BANGALORE NAVODAYA SCHOOLS COMPLEX

PRE-BOARD EXAMINATION - 2020

MATHEMATICS

Class – X

(Set 2)

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 HCF of two consecutive even numbers is
   a) 1 b) 2 c) 4 d) 8

2. Consider the following distribution:

Marks	Above 0	Above 10	Above 20	Above 30	Above 40	Above 50
Number of students	63	58	55	51	48	42

The frequency of the class 30 – 40 is
a) 3 b) 4 c) 48 d) 41

3. The least number that is divisible by all the numbers from1 to 10 (both inclusive) is
   a) 10 b) 100 c) 504 d) 2520

4. The pair of linear equation x = a and y = b graphically represents the lines which are
   a) parallel
   b) intersecting at (b, a)
   c) coincident
   d) intersecting at (a, b)

5. If ΔABC is right angled at C, the $\cos(A + B)$ is

a) 0 b) 1 c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$

6. If $15\cot A = 8$, then $\sin A =$

a) $\frac{3}{5}$ b) $\frac{4}{3}$ c) 1 d) $\frac{15}{17}$

7. $\sin A = \cos A$ is true when A =

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

8. The coordinates of one end point of a diameter of a circle are A(4, –1) and the coordinates of the centre of the circle are C(1,–3). Coordinate of B is

a) (2, 5) b) (–2 , –5) c) (–2, 5) d) (2, –5)

9. The distance between the point P(0, 6) and B(0, –2) is

a) 6 b) 8 c) 4 d) 2

10. Point on Y axis has coordinate

a) (–a, b) b) (a, 0) c) (0 , b) d) (–a , –b)

(Q.11 – Q.15) Fill in the blanks.

11. The total surface area of the top shown in the figure is ----------

12. If –4 is a zero of the polynomial $x^2 - x - (2k + 2)$, then the value of k is ----------

OR

If the roots of the equation $ax^2 + bx + c = 0$ are equal, then c = ----------

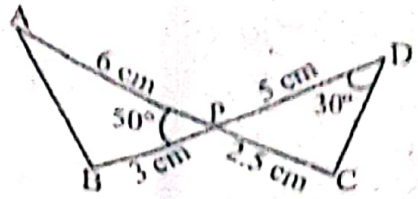
13. Corresponding sides of two similar triangles are in the ratio 4:9. Area of these trian are in the ratio ----------

14. Common difference of an AP in which $a_{18} - a_{14} = 32$ is ----------

15. A die is thrown once. The probability of getting an prime number is ----------

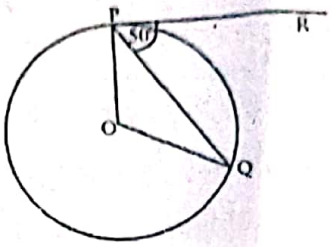
(Q. 16 – Q. 20) Answer the following.

16. In figure, two line segments AC and BD intersect each other at the point P such that PA = 6cm, PB = 3cm, PB = 3cm, PC = 2.5cm, PD = 5cm, $\angle APB = 50^0$, $\angle CDP = 30^0$. Find $\angle PBA$.



17. The HCF of two numbers is 145 and their LCM is 2175. If one of the number is 725, find the other.

18. In figure O is the centre of a circle, PQ is a chord and the tangent PR at P makes an angle 50^0 with PQ, find $\angle POQ$.



OR

Find the length of tangent drawn to a circle of radius 8cm from a point 17cm away from the centre of the circle.

19. Find the common difference of the following AP:

$\frac{1}{p}, \quad \frac{1-P}{P}, \quad \frac{1-2P}{P}$ ....

20. Find the value of k for which the following system of linear equations has no solution.

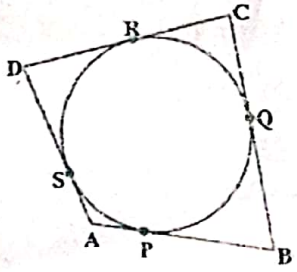
$kx + 3y = k - 2$

$12x + ky = k$

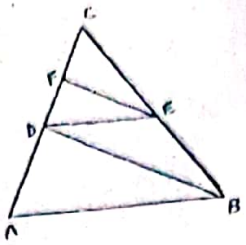
Section B

21. How many three digit numbers are divisible by 7?

22. A quadrilateral ABCD is drawn to circumscribe a circle, as shown in figure. Prove tha AB + CD = AD + BC.



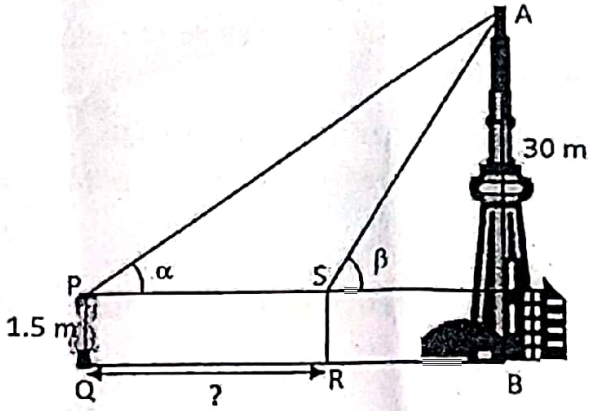
23. In the given figure AB||DE and BD||EF. Prove that $DC^2 = CF \times AC$.



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 Minar is a tower or turret found especially in India. It is the famous monument of tourist attractions including other places near it. Tourists from all over the world come here every year to see the beauty of these historical monuments. One day a 1.5m tall boy went for an excursion trip. He saw a beautiful minar and he asked about the height of the minar from the local guide. The local guide told him that the height of the minar is 30m approximately. He is standing at some distance from the minar and observes the angle of elevation from his eyes to the top of the building increases from α to β as he walks towards it such that $\sin(\alpha+\beta) = 1$ and $\cos(\beta-\alpha) = \frac{\sqrt{3}}{2}$. Find the distance he walked towards the building.



25. Cards marked with numbers 5 to 50 are placed in a box and mixed thoroughly. A card is drawn at random. Find the probability that the number on the taken out card is

i) a prime number less than 10

ii) a number which is a perfect square.

OR

Two coins are tossed simultaneously. What is the probability of getting

i) atleast one head.

ii) atmost one tail

26. Kiran went to a shop to buy water tank for his house. Two types of water tanks were available in the shop. One is in cubic form of dimension 1m x 1m x 1m and another is in the form of cylinder with diameter 1m and height 1m. Kiran wants to buy a tank with more capacity. Which type of tank he may buy?

Section C

27. Prove that $\sqrt{7}$ is irrational.

OR

Show that any positive odd integer is of the form (4m + 1) or (4m + 3), where m is some integer.

28. The ratio of 11^{th} term to 18^{th} term of an AP is 2:3. Find the ratio of the 5^{th} term to 21^{st} term. Also find the ratio of sum of the first five terms to sum of the first 21 terms.

29. Solve the following system of equations:

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

$$\frac{15}{x+y} + \frac{7}{x-y} = 10$$

OR

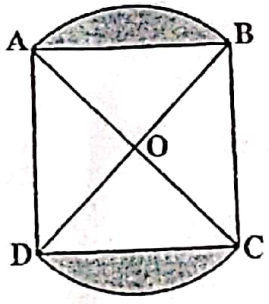
$$\frac{x}{a} + \frac{y}{b} = a + b$$

$$\frac{x}{a^2} + \frac{y}{b^2} = 2$$

30. Obtain all other zeros of $x^4 + 4x^3 - 2x^2 - 20x - 15$ if two of its zeros are $\sqrt{5}$ and $-\sqrt{5}$.

31. If R(x, y) is a point on the line segment joining points P(a,b) and Q(b, a), then prove that x + y = a + b

32. In the figure given below, two circular flower beds have been shown on two sides of a square lawn ABCD of side AB = 42m. If the centre of each flower bed is the point of intersection of O of the diagonals of the square lawn, find the sum of areas of two flower beds.

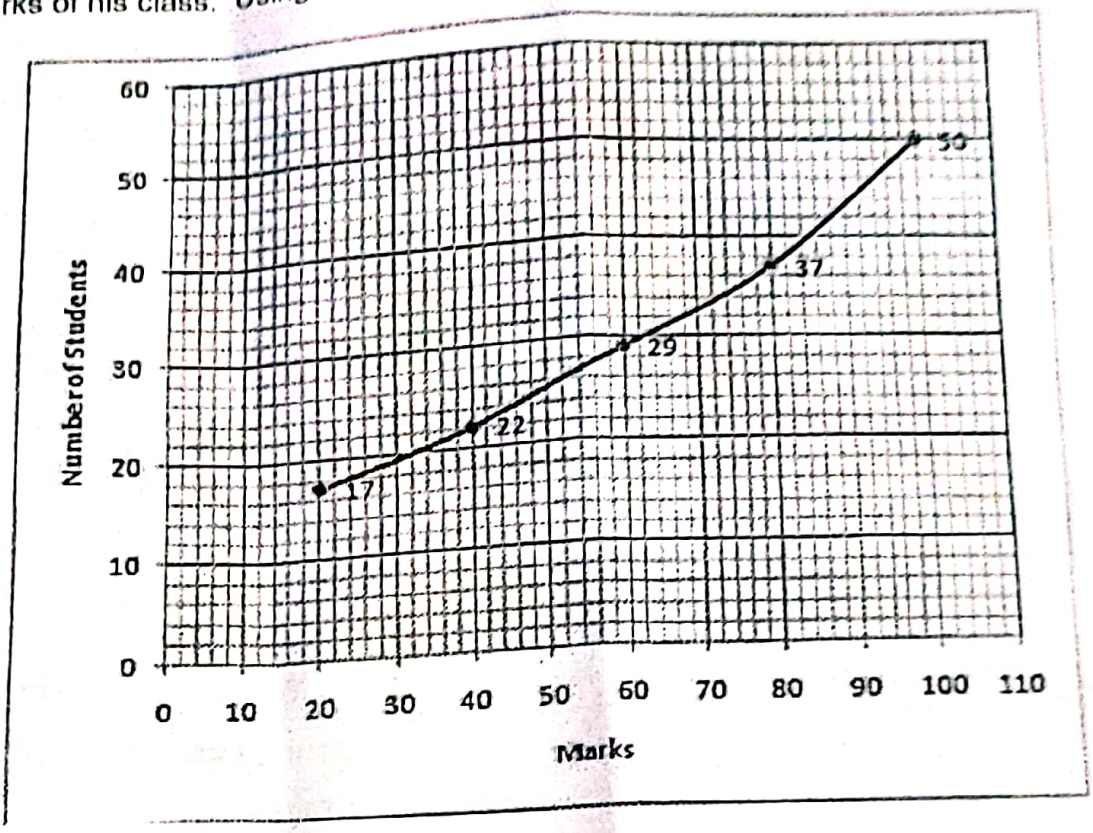


33. If $\cos A + \sin A = \sqrt{2}\cos A$, Prove that $\cos A - \sin A = \sqrt{2}\sin A$.

OR

Evaluate $\frac{2\sin 68^0}{\cos 22^0} - \frac{2\cot 15^0}{5\tan 75^0} - \frac{3\tan 45^0.\tan 20^0.\tan 40^0.\tan 50^0.\tan 70^0}{5}$

34. Aditya decided to collect the science marks of his class. The total number of students 50. After collecting the data, he analyzed the data and prepared a report on the scien marks of his class. Using this report he drew the following graph.



Based on the above graph, answer the following questions:

i) Form the frequency distribution table for the data.
ii) Find the median marks of his class from the graph.
iii) Obtain the mode of the data if mean mark is 52.

Section D

35. Draw a triangle ABC with sides BC = 7cm, $\angle B = 45^0$, $\angle A = 105^0$. Then construct triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC.

OR

Draw a circle of radius 4.2cm. Draw a pair of tangents to this circle inclined to e other at an angle of 45^0.

36. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

37. If a man walks 1km/hr faster than his usual speed then he covers a distance of 3km in 15 minutes less time. Find the usual speed.

OR

Solve the following equation:

$$\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$$

38. A bucket is in the form of a frustum of a cone with a capacity of 12308.8 cm^3 of water. The radii of the top and bottom circular ends are 20cm and 12cm respectively. Find the height of the bucket and the area of the metal sheet used in its making. (use $\pi = 3.14$)

OR

A hemispherical bowl of internal diameter 36cm contains liquid. This liquid is filled into 72 cylindrical bottles of diameter 6cm. Find the height of each bottle if 10% of liquid wasted in this transfer.

39. A 1.5m tall boy is standing at some distance from a 30m tall building. The angle of elevation from his eyes to the top of the building increases from 30^0 to 60^0 as he walks towards the building. Find the distance he walked towards the building.

40. A survey regarding the heights (in cm) of 50 girls of a class was conducted and the following data was obtained.

Height (in cm)	120 – 130	130 – 140	140 – 150	150 – 160	160 – 170
Number of girls	2	8	12	20	8

Find the median and mode of the above data.