

GYAN BHARATI SCHOOL
SUMMATIVE ASSESSMENT - I, 2016-17
MATHEMATICS
Class - X

Time Allowed: 3 hours

Maximum Marks: 90

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 31 questions divided into four sections A, B, C and D. Section-A comprises of 4 questions of 1 mark each; Section-B comprises of 6 questions of 2 marks each; Section-C comprises of 10 questions of 3 marks each and Section-D comprises of 11 questions of 4 marks each.
3. There is no overall choice in this question paper.
4. Use of calculator is not permitted.

SECTION-A

Question numbers 1 to 4 carry one mark each

- 1 ✓ In $\triangle ABC$, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}$, $AY = 5\text{cm}$ and $YC = 9\text{cm}$, then state whether XY and BC parallel or not. 1
- 2 ✓ Find the value of $\sec^2 42^\circ - \operatorname{cosec}^2 48^\circ$. 1
- 3 ✓ Write the expression in simplest form : $\sec^2 \theta - \frac{1}{\operatorname{cosec}^2 \theta - 1}$. 1
- 4 ✓ Find the mode of the data, using an empirical formula, when it is given that median = 41.25 and mean = 33.75. 1

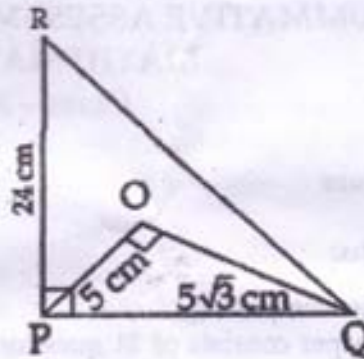
SECTION-B

Question numbers 5 to 10 carry two marks each.

- 5 ✓ Check whether 4^n can end with the digit 0 for any natural number n. 2
- 6 ✓ How many irrational numbers lie between $\sqrt{2}$ and $\sqrt{3}$? Write any two of them. 2
- 7 ✓ Find whether the following pair of linear equations is consistent or inconsistent : 2

$$x + 2y = 4 \quad ; \quad 3x + 6y = 12$$

- 8 ✓ In the given figure, $OP = 5$ cm, $OQ = 5\sqrt{3}$ cm, $\angle POQ = 90^\circ$, $\angle RPQ = 90^\circ$ and $PR = 24$ cm. Find RQ .



- 9 ✓ In ΔABC , D is a point on side BC such that $\angle ADC = \angle BAC$. Prove that $CA^2 = CB \cdot CD$. 2

- 10 ✓ In a class test, 50 students obtained marks as follows: 2

Marks obtained	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of students	4	6	25	10	5

Find the modal class and the median class.

SECTION-C

Question numbers 11 to 20 carry three marks each.

- 11 ✓ Find LCM of 36, 54 and 63 by prime factorization method. Why LCM of numbers is always greater than or equal to each of the numbers? 3

- 12 ✓ What should be added in the polynomial $x^3 - 3x^2 + 6x - 15$ so that it is completely divisible by $x - 3$. 3

- 13 ✓ If α and β are the zeroes of the polynomial $x^2 - 5x + 6$, then find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$. 3

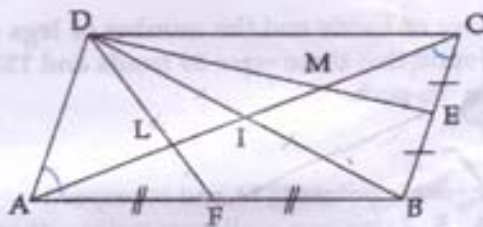
- 14 ✓ Solve the following pair of linear equations by the substitution method: 3

$$\sqrt{3}x + \sqrt{5}y = 0$$

$$\sqrt{5}x - \sqrt{8}y = 0$$

- 15 ✓ In a rhombus, prove that four times the square of any side is equal to sum of the squares of its diagonals. 3

- 16 In given figure, ABCD is a parallelogram E and F are the mid points of BC and AB respectively. 3



Prove that DB bisects LM.

- 17 Find the value of x if: 3

$$4 \left(\frac{\sec^2 59^\circ - \cot^2 31^\circ}{3} \right) - \frac{2 \sin 90^\circ}{3} + 3 \tan^2 56^\circ \times \tan^2 34^\circ = \frac{x}{3}$$

- 18 Prove the following identity 3

$$\frac{\sin^4 \theta - \cos^4 \theta}{(\sin^3 \theta - \cos^2 \theta \cdot \sin \theta) \cdot \operatorname{cosec} \theta} = 1$$

- 19 Find the mean of the following distribution: 3

Class Interval	50 - 75	75 - 100	100 - 125	125 - 150	150 - 175
Frequency	5	6	3	4	3
Class Interval	175 - 200	200 - 225	225 - 250	250 - 275	275 - 300
Frequency	7	5	4	8	5

- 20 Monthly consumption of electricity of some consumers is given below as a distribution. Find the missing frequency (x), if mode of distribution is given to be 200 units. 3

Monthly consumption (in units)	90-120	120-150	150-180	180-210	210-240
Number of consumers	20	15	x	75	50

SECTION-D

Question numbers 21 to 31 carry four marks each.

- 21 Is square root of every non-square number always irrational? Find the smallest natural number which divides 2205 to make its square root a rational number. 4

- 22 Find all other zeroes of the polynomial $2x^4 - x^3 - 19x^2 + 9x + 9$, if two of its zeroes are 1 and -3. 4

23 Aditya is walking along the line joining (1, 4) and (0, 6), Aditi is walking along the line joining (3, 4) and (1, 0). Represent on graph and find the point where both of them cross each other. 4

24 At a certain time in a tiger park, the number of heads and the number of legs of tiger and human visitors were counted and it was found that there were 39 heads and 132 legs. Find the number of tigers and human visitors in the park. 4
Why it is important to take care of tigers?

25 On three line segments OA, OB and OC there are points L, M and N respectively such that LM \parallel AB and MN \parallel BC. If L, M, N and A, B, C are non-collinear points, then prove that LN \parallel AC. 4

26 In a ΔABC , the middle points of sides BC, CA and AB are D, E and F respectively. Find ratio of ar (ΔDEF) to ar (ΔABC). 4

27 If $\theta = 30^\circ$, verify the following: 4

(i) $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$

(ii) $\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$

28 If $\cot \theta = 3x - \frac{1}{12x}$, then show that $\cot \theta + \operatorname{cosec} \theta = 6x$ or $-\frac{1}{6x}$. 4

29 Prove that: 4

$$\left(\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} \right) \cdot \left(\frac{\cos A}{1 - \sin A} - \frac{1 - \sin A}{\cos A} \right) = 4 \tan A \cdot \sec A$$

30 For the following frequency distribution, draw a 'less than type' ogive and a 'more than type' ogive: 4

Class	0-20	20-40	40-60	60-80	80-100
Frequency	5	12	20	11	2

Also, find median from the curves.

31 The following distribution shows the daily pocket money of 40 students of a class. If the mean pocket money is ₹ 21.70, find the missing frequencies x and y. 4

Daily pocket money (in ₹)	10-14	14-18	18-22	22-26	26-30	30-34	34-38
Number of students	8	7	4	x	6	y	3

Handwritten calculations: $\frac{122}{26} = \frac{24}{5}$

Handwritten calculations: $\frac{21 \cdot 0}{21 \cdot 3} = 0.2 \cdot 3$

Handwritten notes: $\frac{11 \cdot 0}{11 \cdot 2} = 0.5 \cdot 2$