Section A

1. Without performing long division, state whether $\frac{17}{8}$ will have a terminating or non-terminating repeating decimal expansion.

2) Find the value of k for the given quadratic equation, so that it has two equal roots $kx(x-2)+6=0$.

3) In the AP find the missing terms
$\_, 38, \_, \_, \_, -22$.

4) Find a relation between x and y such that the point (x,y) is equidistant from the points $(7,1)$ and $(3,5)$.

5) How many two digit numbers are divisible by 3?

6) Do the points $(3,0), (-2,-3)$ & $(2,3)$ form a triangle? If so, name the type of triangle formed.

7) If HCF $(336, 54) = 6$, find LCM $(336, 54)$

8) Find the nature of roots of the quadratic equation $2x^2 - 4x + 3 = 0$.

9) Find the common difference of the AP
$\frac{1}{a}, \frac{3-a}{3a}, \frac{3-2a}{3a}, \ldots (a \neq 0)$

10) Evaluate $\sin^2 60 + 2\tan 45 - \cos^2 30$

11) If $\sin A = \frac{3}{4}$, calculate $\sec A$.

11) Write the coordinates of the point P on the x-axis which is equidistant from points A(-2,0) and B(6,

SECTION B

12) Write the smallest number which is divisible by both 306 and 657.

13) Find a relation between x and y if the points A(x,y), B(-4,6) and C(-2,3) are collinear.

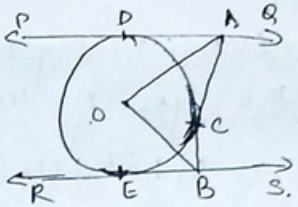
14) Find the area of a triangle whose vertices are given as (1,-1), (-4,6) and (-3,-5).

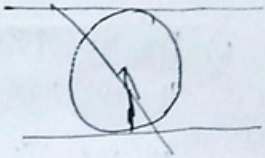
SECTION C

15) ~~Find~~ Prove that $2+5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

16) Using Euclid's algorithm, find the HCF of 2048 and 960.

17) In fig. PQ and RS are two parallel ~~lines~~ tangents to a circle with centre O and another tangent AB with point of contact C intersecting PQ at A and RS at B. Prove that $\angle AOB = 90^\circ$.





18) Find the ratio in which line $x-3y=0$ divides the line segment joining the points (-2,-5) and (6,3). Find the coordinates of the point of intersection.

19) Evaluate

$$\left(\frac{3\sin 43^\circ}{\cos 47}\right)^2 - \frac{\cos 37 \operatorname{cosec} 53}{\tan 5 \tan 25 \tan 45 \tan 65 \tan 85}$$

20) For what value of k, is the polynomial $f(x) = 3x^4 - 9x^3 + x^2 + 15x + k$ completely divisible by $3x^2 - 5$?

21) Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and coefficients.

SECTION B

22) Check whether 6^n can end with the digit 0 for any natural number n.

23) Show that $5 - \sqrt{3}$ is irrational.

24) Find the 11th term from the last term of the AP: 10, 7, 4, ... −62.

25) Two APs have the same common difference. The difference between their 100th terms is 100, what is the difference between their 1000th terms.

26) Find the ratio in which the y axis divides the line segment joining the points (5, −6) and (−1, −4). Also find the point of intersection

SECTION C

27) Use Euclid's algorithm to find the HCF of 4052 and 12576.

28) Find the roots of the quadratic equation
$3x^2 - 2\sqrt{6}x + 2 = 0$

29) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the distance. Find the speed of the train.

30) If the point A(6,1), B(8,2), C(9,4) and D(p,3) are the vertices of a parallelogram, taken in order, find the value of p.

31) Find the value of k if the points A(2,3), B(4,k) and C(6,-3) are collinear.

32) If A, B, C are interior angles of a triangle ABC, show that $\sin\left(\frac{B+C}{2}\right) = \cos\frac{A}{2}$.

33) Prove $\frac{1+\sec A}{\sec A} = \frac{\sin^2 A}{1-\cos A}$

34) Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

35) Find the area of the sector of a circle with radius 4cm and angle 30°. Also find the area of the corresponding major sector. ($\pi = 3.14$)

36) Write all the values of p for which the quadratic equation $x^2 + px + 16 = 0$ has equal roots. Find the roots of the equation so obtained.

SECTION D

37) Amit, standing on a horizontal plane, finds a bird flying at a distance of 200 m from him at an elevation of 30°. Deepak, standing on the roof of a 50m high building, finds the angle of elevation of the same bird to be 45°. Amit and Deepak are on opposite sides of the bird. Find the distance of the bird from Deepak.

38) Prove that $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta \operatorname{cosec}\theta$

39) Prove that $\frac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} = 2 + \frac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta}$.

40) Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

41) A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

42) A 1.2m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60°. After some time, the angle of elevation reduces to 30°. Find the distance travelled by the balloon during the interval

13) A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.

14) Using $\operatorname{cosec}^2 A = 1 + \cot^2 A$.

Prove that $\dfrac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$.