MATHEMATICS

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1 A

Question numbers 1 to 4 carry 1 mark each.

1. In Fig., PQ is a tangent at point C to a circle with centre O. If AB is a diameter and $\angle CAB = 30°$, find $\angle PCA$.

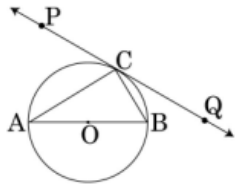

Fig. (for Q1) — Replace '1.png' with your image file.

2. For what value of k will $k+9$, $2k-1$ and $2k+7$ be consecutive terms of an A.P.?

3. A ladder, leaning against a wall, makes an angle of $60°$ with the horizontal. If the foot of the ladder is $2.5\,\text{m}$ away from the wall, find the length of the ladder.

4. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen.

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2 B

Question numbers 5 to 10 carry 2 marks each.

5. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic $p(x^2+x)+k = 0$ has equal roots, find the value of k.

6. Let P and Q be the points of trisection of the line segment joining the points $A(2,-2)$ and $B(-7,4)$ such that P is nearer to A. Find the coordinates of P and Q.

7. In Fig., a quadrilateral $ABCD$ is drawn to circumscribe a circle (centre O) so that sides AB, BC, CD, DA touch the circle at P, Q, R, S respectively. Prove $AB + CD = BC + DA$.

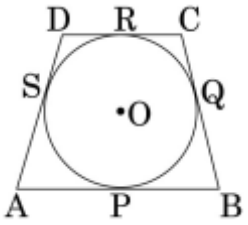

Fig. (for Q7) — Replace '2.png' with your image file.

8. Prove that the points $(3,0)$, $(6,4)$ and $(-1,3)$ are vertices of a right-angled isosceles triangle.

9. The 4th term of an A.P. is zero. Prove that the 25th term of the A.P. is three times its 11th term.

10. In Fig., from an external point P two tangents PT and PS are drawn to a circle with centre O and radius r. If $OP = 2r$, show that $\angle OTS = \angle OST = 30°$.

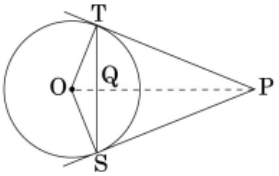

Fig. (for Q10) — Replace '3.png' with your image file.

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3 C

Question numbers 11 to 20 carry 3 marks each. (We include up to 15 here)

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11. In Fig., O is the centre of a circle such that diameter $AB = 13$ cm and $AC = 12$ cm. BC is joined. Find the area of the shaded region. (Take $\pi = 3.14$.)

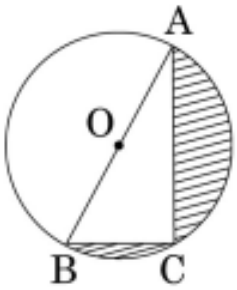

Fig. (for Q11) — Replace ‘4.png‘ with your image file.

12. In Fig., a tent is in the shape of a cylinder surmounted by a conical top of same diameter. If the height and diameter of the cylindrical part are $2.1\,\text{m}$ and $3\,\text{m}$ respectively and the slant height of the conical part is $2.8\,\text{m}$, find the cost of canvas required at Rs. 500 per sq. m. (Use $\pi = \frac{22}{7}$.)

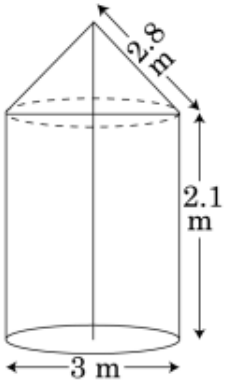

Fig. (for Q12) — Replace ‘5.png‘ with your image file.

13. If the point $P(x, y)$ is equidistant from $A(a + b, b - a)$ and $B(a - b, a + b)$, prove that $bx = ay$.

14. In Fig. 6, find the area of the shaded region enclosed between two concentric circles of radii $7\,\text{cm}$ and $14\,\text{cm}$ where $\angle AOC = 40°$. (Use $\pi = \frac{22}{7}$.)

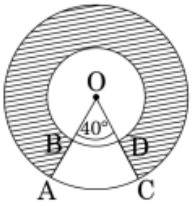

Fig. (for Q14) — Replace ‘6.png‘ with your image file.

15. If the ratio of the sum of first n terms of two APs is $(7n + 1) : (4n + 27)$, find the ratio of their m^{th} terms.

(Questions 16 onwards omitted — this file contains Questions 1–15 only.)