Class 10 - Mathematics
Maths paper 2

Maximum Marks: 80   **Time Allowed: 3 hours**

Section A

1. Answer the following   **10**
   a) If the equation x^2 - mx + 1 = 0 has two real and equal roots, then find m.
   b) Find the values of k for which the given equation has real roots:

   kx^2 - 6x - 2 = 0
   c) Solve: x^2 - $3\sqrt{5}$x + 10 = 0
   d) Find the solution of the quadratic equation $3\sqrt{3}x^2 + 10x + \sqrt{3} = 0$
   e) If -2 is a root of the equation $3x^2$ + 5x + 2k = 0, then find the value of k.
   f) Find the value of a, for which point P ($\frac{a}{3}$, 2) is the midpoint of the line segment joining the points Q (-5, 4) and R (-1, 0).
   g) Find the distance between the following pairs of points: (2, 3), (4,1)
   h) Find the distance between the points (0, a) and (0, b).
   i) To locate a point Q on line segment AB such that BQ = $\frac{5}{7} \times$ AB. What is the ratio of line segment in which AB is divided?
   j) If the distance between the points (4, k) and (1, 0) is 5, then what can be the possible values of k.

2. Answer the following   **10**
   a) Find the area of a sector of angle p (in degrees) of a circle with radius R.
   b) A circular wire of radius 42 cm is cut and bent into the form of a rectangle whose sides are in the ratio 6:5. Find the smaller side of the rectangle.
   c) If the area of a circle is numerically equal to twice its circumference, then find the diameter of the circle.
   d) A chord of a circle of radius 10 cm subtends a right angle at its centre. What is the length of the chord.
   e) If the perimeter of a semicircular protactor is 66 cm, find the radius of the protactor.
   f) In an A.P., if d = - 2, n = 5 and a_n= 0, then find the value of a.
   g) For the AP $\frac{3}{2}, \frac{1}{2}, \frac{-1}{2}, \frac{-3}{2}$,..... write the first term and the common difference.
   h) For the following APs, write the first term and the common difference: 0.6, 1.7, 2.8, 3.9 ....
   i) Show that $(a-b)^2$, $(a^2 + b^2)$ and $(a+b)^2$ are in AP.
   j) Find the Arithmetic Mean between:

   i. 13 and 19
   ii. (a - b) and (a + b)

Section B

3. Answer any 6   **12**
   a) How many terms are there in the AP 41,38,35,..., 8?
   b) An AP consists of 31 terms. If 16th term is 10, then find the sum of all the terms of this AP.
   c) Two taps running together can fill a tank in $3\frac{1}{13}$ hours. If one tap takes 3 hours more than the other to fill the tank, then how much time will each tap take to fill the tank?
   d) Find the value of x such that PQ = QR where the coordinates of P, Q and R are (6, -1), (1, 3) and (x, 8) respectively.
   e) If Q(0, 1) is equidistant from P(5, -3) and R(x, 6), find the values of x. Also find the distances QR and
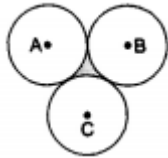
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f) In a circle with centre O and radius 5 cm, AB is a chord of length $5\sqrt{3}$ cm. Find the area of sector AOB.

g) A sector of a circle of radius 4 cm contains an angle of 30°. Find the area of the sector.
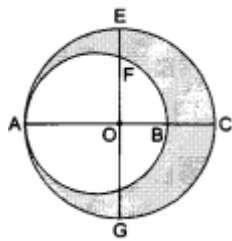
Section C

4. Answer any 8   **24**

a) Three equal circles, each of radius 6 cm, touch one another as shown in the figure. Find the area enclosed between them. [Take π = 3.14 and $\sqrt{3}$ = 1.732.]

b) In the given figure, O is the centre of the bigger circle, and AC is its diameter. Another circle with AB as diameter is drawn. If AC = 54 cm and BC = 10 cm, find the area of the shaded region.

c) A (6,1), B (8,2) and C (9,4) are three vertices of a parallelogram ABCD. If E is the mid-point of DC, find the area of $\triangle$ADE.

d) Show that A(1, 2), B(4, 3), C(6, 6) and D(3, 5) are the vertices of a parallelogram. Show that ABCD is not a rectangle.

e) The length of a rectangle exceeds its width by 8 cm and the area of the rectangle is 240 sq. cm. Find the dimensions of the rectangle.

f) Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360. Formulate the quadratic equation to find their ages.

g) Solve: $\frac{x}{x-1} + \frac{x-1}{x} = 4\frac{1}{4}, x \neq 2, 0$

h) Find the sum of all natural numbers between 100 and 500 which are divisible by 8.

i) A manufacturer of laptop produced 6000 units in 3rd year and 7000 units in the 7th year. Assuming that production increases uniformly by a fixed number every year, find

   i. the production in the 1st year,
   ii. the production in the 5th year,
   iii. the total production in 7 years.

Section D

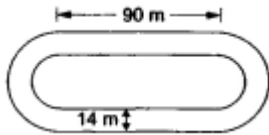5. Answer any 6   **24**

a) 200 logs are stacked in such a way that there are 20 logs in the bottom row, 19 in the next row, 18 in the next row, and so on. In how many rows 200 logs are placed and how many logs are there in the top row?

b) The sum of the first 7 terms of an AP is 182. If its 4th and 17th terms are in the ratio 1:5, find the AP.

c) Find the area of the triangle formed by joining the midpoints of the sides of the triangle whose vertices are A(2, 2), B(4, 4) and C(2, 6).

d) The area of right angled triangle is 480 cm^2. If the base of triangle is 8 cm more than twice the height (altitude) of the triangle, then find the sides of the triangle.

e) A truck covers a distance of 150 km at a certain average speed and then covers another 200 km at an average speed which is 20 km per hour more than the first speed. If the truck covers the total distance in 5 hours, then find the first speed of the truck.

f) The inside perimeter of a running track shown in the figure is 400 m. The length of each of the straight portions is 90 m, and the ends are semicircles. If the track is 14 m wide everywhere, find

the area of the track. Also, find the length of the outer boundary of the track.

g) Find upto three places of decimal the radius of the circle whose area is the sum of the areas of two triangles whose sides are 35, 53, 66 and 33, 56, 65 measured in centimetres (Use π = 22/7).