NAVODAYA VIDYALAYA SAMITI

PRE BOARD II EXAMINATION

SUBJECT: MATHEMATICS (BASIC)

TIME: 3 HOURS **CLASS: X** **TOTAL MARKS: 80**

General Instructions:

1. This Question Paper has **5** Sections **A-E.**
2. Section **A** has **20 MCQs** carrying 1 mark each
3. Section **B** has **5** questions carrying **02** marks each.
4. Section **C** has **6** questions carrying **03** marks each.
5. Section **D** has **4** questions carrying **05** marks each.
6. Section **E** has **3** case based integrated units of assessment (**04** marks each) with subpartsof **1, 1** and **2** marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice hasbeen provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. The LCM of 'a' and 24 is 72 and HCF of 'a' and 24 is 12 then a =
a) 36 b) 12 c) 18 d) 30

2. The sum of the exponents of the prime factors in the prime factorization of 980 is:
a) 4 b) 5 c) 3 d) 2

3. If one zero of the polynomial $\boldsymbol{2x^2 - 3x + k}$ is reciprocal to the other, then the value of 'k' is:
a) 4 b) 3 c) 4 d) 2

4. The pair of equations $\boldsymbol{2x + 3y = 13}$ and $\boldsymbol{x + y = 5}$ has:
a) Two solutions b) no solution c) a unique solution d) infinitely many solutions

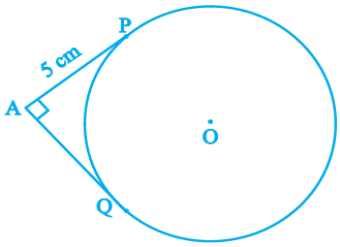
5. If the roots of the equation $\boldsymbol{12x^2 + mx + 5 = 0}$, are real and equal, then $\boldsymbol{m}$ is equal to:
a) $\boldsymbol{8\sqrt{15}}$ b) $\boldsymbol{2\sqrt{15}}$ c) $\boldsymbol{4\sqrt{15}}$ d) $\boldsymbol{10\sqrt{15}}$

6. The distance of the point $\boldsymbol{(-2, 5)}$ from y-axis is:
a) 1 b) 4 c) 2 d) 3

7. In two triangles ABC and DEF, $\boldsymbol{\angle A = \angle E \; and \; \angle B = \angle F}$. Then $\boldsymbol{\frac{AB}{AC} =}$
a) $\boldsymbol{\frac{EF}{ED}}$ b) $\boldsymbol{\frac{DE}{DF}}$ c) $\boldsymbol{\frac{ED}{EF}}$ d) $\boldsymbol{\frac{EF}{DF}}$

8. The coordinates of the mid- point of the line segment joining $\boldsymbol{(-8, 13)}$ and $\boldsymbol{(x, 7)}$ is $\boldsymbol{(4, 10)}$. Then $\boldsymbol{x =}$
a) 10 b) 16 c) 4 d) 8

9. In the given figure, the pair of tangents AP and AQ drawn from an external point A to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. Then the radius of the circle is:



a) 10 cm b) 2.5 cm c) 7.5 cm d) 5 cm

10. If $\mathbf{15}\,\boldsymbol{cotA} = \mathbf{8}$, then the value of $\boldsymbol{secA} =$

a) 15/17 b) 17/8 c) 15/8 d) 8/17

11. The ratio of the areas of a circle and an equilateral triangle, whose diameter and side are equal to each other, is:

a) $\sqrt{\mathbf{3}} : \boldsymbol{\pi}$ b) $\boldsymbol{\pi} : \sqrt{\mathbf{2}}$ c) $\boldsymbol{\pi} : \sqrt{\mathbf{3}}$ d) $\boldsymbol{\pi} : \mathbf{1}$

12. The value of acute angle $\boldsymbol{\theta}$ satisfying $\sqrt{\mathbf{3}}\,\boldsymbol{sin\theta} = \boldsymbol{cos\theta}$ is:

a) 30^o b) 60^o c) 45^o d) 90^o

13. The ratio of the radii of two spheres is 4:5. The ratio of their surface areas is:

a) 4:5 b) 8:10 c) 5:4 d) 16:25

14. The value of $\mathbf{9}\,\boldsymbol{sec^2A} - \mathbf{9}\,\boldsymbol{tan^2A} = 1$

a) 1 b) 9 c) 8 d) 0

15. If the radius of a circle is doubled, its area becomes:

a) 2 times b) 4 times c) 8 times d) 16 times

16. The mean and median of a data are 20 and 22 respectively. The value of mode is:

a) 20 b) 22 c) 21 d) 26

17. The mean of first ten odd natural numbers is:

a) 10 b) 5 c) 20 d) 19

18. If P(E) = 0.05, then P(not E) is equal to:

a) 0.05 b) 95 c) 0.95 d) 0.90

<u>Direction for questions 19 & 20:</u> In question numbers 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R).** Choose the correct option.

19. ***Statement A (Assertion):*** $\sqrt{\mathbf{3}}$ is an irrational number.
Statement R (Reason): The square roots of all positive integers are irrationals.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

20. ***Statement A (Assertion):*** The point (0, 4) lies on *y* -axis.
Statement R (Reason): The *x* co-ordinate of the point on *y* -axis is zero.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

SECTION B

(Section B consists of 5 questions of 2 marks each.)

21. Find whether the following pair of linear equations has unique solution, no solution, or infinitely many solutions:

$$x - 3y - 3 = 0,$$
$$3x - 9y - 2 = 0$$

22. A vertical pole of length 6 m casts a shadow 4 m long on the ground. At the same time a tower casts a shadow 28 m long. Find the height of the tower

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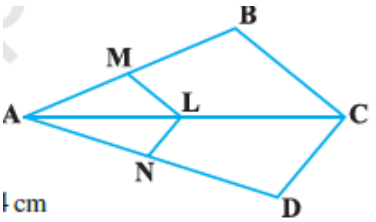
OR

In the given Fig, if LM || CB and LN || CD, prove that $\frac{AM}{AB} = \frac{AN}{AD}$



23. The length of a tangent from a point A at distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle.

24. If $3\cot A = 4$, find the value of $\frac{1-tan^2 A}{1+tan^2 A}$

25. Find the area of a quadrant of a circle whose circumference is 22 cm

OR

The length of the minute hand of a clock is 14 cm. find the area swept by the minute hand in 5 minutes.

Section C

(Section C consists of 6 questions of 3 marks each.)

26. Given that $\sqrt{3}$ is an irrational, prove that $7 - 2\sqrt{3}$ is irrational.

27. Find the zeroes of the quadratic polynomial $2x^2 - 3 + 5x$ and verify the relationship between the zeroes and the coefficients of the polynomial.

28. Two years ago, Raju was thrice as old as his daughter and six years later he will be four years older than twice her age. Find their present ages.

OR

Solve the following equations graphically: $x - y + 1 = 0$ and $3x + 2y - 12 = 0$

29. Prove that the lengths of tangents drawn from an external point to a circle are equal.

30. Prove that: $\frac{1+sin\theta}{1-sin\theta} = (sec\theta + tan\theta)^2$

OR

If $cos\theta - sin\theta = \sqrt{2}\, sin\theta$, then show that $cos\theta + sin\theta = \sqrt{2}\, cos\theta$

31. A bag contains 4 white balls, 6 red balls, 7 black balls, and 3 blue balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is:

a) Not black
b) Neither black nor white
c) Red or white.

Section D

(Section D consists of 4 questions of 5 marks each.)

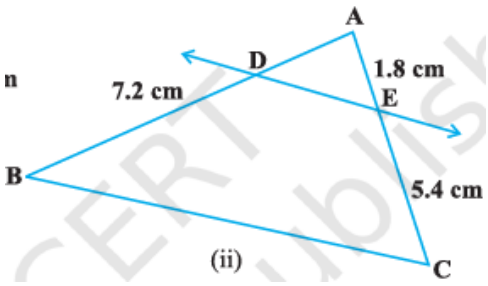
32. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.

OR

The sum of the reciprocals of Rehman's ages, (in years) 3 years ago and 5 years from now is 1/3. Find his present age.

33. 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.

Using the above theorem, find AD in the given figure where $\boldsymbol{DE \parallel BC}$, DB = 7.2 cm, AE = 1.8 cm, EC = 5.4 cm



34. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

OR

A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.

35. During a medical check-up of 35 students, their weights were recorded as follows:

Weight (in kg)	No. of students
Below 40	3
Below 42	5
Below 44	9
Below 46	14
Below 48	28
Below 50	31
Below 52	35

Compute the modal weight.

Section E

(Case study based questions are compulsory.)

36. A group of Class X students visited Rishikesh in Uttarakhand on a trip. They observed from a point (P) on a river bridge that the angles of depression of opposite banks of the river are 60° and 30° respectively. The height of the bridge is about 18 meters from the river.

Based on the above information, answer the following questions.

a) Find the distance PA.

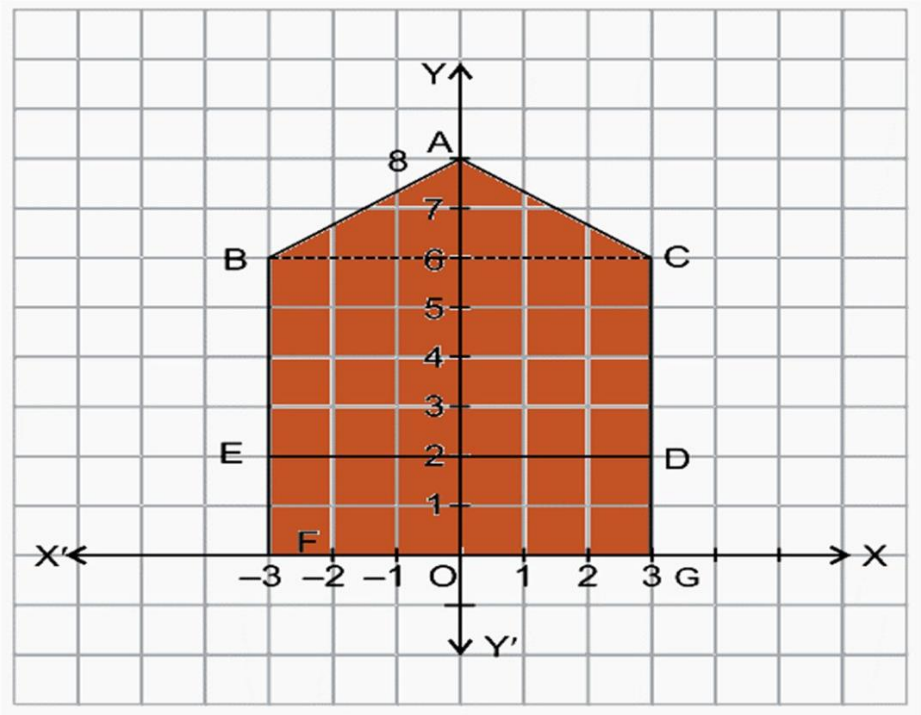
b) Find the distance PB

c) Find the width AB of the river.

OR

Find the height BQ if the angle of the elevation from P to Q be 30°.

37. Aditya asked carpenter to make front door of his guest house. The carpenter suggested him a design which is plotted on a graph as shown in figure given below:



a) What is the length of line segment AB?

b) Mid-point of ED will lie on:

i) x- axis ii) y-axis iii) origin iv) 1st quadrant

c) What are the coordinates of mid-point of BE?

OR

If we join BD, then in what ratio the line segment BD is divided by the y-axis?

38. Anand is celebrating his birthday. He invited his friends. He bought a packet of toffees/candies which contains 120 candies. He arranges the candies such that in the first row there are 3 candies, in second there are 5 candies, in third there are 7 candies and so on.

a) Name the type of sequence formed by the number of candies in each row in the above situation.

b) Find the difference in number of candies placed in 7th and 3rd row.

c) Find the total number of rows of candies.

OR

d) If Anand decides to make 15 rows, then how many total candies will be placed by him with the same arrangement?