PRERNA EDUCATION
Sample Paper
Class – X
Subject –Mathematics

Time:3hrs *Maximum Marks: 80*

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 30 questions divided into four sections – A, B,C and D. Section A contains 10 questions of 1 marks each. Section B contains 5 questions of 2 marks each. Section C contains 10 questions of 3 marks each and Section D contains 5 questions of 6 marks each.

(iii) Use of calculators is not permitted .

SECTION – A

Q.1 If p is prime number then find HCF and LCM of p and (p + 1).

Q.2 If graph of polynomial P(x) neither touches nor intersects the x-axis, then write the number of real zeroes of P(x).

Q.3 If one root of the quadratic equation is $2 + \sqrt{3}$, then what is other root? Also write the quadratic equation.

Q.4 Let the sequence be defined by $a_1 = 1$, $a_n = 3a_{n-1} + 1$ for all $n > 1$. Find next four terms of sequence

Q.5 If $\sin(A) - \cos(A) = 0$, find the value of $\cot^{25}(A) + \tan^{25}(A)$

Q.6 The length of minute hand of clock is 14 cm. Find the area swept by minute hand in one minute.

Q.7 The probability guessing the correct answer to certain test questions is x/12. If the probability of not guessing the correct answer to this question is 3/4, find x.

Q.8 The mean of six observations x + 6, x – 6, x, x + 8, x + 12, x – 2 is 26, find the observations.

Q.9 ΔABC is an isosceles triangle right angled at B. Similar triangles ACD and ABE are constructed on sides AC and AB. Find the ratio between the areas of ΔABE and ΔACD.

Q.10 The two tangents from an external point P to a circle with centre O are PA and PB. If angle $APB = 70^o$, what is value of angle AOB?

SECTION – B

Q.11 Find the value of a and b so that $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$

Q.12 Find acute angles A and B, if $\sin(A + 2B) = \sqrt{3}/2$ and $\cos(A + 4B) = 0$, $A > B$

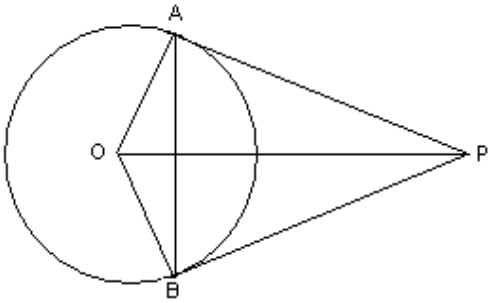
Q.13 The coordinates of the vertices of ΔABC are A(4,1), B(-3,2) and C(0,k). given area of ΔABC = 12 sq. units. Find the value of k.

Q.14 Two dice are thrown find the probability of getting (i) doublet of prime numbers (ii) Neither a total of 8 nor a doublet (iii) even on first dice and prime on second (iv) product on two dices as a perfect square of the number

OR

A card is drawn from deck of 52 cards, find the probability that card drawn is neither red nor queen, neither red nor club, neither face card nor black card, a card without number

Q.15 In Figure, OP is equal to diameter of the circle. Prove that ΔABP is a equilateral triangle.



SECTION – C

Q.16 Show that $n^2 + n + 1$is not divisible by 5 for any n, where n is a natural number.

OR

Prove that $\sqrt{5} + \sqrt{3}$ is irrational number.

Q.17 If (x-3) is factor of $2x^2 + ax + b$ and a + b = 2, find the values of a & b.

Q.18 Solve $(a-b)x+(a+b)y = a^2 - 2ab - b^2, (a+b)(x+y) = a^2 + b^2$

Q.19 In a flower bed there are 23 rose plants in first row, 21 in second row, 19 in third row, and so on. There are 5 rose plants in last row. How many rose plants are there in the flower bed?

OR

Find three numbers in A.P. such that their sum is 54 and product of two extremes is 275. Find the numbers.

Q.20 Prove $\left(\dfrac{1+\sin\theta+\cos\theta}{1+\cos\theta-\sin\theta}\right) = \dfrac{1+\sin\theta}{\cos\theta}$

OR

If $a\cos\theta - b\sin\theta = c$ prove that $b\cos\theta + a\sin\theta = \pm\sqrt{a^2+b^2-c^2}$

Q.21 The vertices of ΔABC are A(4,6), B(1,5) and C(7,2). A line is drawn to intersect sides AB and AC at D and E respectively, such that AD/AB = AE/AC = 1/4. Calculate the area of the ΔADE and compare it with the area of ΔABC.

Q.22 The coordinate of centroid of a ΔPQR is (5,2). If the vertices of the ΔPQR are P(3,2) and Q(10,3). Find the coordinates of R, also the length of median PS

Q.23 In trapezium ABCD, AB ‖ DC and DC = 2AB. EF drawn parallel to AB cuts AD in F and BC in E, such that BE/EC = ¾. Diagonal BD intersects EF at G. Prove that 7FE = 10AB.

Q.24 Construct a ΔABC with BC = 7 cm, angle B = 45°, angle A = 105° Then construct a triangle similar to given triangle such that each side of the new triangle is 4/3 of given triangle.

Q.25 Three horses are tethered at 3 corner of a triangular plot having 20m, 30m and 40m with ropes of 7m length each. Find the area where the horses can graze.

SECTION – D

Q.26 A rectangular park is to be designed whose breath is 3 m less than its length. Its area is to be 4 sq. mts more than the area of that park that has already been made in shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find its length and breadth.

Q.27 From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30^o & 45^o respectively. If the bridge is at height of 3 m from the banks, find the width of the river.

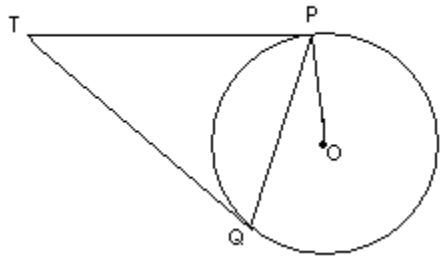
OR

The angle of elevation of an unfurnished tower at a point of distance 120 m from its base is 45^o. How much the height must be raised so that the angle of elevation be 60^o?

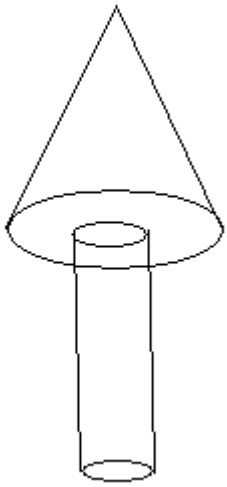
Q.28 Prove that the lengths of two tangents drawn from external point are equal .

Making use of above prove the following:

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



Q.29 A wooden toy rocket is in shape of a cone mounted on a cylinder as shown in figure. The height of entire rocket is 24 cm while the height of conical part is 6 cm. The base of conical portion has a diameter of 5 cm, while the base diameter of cylindrical portion is 3 cm. If the conical portion is to be painted orange and cylindrical portion yellow, find the area of the rocket painted with each of these colours. (Take $\pi = 3.14$)



OR

A farmer connects a pipe of internal diameter 20 cm from a canal into a cykindrical tank in her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/hr, in how much time will the tank be filled?

Q.30 Draw both less than and more than ogive on same graph and hence find median from the graph

Wages	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of workers	4	8	10	12	10	4	2