \implies r = 5$.

6. 9 cm : $r^2 = 81 \implies r = 9$.

7. 12.5π cm^2 : Radius $= 5$; Semicircle area $= \dfrac{1}{2} \times \pi \times 5^2 = 12.5\pi$.

8. 77 cm^2 : Area $= \dfrac{1}{2} \times \dfrac{22}{7} \times 7^2 = 77$.

9. 113.0 m^2 : Radius $= 6$; Area $= 3.14 \times 6^2 = 113.04 \approx 113.0$.

10. 616 cm^2 : Area $= \dfrac{22}{7} \times 14^2 = 616$.

11. 9π cm^2 : Quarter area $= \dfrac{1}{4} \times \pi \times 6^2 = 9\pi$.

12. 5 m : $r^2 = 78.5 \div 3.14 = 25 \implies r = 5$.

13. 56π cm^2 : Large area $= 81\pi$, small area $= 25\pi$; Annulus $= 81\pi - 25\pi = 56\pi$.

14. 100π m^2 : Total radius $= 8 + 2 = 10$ m; Area $= \pi \times 10^2 = 100\pi$.

15. $(60 + 9\pi)$ cm^2 : Rectangle area $= 10 \times 6 = 60$; Two semicircles combine to form a full circle of radius 3 ($\pi \times 3^2 = 9\pi$); Total $= 60 + 9\pi$.

16. 16 m : $r^2 = 201.1 \div 3.14 \approx 64 \implies r = 8$; Diameter $= 16$.

17. 84π cm^2 : Disc area $= 100\pi$; Four holes area $= 4 \times (\pi \times 2^2) = 16\pi$; Remaining $= 100\pi - 16\pi = 84\pi$.

18. 21.5 cm^2 : Square area $= 100$; Circle area $= 3.14 \times 5^2 = 78.5$; Waste $= 100 - 78.5 = 21.5$.

19. 1114.0 m^2 : Rectangle area $= 40 \times 20 = 800$; Two semicircles form a circle of radius 10 ($3.14 \times 10^2 = 314$); Total $= 800 + 314 = 1114.0$.

20. 5 : $\pi(x + 2)^2 = 49\pi \implies (x + 2)^2 = 49 \implies x + 2 = 7 \implies x = 5$.