PRE-BOARD EXAMINATION - 1(2020-'21)
MATHEMATICS

CLASS X **TIME: 3 hours**
MAX. MARKS: 80

General Instructions:

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part – A:
1. It consists of two sections- I and II
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:
1. Question No 21 to 26 are Very short answer Type questions of 2 mark each,
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks

PART-A

SECTION I

1. Find the largest number which divides 70 and 125, leaving remainders 5 and 8 respectively. (1)

OR

HCF(306,657) =9, then find the LCM (306,657)

2. If α and β are zeroes of $x^2 - 4x + 1$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$. (1)

3. Check whether the pair of equations $5x - y = 7$ and $x - y = -1$ are consistent or inconsistent. (1)

4. Find the distance of a point P(x, y) from the origin. (1)

5. Find the sum of first n even numbers. (1)

OR

Find the sum of all 11 terms of an AP whose middle most term is 30

6. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other. (1)

7. Evaluate: $10(\frac{1-cot^2 45}{1+sin^2 90})$. (1)

OR

If $\text{cosec}\theta = \frac{5}{4}$, then find the value of $\cot\theta$ (1)

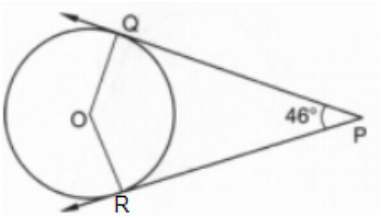
8. A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant. (1)

9. If the angle between two tangents drawn from an external point P to a circle of radius a and centre O, is 60°, then find the length of OP. (1)

OR

10. In the figure PQ and PR are the two tangents to a circle with centre O.

If $\angle QPR = 46°$, find ∠QOR (1)



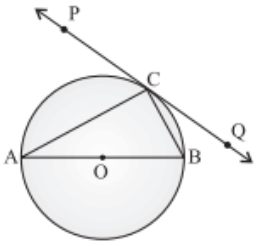
10. In ΔABC, D and E are points AC and BC respectively such that DE || AB. If AD = 2x, BE = 2x – 1, CD = x + 1 and CE = x – 1, then find the value of x. (1)

11. Find the 9th term from the end (towards the first term) of the A.P. 5, 9, 13, ..., 185.(1)

12. The ratio of the height of a tower and the length of its shadow on the ground is $\sqrt{3}$: 1. What is the angle of elevation of the sun? (1)

13. If x = 3sinθ and y = 4 cosθ then find the value of $\sqrt{16x^2 + 9y^2}$ (1)

14. . In figure PQ is a tangent at a point C to a circle with centre O. If AB is a diameter and∠CAB = 30°, find ∠PCA. (1)



15. A solid metallic sphere of diameter 16 cm is melted and recasted into smaller solid cones, each of radius 4 cm and height 8 cm. Find the number of cones so formed. (1)

OR

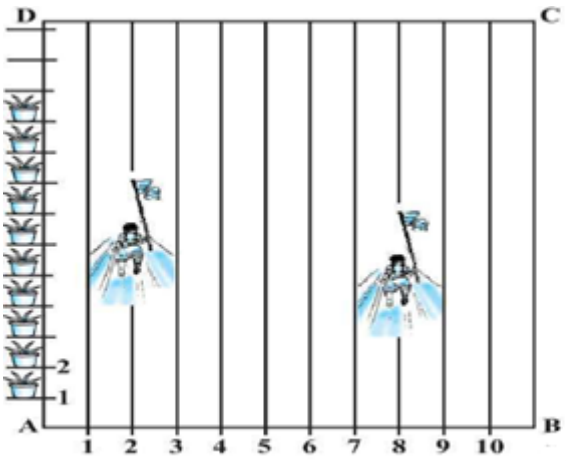
Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere?

16. A number is chosen at random from the numbers – 3, – 2, – 1, 0, 1, 2, 3. What will be the probability that square of this number is less than or equal to 1? (1)

Section II

Attempt any four sub parts of each question. Each subpart carries 1 mark

17. On a sports day,in a rectangular field ABCD lines were drawn with chalk powder at a distance of 1m each. 100 flower pots have been placed at a distance of 1m from each other along AD as shown in the figure:



Anitha and Babitha started the final race. After 5 minutes Anitha covered $1/10^{th}$ of the track on the second line along AD, while babitha covered $1/5^{th}$ of track on the 8^{th} line along AD after which Anitha fell down. Babitha then stopped and approached to help Anitha.

i. Considering A as the origin, what are the coordinates of A? (1)

a) (0,1) b) (1,0) c) (0,0) d)(-1,-1)

ii.What are the coordinates of B? (1)

a)(0,11) b)(11,0) c)(0,0) d)(1,11)

iii. What is the coordinate of the position of Anitha after 5minutes? (1)

a)(0,6) b)(2,6) c)(6,2) d)(2,0)

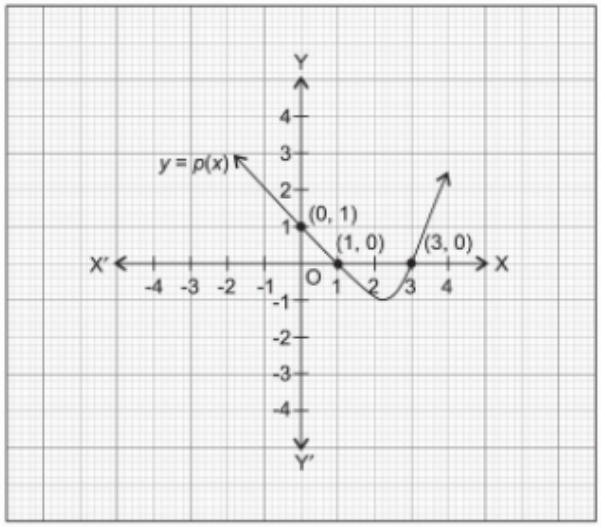
iv. What is the coordinate of the position of Babitha after 5minutes? (1)

a)(8,0) b)(5,8) c)(8,5) d)(0,5)

v. How much distance Babitha has to run to help Anitha? (1)

a) 37 units b)$\sqrt{37}$ units c) 6units d) 36units

18. In a game to entertain themselves, students of class 10th have drawn fallowing figure with chalk on the ground.They have some questions in their mind which they want to solve. Please answer and solve their questions.



i. The number of zeros of the polynomial P(x) is (1)

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

ii. The zeros of the polynomial are (1)

a. 1,3 b. -1,3 c. 1,-3 d. -1,-3

iii. The expression of the polynomial is (1)

a. $x^2 + 4x + 3$ b. $x^2 - 4x + 3$ c. $x^2 + 4x - 3$ d. $x^2 - 4x - 3$

iv. The value of the polynomial if x = 3 is (1)

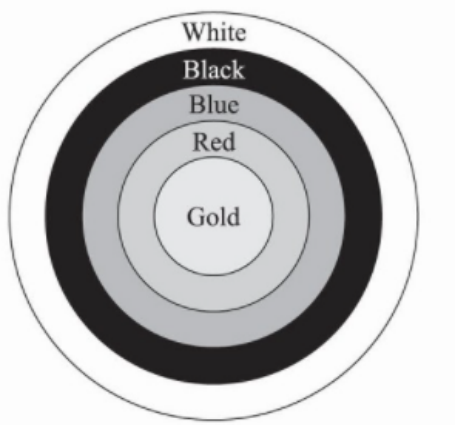
a. 24 b. 0 c. 18 d.-6

v. What is the degree of the polynomial? (1)

a. 0 b.1 c. 2 d. 3

19. Can you hit the bullseye ? Bullseye or archery is the sport of hunting or shooting at targets using a bow and arrows. Archery target is formed with concentric circles. Look at the figure shown here.

The figure depicts an archery target marked with its five scoring areas from the centre outwards as gold,Red,Blue Klack and white.The diameter of the region representing Gold score is 21cm and each of the other bands is 10.5cm wide.



i. The area of the region representing the Gold scoring area is (1)

a. 346.5cm^2 b. 370cm^2 c. 368.85cm^2 d.390cm^2

ii. Radius of the region representing Gold and Red scoring areas is (1)

a.42cm b.52.5cm c. 21cm d. 44cm

iii. The diameter of the archery target is (1)

a. 90cm b.100cm c.105cm d. 110cm

iv. The area of region representing Red scoring area is (1)

a. 572.8cm^2 b. 1039.5cm^2 c.940.8cm^2 d.1260cm^2

v. Radius of the region representing Gold, Red, Black and Blue scoring areas is (1)

a. 10.5cm b. 21cm c.42 cm d.84cm

20.

You are studying in class X.Your class teacher have organized an educational trip to see TajMahal at Agra.You and your teacher interested in history as well. Your teacher narrated the facts of TajMahal to you. Then she showed you combinations of solid figures. Therefour

minarets which are cylindrical in shape and stand at the four corners of the TajMahal.There is a hemispherical dome of radius 35 m above a height of 7 m.

(i) Write the formula to find the volume of the hemispherical portion of the dome. (1)

a. $\frac{2}{3}\pi r^3$ b.$\frac{4}{3}\pi r^3$ c.$\frac{4}{3}\pi r^2$h d. πr^2h

(ii) Find the volume of the hemispherical dome of the TajMahal considering the radius 35 metres. (1)

(a) 89833.33 m^3 b) 49258.44m^3 c 369500 m^3 d 266500 m^3

(iii) What will be the outer surface area of the dome taking radius as 35 meter? (1)

(a) 7700 m^2 b) 6600 m^2 (c) 5500 m^2 (d) 4400 m^2

(Iv) What is the volume of the base of the TajMahalupto a height of 7 m and length an breadth as 70 m each. (1)

(a) 46300 m b) 36900 m c) 34300 m d) 36300 m

(v) What will be the cost of cloth of 100 per sq.m which will be used to cover the out surface of hemispherical dome? (1)

(a) 3440000 (b) 3550000 (c) 3770000 (d) 3660000

SECTION III

Part –B

All questions are compulsory. In case of internal choices, attempt any one.

21.Express 23150 as product of its prime factors. Is it unique? (2)

22. Find the ratio in which P (4, m) divides the line segment joining the points A (2, 3) and B (6, –3). Hence find m. (2)

OR

A line intersects the y-axis and x-axis at the points P and Q respectively. If (2, – 5) is the mid-point of PQ, then find the co-ordinates of P and Q.

23. Find the roots of the quadratic equation $\sqrt{2}\,x^2 + 7x + 5\sqrt{2} = 0$ (2)

24. Draw a line segment of length 8 cm and divide it internally in the ratio 4 : 5. (2)

25. Prove that $(\frac{1-tanA}{1-cotA})^2 = tan^2A$, ∠A is acute (2)

OR

Prove that $\frac{sin^3\theta + cos^3\theta}{sin\theta + cos\theta} = 1 - sin\theta.cos\theta$

26. A circle touches all the four sides of a quadrilateral ABCD.

Prove that AB + CD = BC+ DA (2)

Part –B

All questions are compulsory. In case of internal choices, attempt anyone.

SECTION IV

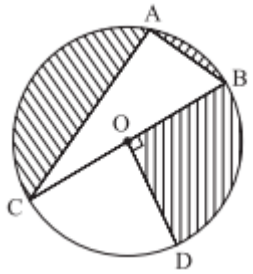
27. Given that$\sqrt{2}$ is irrational, prove that $(5 + 3\sqrt{2})$ is an irrational number. (3)

28. For what value of *p* the equation $(1 + p)x^2 + 2(1+2p)x + (1+p) = 0$ (3)

OR

If – 5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k. (3)

29. In the given figure, O is the centre of the circle with AC = 24 cm, AB = 7 cm and ∠ BOD = 90°. Find the area of the shaded region. (3)



30. In an isosceles ΔABC right angled at B, prove that $AC^2 = 2AB^2$. (3)

OR

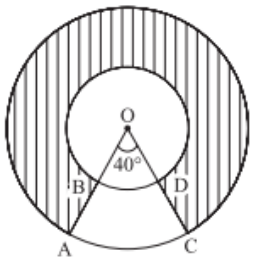
Prove that, in a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

31. For the month of February, a class teacher of Class IX has the following absentee record for 45 students. Find the mean number of days, a student was absent. (3)

Number of days of absent	0 – 4	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24
Number of students	18	3	6	2	0	1

32. If ad ≠ bc, then prove that the equation $(a^2 + b^2)x^2 + 2(ac + bd)x + (c^2 + d^2) = 0$ has no real roots. (3)

33. In figure find the area of the shaded region, enclosed between two concentric circles of radii 7 cm and 14 cm where ∠AOC = 40°. (Use π = 22/7) (3)



Part –B

All questions are compulsory. In case of internal choices, attempt anyone.

Section V

34. On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower. (5)

OR

An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45° and 60° respectively. Find the width of the river.

[Use $\sqrt{3}$ = 1·732]

35. Draw the graph of the pair of linear equations x + 3y = 6 and 2x – 3y = 2 Find the ratio of the areas of the two triangles formed by first line, x = 0, y = 0 and second line, x = 0,y = 0. (5)

36. A hemispherical bowl of internal diameter 36 cm contains liquid. This liquid is filled into 72 cylindrical bottles of diameter 6 cm. Find the height of each bottle, if 10% liquid is wasted in this transfer. (5)