VAGDEVI VILAS SCHOOL MARATHAHALLI

BANGALORE SAHODAYA SCHOOLS COMPLEX

PRE-BOARD EXAMINATION - 2020

MATHEMATICS

Class – X

(Set 3)

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

General Instructions:

a) All questions are compulsory

b) The question paper consists of 40 questions divided into four sections A, B,C, & D.

c) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.

d) There is no overall choice. However internal choices have been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each and 3 questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

e) Use of calculators is not permitted.

Section A

1. The decimal expansion of a rational number $\frac{33}{2^2x5}$ will terminate after

   a) One decimal place b) two decimal places

   c) three decimal places d) more than three decimal places

2. The abscissa of the point of intersection of the less than type and of the more than type cumulative frequency curves of a grouped data gives its

   a) Mean b) median c) mode d) all the three

3. If the HCF of 65 and 117 is expressible in the form of 65m – 117, then the value of m is

   a) 4 b) 2 c) 1 d) 3

4. The pair of equations x + 2y + 5 = 0 and –3x –6y + 1 = 0 has

   a) Unique solution b) exactly two solutions

   c) Infinitely many solutions d) No solution

5. If $\cos A = \frac{4}{5}$, then the value of tanA is

a) $\frac{3}{5}$ b) $\frac{3}{4}$ c) $\frac{4}{3}$ d) $\frac{5}{3}$

6. In ΔPQR, right angled at Q, RQ = 3cm and PR = 6cm, then $\angle QPR =$

a) 0^0 b) 30^0 c) 45^0 d) 90^0

7. $\sin A = \frac{\sqrt{3}}{2}$ and cosb = 0, then the value of B – A is

a) 0^0 b) 90^0 c) 60^0 d) 30^0

8. If origin is the mid point of the line segment joined by the points (2, 3) and (x, y), then the value of (x, y) is

a) (2, –3) b) (2, 3) c) (–2 , 3) d) (–2 , –3)

9. If the distance between the points (4, p) and (1, 0) is 5, then the value of p is

a) 4 only b) ± 4 c) – 4 only d) 0

10. The distance of the point P(2, 3) from x axis is

a) 2 b) 3 c) 1 d) 5

(Q.11 – Q.15) Fill in the blanks.

11. Two identical solid cubes of side 'a' unit are joined end to end. Then the total surface area of the resulting cuboid is ----------

12. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is reciprocal of the other, then the value of 'a' is ----------

OR

The sum of the roots of the equation kx2 + 2x + 3k = 0 is equal to their product, then value of k is----------

13. $\Delta ABC \sim \Delta DEF$ such that $ar(ABC) = 36cm^2$, $ar(DEF) = 49cm^2$. Then the ratio of their corresponding sides is ----------

14. If the common difference of the AP is 5, the $a_{18} - a_{13}$ = ----------

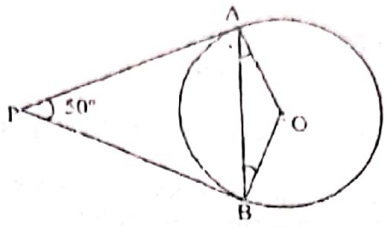
15. A card is drawn at random from a well shuffled deck of 52 cards. The probability of getting a black king is ----------

(Q.16 – Q. 20) Answer the following

16. Two poles of height 13m and 7m respectively, stand on a plane ground at a distance 8m from each other. Find the distance between their tops.

17. The HCF of two numbers is 18 and their product is 12960. Find their LCM.

18. In figure PA and PB are tangents to circle with centre O such that $\angle APB = 50^0$. Find $\angle OAB$.



OR

Quadrilateral ABCD is circumscribed to a circle. If AB = 6cm, BC = 7cm and CD = 4cm. Find the length of AD.

19. Find the common difference of the following AP:

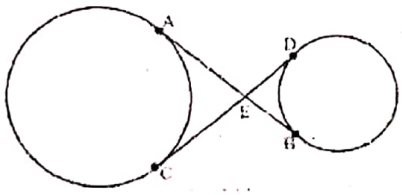
$\frac{1}{3}, \frac{1-3b}{3}, \frac{1-6b}{3}, \ldots \ldots$

20. Find the value of k for which the system of equations $kx - y = 2$, $6x - 2y = 3$ has a unique solution.

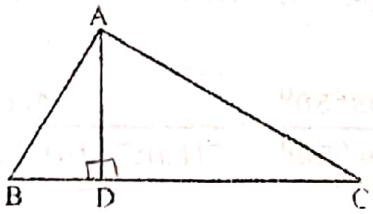
Section B

21. How many multiples of 4 lie between 10 and 250?

22. Common tangents AB and CD to two circles intersect at E. Prove that AB = CD.



23. In a ΔABC, AD is perpendicular to BC. Prove that $AB^2 + CD^2 = AC^2 + BD^2$



OR

In a trapezium ABCD, O is the point of intersection of AC and BD, AB||CD and AB = 2CD. If the area of $\Delta AOB = 84cm^2$, find the area of ΔCOD.

24. A tree breaks down due to storm and the broken part bends, so that the top of the tree touches the ground making an angle 30^0 with it. The distance from the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree before it was broken.

25. Cards numbered 11 to 60 are kept in a box, find the probability that the number on the drawn card is
i) a perfect square number
ii) a prime number less than 20

OR

In a family of three children, find the probability of having at least one boy.

26. How many spherical solid bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter.

Section C

27. Prove that $\sqrt{5}$ is irrational.

OR

Find the largest number which divides 129 and 545 leaving remainders 3 and 5 respectively.

28. If the sum of first p terms of an AP is same as the sum of its first q terms, then show that sum of its first (p+q) terms is 0.

29. Solve the following system of equations:

$$\frac{5}{x+1} - \frac{2}{y-1} = \frac{1}{2}$$

$$\frac{10}{x+1} + \frac{2}{y-1} = \frac{5}{2}$$

OR

$$\frac{ax}{b} - \frac{by}{a} = a + b$$
$$ax - by = 2ab$$

30. Show that the points A(a, b+c), B(b, c+a) and C(c, a+b) are collinear.

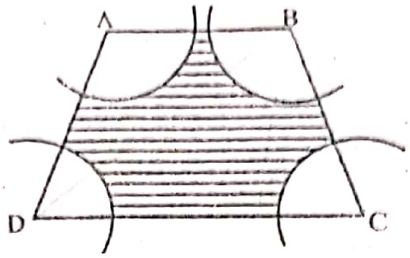
31. Evaluate $\frac{cos^2 40^0 + cos^2 50^0}{\sin^2 40^0 + \sin^2 50^0} + \frac{4cos70^0.cosec20^0}{7(tan5^0.tan25^0.tan45^0.tan65^0.tan85^0)}$

OR

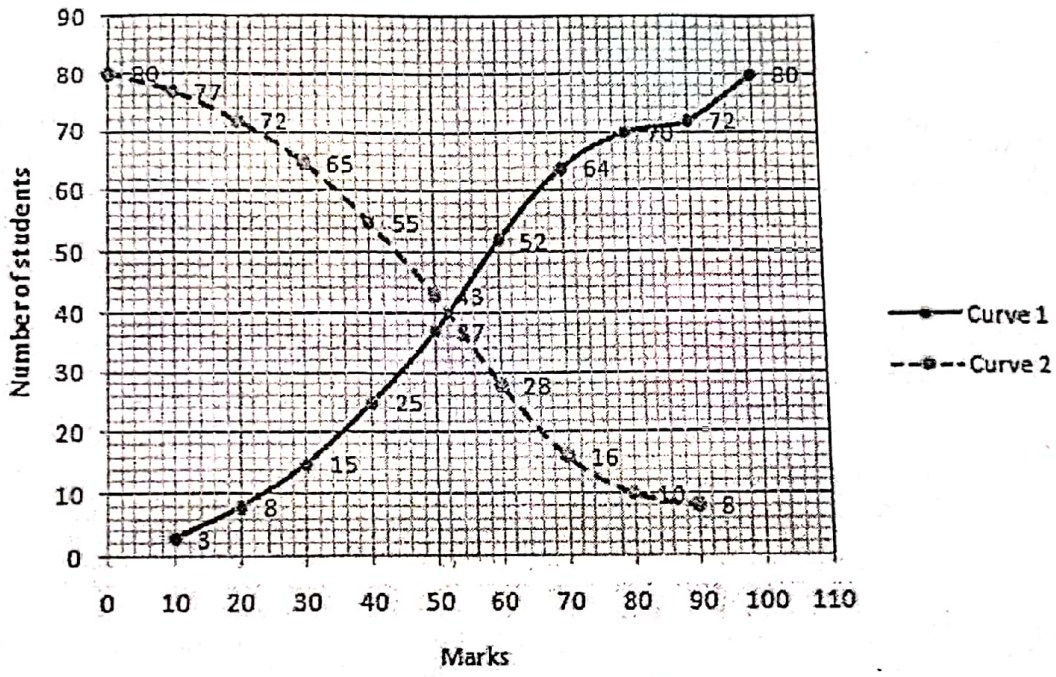
Prove that $(1+\frac{1}{tan^2 A})(1+\frac{1}{cot^2 A}) = \frac{1}{sin^2 A - sin^4 A}$

32. Find all the zeros of $x^4 - 6x^3 - 26x^2 + 138x - 35$, it being given that two of its zeros are $(2+\sqrt{3})$ and $(2-\sqrt{3})$.

33. In the figure given below, ABCD is a trapezium with AB||CD, AB = 18cm, DC = 32cm, and the distance between AB and CD is 14cm. If arcs of equal radii 7cm have been drawn with centres A, B, C and D, then find the area of the shaded region.



34. Mohan collected the marks of mathematics from two sections of class X. The total number of students in two sections is 80. After collecting the data, he analyzed the data and prepared a report on the mathematics marks of two sections. Using this report he drew the following graph.



Based on the above graph, answer the following questions:

i) Identify the less than type and more than type ogives from the given graph.

ii) Find the median marks of two sections.

iii) Obtain the mode of the data if the mean mark is 54.

Section D

35. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

36. Construct a triangle ABC in which BC = 8cm, $\angle B = 45^0$ and $\angle C = 60^0$. Construct another triangle similar to ΔABC, such that its sides are $\frac{3}{5}$ of the corresponding sides of ΔABC.

OR

Draw a circle of radius 4cm. Draw a pair of tangents to this circle, which is inclined to each other at an angle of 60^0.

37. A motor boat whose speed is 9km/hr in still water, goes 15km downstream and comes back in a total time of 3 hours 45 minutes. Find the speed of the stream.

OR

Solve the following equation:

$12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$

38. A container in the shape of a frustum of a cone having diameters of the top and bottom are 35 cm and 30 cm and the vertical height 14cm, is completely filled with oil. If each cm^3 of oil has a mass of 1.2g, then find the cost of oil in the container if it costs Rs. 40 per litre.

OR

A sphere of diameter 6cm is dropped in to a right circular cylindrical vessel, partly filled with water. The diameter of the cylindrical vessel is 12cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel?

39. The angle of elevation of an aeroplane from a point on the ground is 45^0. After flying 15 seconds, the elevation changes to 30^0. If the aeroplane is flying at a height of 2500m, find the speed of the aeroplane.

40. 100 surnames were randomly picked up from the telephone directory and the distribution of the number of letters of the English alphabet in the surnames obtained as follows.

Number of letters	1 – 4	4 – 7	7 – 10	10 – 13	13 – 16	16 – 19
Number of surnames	6	30	40	16	4	4

i) Determine the mean of the letters in the surname.
ii) Also find the modal size of the surnames.