High School Examination (Main) - 2024

Subject – Mathematics

Class – X

Time Allowed: 3 hours **Maximum Marks: 75**

Instructions:

1. All questions are compulsory.

2. Question Nos. 1 to 5 are objective type questions.

3. Internal options are given in Question Numbers 6 to 23.

4. Draw neat and clean labelled diagram wherever required.

SECTION – A

1. Choose the correct option and write it : **(1 × 6 = 6)**

(a) Quadratic polynomial $ax^2 + bx + c$, the graph of found on graph paper -

(i) straight line (ii) parallel line

(iii) parabolas (iv) curve line

(b) The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is dependent and consistent, if

(i) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (ii) $\frac{a_1}{b_1} = \frac{b_1}{a_1} = \frac{c_1}{a_1}$

(iii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (iv) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(c) No real roots of quadratic equation $ax^2 + bx + c = 0$, if

(i) $b^2 + 4ac > 0$ (ii) $b^2 - 4ac = 0$

(iii) $b^2 - 4ac > 0$ (iv) $b^2 - 4ac < 0$

(d) 11th term of the A.P. $-3, -\frac{1}{2}, 2, \ldots$ is

(i) 28 (ii) 22

(iii) – 38 (iv) $-48\frac{1}{2}$

(e) The time-period of famous Greek mathematician Thelas is -

(i) B. C. 640 – 546 (ii) 476 – 550 B. C.

(iii) 1777 – 1855 B. C. (iv) 770 – 850 B. C.

(f) Distance between point P(3, 2) and Q(–2, –3) is :

(i) 7.09 (approx) (ii) 7.07 (approx)

(iii) 7.21 (approx) (iv) 1.41 (approx)

2. Fill in the blanks : **(1 × 6 = 6)**

(i) $\sqrt{3}$ is a ____ number.

(ii) P (x) is a polynomial in x, the highest power of x in P (x) is called ____ .

(iii) Quadratic formula ____ is solving for quadratic equation $ax^2 + bx + c = 0$.

(iv) The number of terms in the A.P. : 7, 13, 19, ….., 205 ____ is.

(v) All ____ triangles are similar.

(vi) Length of an arc of a sector of a circle with radius r and angle with degree measure θ is ____ .

3. Write True and False in the following : **(1 × 6 = 6)**

(i) A line intersecting a circle in two points is called a slant secant line.

(ii) Probability of an event which is sure to occurs is 1.

(iii) Volume of any hemisphere is $\frac{1}{3}\pi r^3$, where r is a radius of circle.

(iv) The height or length of an object or the distance between two distant objects can be determined with the help of trigonometric ratios.

(v) The mean is that value among the observations which occurs most often.

(vi) The sum of the probabilities of all the elementary events of an experiment is 1.

4. Match the column 'A' with column 'B' and write the correct pair : **(1 × 6 = 6)**

	Column 'A'		**Column 'B'**
(i)	$\sin^2 25^o + \cos^2 25^o$	(a)	$\sqrt{3}$
(ii)	$\tan\theta$	(b)	$\frac{2}{3}\pi r^3$
(iii)	$\sec^2\theta - 1$	(c)	1
(iv)	$\tan 30^o$	(d)	$\frac{\theta}{360}\pi r^2$
(v)	Area of a sector	(e)	$\frac{\sin\theta}{\cos\theta}$
(vi)	Volume of hemisphere	(f)	$\tan^2\theta$
		(g)	$\frac{1}{\sqrt{3}}$
		(h)	$\frac{\theta}{360}\times 2\pi r$

5. Write the answer in one word / sentence of each : **(1 × 6 = 6)**

(a) Write the formula of finding n^{th} term of an A.P.

(b) Write the statement of "Basic Proportionality Theorem".

(c) Define "Secant line" of a circle.

(d) Write the formula of product of zeros from quadratic polynomial $ax^2 + bx + c$.

(e) Define the point of contact in the circle.

(f) Write the formula of area of segment of a circle.

6. Find the H.C.F. of the numbers 6 and 20. **(2)**

OR

Express the number 140 as a product of its prime factors.

7. Find the zeros of the quadratic polynomial $3x^2 - x - 4$. **(2)**

OR

Find a quadratic polynomial, the sum of zeros is 4 and the product of zeros is 1.

8. Find the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$ for the following pair of linear equations and say that it is consistent or inconsistent. **(2)**

$5x - 4y + 8 = 0$

$7x + 6y - 9 = 0$

OR

Find the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$ for the following pair of linear equations and say that it is consistent or inconsistent.

$x + y = 14$

$x - y = 4$

9. Write next two terms of given A.P. **(2)**

4, 10, 16, 22, …..

OR

Find the sum of the following :

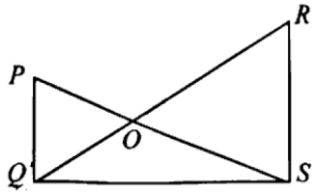
$34 + 32 + 30 + \ldots\ldots + 10$

10. E and F are points on the sides PQ and PR respectively of ΔPQR. State whether EF || QR - when **(2)**

PE = 4 cm, QE = 4.5 cm, PF = 8 cm, RF = 9 cm

OR

In figure, if PQ || RS, prove that $\Delta POQ \sim \Delta SOR$



11. Find the distance between the points (–5, 7) and (–1, 3). **(2)**

OR

Determine if the points (1, 5), (2, 3) and (–2, –11) are collinear.

12. Find the values of y for which the distance between the points P(2, 3) and Q(10, y) is 10 units. **(2)**

OR

Find the coordinates of a point A where AB is the diameter of a circle whose center is (2, –3) and coordinates of B are (1, 4).

13. If in right-angle triangle ABC, $\angle B = 90^o$ and AB = 4 cm, BC = 3 cm, then find the value of sinA and cos A. **(2)**

OR

Find the value of :

Sin 60° cos30^o + sin30^o cos60^o

14. Prove that the tangents drawn at the ends of a diameter of a circle are parallel. **(2)**

OR

From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle.

15. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. **(2)**

OR

In a circle of radius 21 cm, an arc subtends an angle of 60° at the center. Find the length of the arc.

16. We throw a die once. Find that **(2)**

(i) What is the probability of getting a number greater than 4?

(ii) What is the probability of getting a number less than 4?

OR

One card is drawn from a well shuffled deck of 52 cards, calculate the probability that the card will –

(i) be an ace

(ii) not be an ace

17. What is an impossible event? What is the probability of an impossible event? **(2)**

OR

If P (E) = 0.95, then what is the probability of "not E"?

18. Find the L.C.M. and H.C.F. of 8.9 and 25 by applying the prime factorization method. **(3)**

OR

Prove that $7\sqrt{5}$ is irrational number.

19. Check whether that $x^2 - 2x = (-2)(3 - x)$ is a quadratic equation. **(3)**

OR

Find the roots of the quadratic equation $6x^2 - x - 2 = 0$.

20. The angle of elevation of the top of a tower from a point on the ground, which is 25 m away from the foot of the tower is 60°. Find the height of the tower. **(3)**

OR

From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

21. Solve the pair of linear equations - **(4)**

$3x + 4y = 10$ and $2x – 2y = 2$

OR

The sum of the digits of a two digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

22. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find the surface area. **(4)**

OR

A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4 cm. Find the volume of wood in the entire stand.

23. The table below shows the daily expenditure on food of 25 households in a locality. Find the mean daily expenditure on food by a suitable method. **(4)**

Daily expenditure (in Rs.)	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350
Number of households	4	5	12	2	2

OR

The following data gives the information on the observed lifetimes (in hours) of 255 electrical components. Determine the mode lifetimes of components.

Lifetimes (in hours)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Frequency	10	35	52	61	38	29

***** End *****