Maths Second Term model question paper 1

Answer key

Part 1: Short Answer Questions (2 Marks Each)

1. a) The scale factor of the smaller triangle to the larger triangle is $\frac{3}{4}$.
   b) Perimeter of the larger triangle = $\frac{4}{3} \times 24 = 32\,\text{cm}$.
2. a) Length of diagonal = $\sqrt{8^2 + 6^2} = \sqrt{100} = 10\,\text{cm}$.
   b) Circumference of the circle = $\pi \times 10 = 31.42\,\text{cm}$ (approx.).
3. a) Radius = $\frac{28}{2} = 14\,\text{m}$.
   b) Area = $\pi r^2 = \pi(14)^2 = 615.75\,\text{m}^2$ (approx.).
4. The numbers are 6 and 4.

Part 2: Medium-Length Questions (3 Marks Each)

5. a) Perimeter of the larger triangle = $\frac{5}{3} \times 24 = 40\,\text{cm}$.
   b) Triangles are similar because corresponding angles are equal, and sides are in proportion.
6. a) Ratio of diameters = $2 : 3 : 4$.
   b) Area of the largest circle = $\frac{16}{4} \times 12.56 = 50.24\,\text{cm}^2$.
7. a) Equation: $|x - y| = 9$.
   b) Points are 3 and -6.
8. a) Perimeter = $2(x + x + 5) = 4x + 10$.
   b) Area = $x(x + 5) = 10 \times 15 = 150\,\text{cm}^2$.
9. a) Central angle of one arc = $\frac{360^\circ}{4} = 90^\circ$.
   b) Length of one arc = $\frac{90}{360} \times 2\pi r$ $\frac{\pi}{2} \times 7 = 11\,\text{cm}$ (approx.).
10.

a) Length of the other leg = $\sqrt{13^2 - 12^2} = 5\,\text{cm}$.
b) Area = $\frac{1}{2} \times 12 \times 5 = 30\,\text{cm}^2$.

11.

Ratio of sides = $3:4:5$.
Lengths are $9\,\text{cm}, 12\,\text{cm}, 15\,\text{cm}$.
Area = $\frac{1}{2} \times 12 \times 9 = 54\,\text{cm}^2$.

12.

a) Length of diagonal = $\sqrt{8^2+8^2} = \sqrt{128} = 11.31\,\text{cm}$ (approx.).
b) Area = $8 \times 8 = 64\,\text{cm}^2$.

13.

a) $p(2) = 2^3 - 6(2^2) + 11(2) - 6 = 8 - 24 + 22 - 6 = 0$.
b) $x - 2$ is a factor since $p(2) = 0$.

14.

a) Area of 60° sector = $\frac{60}{360}\pi(10)^2 = \frac{\pi}{6} \times 100 = 52.36\,\text{cm}^2$ (approx.).
Area of 90° sector = $\frac{\pi}{4} \times 100 = 78.54\,\text{cm}^2$ (approx.).
b) Ratio = $\frac{52.36}{78.54} = \frac{2}{3}$.

15. Construction involves scaling each side by $\frac{3}{2}$: $9\,\text{cm}, 12\,\text{cm}, 15\,\text{cm}$.

16. The numbers are 6 and 8.

17.

a) Height = $\sqrt{8^2-4^2} = \sqrt{64-16} = \sqrt{48} = 6.93\,\text{cm}$ (approx.).
b) Area = $\frac{\sqrt{3}}{4}(8)^2 = 27.71\,\text{cm}^2$ (approx.).

18.

a) Area of larger triangle = $\frac{3^2}{2^2} \times 16 = 36\,\text{cm}^2$.
b) Perimeter = $\frac{3}{2} \times 24 = 36\,\text{cm}$.

19.

a) Perimeter = $\pi r + 2r = \frac{22}{7} \times 7 + 14 = 36\,\text{cm}$.
b) Area = $\frac{1}{2}\pi r^2 = \frac{1}{2} \times 22 \times 7 = 77\,\text{cm}^2$.

20. Solutions: $x = 11$ or $x = -3$.

21.

a) $f(2) = 2^2 - 3(2) + 2 = 0$.
b) $f(-1) = (-1)^2 - 3(-1) + 2 = 6$.
c) $f(0) = 0^2 - 3(0) + 2 = 2$.

Part 4: Extended Questions (5 Marks Each)

22.

a) Diagonal = $\sqrt{8^2 + 6^2} = 10\,\text{cm}$.
b) Area of one triangle = $\frac{1}{2} \times 8 \times 6 = 24\,\text{cm}^2$.

23.

a) Area of inner circle = $\pi(7)^2 = 153.94\,\text{cm}^2$.
Area of outer circle = $\pi(14)^2 = 615.75\,\text{cm}^2$.
b) Annular area = $615.75 - 153.94 = 461.81\,\text{cm}^2$.

24.

a) $q(1) = -3$, $q(-1) = -1$.
b) Remainder = $q(1) = -3$.

25.

a) Area of one sector = $\frac{\pi r^2}{8} = \frac{22}{7} \times 14 \times 14 \times \frac{1}{8} = 76.97\,\text{cm}^2$.
b) Area of 5 sectors = $5 \times 76.97 = 384.85\,\text{cm}^2$.

26. Construct triangle with sides $9\,\text{cm}, 12\,\text{cm}, 15\,\text{cm}$.

27.

a) Total area of shaded circles = $4 \times \pi(2)^2 = 50.24\,\text{cm}^2$.
b) Area of rectangle = $10 \times 6 = 60\,\text{cm}^2$.
c) Unshaded area = $60 - 50.24 = 9.76\,\text{cm}^2$.

28.

a) Perimeter of n-th square = $4n\,\text{cm}$.
b) Perimeter of 5-th square = $20\,\text{cm}$.

29.

a) Radius = $\frac{\text{Area of triangle}}{\text{Semi-perimeter}} = 2\,\text{cm}$.
b) Area = $\pi r^2 = 12.56\,\text{cm}^2$.