Abraham T K
X E
Roll No. 15

L70B3EE

SUMMATIVE ASSESSMENT – I, 2015-16
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 an isosceles right triangle, if the hypotenuse is $5\sqrt{2}$ cm, then find the length of the sides of the triangle. 1

2 In a triangle ABC, write $\cos\frac{B+C}{2}$ in terms of angle A. 1

3 If $\sqrt{3}\sin\theta = \cos\theta$, find the value of $\frac{\sin\theta \cdot \tan\theta \cdot (1+\cot\theta)}{\sin\theta + \cos\theta}$. 1

4 For a certain distribution, mode and median were found to be 1000 and 1250 respectively. Find mean for this distribution, using an empirical relation. 1

SECTION-B

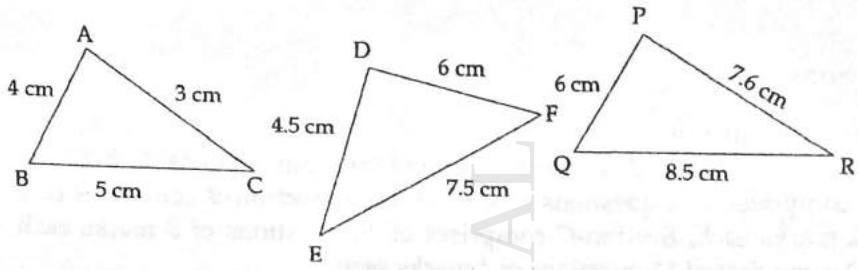
Question numbers 5 to 10 carry two marks each.

5 Explain why the number $7\times5\times3\times2+3$ is not a prime number ? 2

6 If two positive integers a and b can be expressed as $a = p^2q^3$ and $b = p^3q^2$, where p, q are prime numbers, find their LCM and HCF using prime factorisation. 2

7 The Taxi charges in a city consists of a fixed charge together with the charge for the distance covered. For a distance of 6 km, the charges paid are Rs 58 while for a journey of 10 km, the charges paid are ₹ 90. Find the charge per km and the fixed charge. 2

8 State which pairs of triangles in the given figure are similar. Also state the similarity criterion used. 2



9 If $\sin(A + B) = 1$ and $\sin(A - B) = \frac{1}{2}$; $0 \le A + B \le 90°$ and $A > B$, then find A and B. 2

10 The mode of the following data is 36. Find the missing frequency x in it. 2

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	8	10	x	16	12	6	7

SECTION-C

Question numbers **11** to **20** carry three marks each.

11 Show that the square of an odd positive integer is of the form $8m+1$ where m is some whole number. 3

12 Solve for x and y: 3

$x + 4y = 27xy$

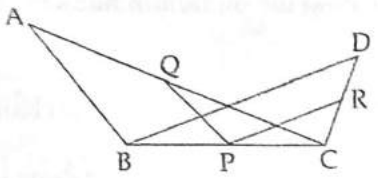
$x + 2y = 21xy$

13 If one zero of the polynomial $2x^2 - 5x - (2k+1)$ is twice the other, find both the zeroes of the polynomial and the value of k. 3

14 The sum of the digits of a two digit number is 8 and the difference between the number and that formed by reversing the digits is 18. Find the number. 3

15 In a ΔABC, AD is perpendicular to BC and $AD^2 = BD \times CD$, Prove that ABC is a right angled Triangle. 3

16 In the figure, ΔABC and ΔDBC have same base BC and lie on the same side of BC. If PQ||BA and PR||BD, then prove that QR||AD. 3



17 Given $2\cos 3\theta = \sqrt{3}$, find the value of θ. 3

18 Prove the following identity : 3

$$\frac{\sin^4\theta - \cos^4\theta}{\left(\sin^3\theta - \cos^2\theta.\sin\theta\right) : \operatorname{cosec}\theta} = 1$$

19 Draw a cumulative frequency curve for the following cumulative frequency distribution. 3

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
Cumulative frequency	50	48	45	32	15	5

20 The weights (in kg) of 45 students of a class are given in the following distribution table. Determine the value of weight x which is such that the number of students having weight less than x kg is same as the number of students having weight more than x kg. 3

Weight (in kg)	Below 45	Below 50	Below 55	Below 60	Below 65	Below 70
Cumulative frequency (cf)	5	11	15	22	38	45

SECTION-D

Question numbers **21** to **31** carry four marks each.

21 Dhudnath has two vessels containing 720 ml and 405 ml of milk respectively. Milk from these containers is poured into glasses of equal capacity to their brim. Find the minimum number of glasses that can be filled. 4

22 4 chairs and 3 tables cost ₹ 2100 and 5 chairs and 2 tables cost ₹1750. Find the cost of one chair and one table separately. 4

23 If a polynomial $8x^4 - 8x^3 - 18x^2 - px - q$ is exactly divisible by $4x^2 - 4x + 1$, then find the value of 'p' and 'q' 4

24 Government of Delhi allotted Relief Fund to help the families whose houses and shops were burned in a fire accident. The fund is represented by $6x^3 - 11x^2 + 15x - 24$. The fund is equally divided between each of the families of that accident. Each family receives an amount of $3x - 7$. After distribution, $7x + 11$ amount is left. The District Magistrate decided to use this amount to develop the infrastructure of the area. Find the number of families which received relief fund from Government.
What value has been depicted here ? 4

25 In a right angled triangle ABC, $\angle A = 90°$ and $AD \perp BC$. Prove that : 4

(i) $AB^2 = BD \times BC$

(ii) $AD^2 = BD \times DC$

(iii) $AC^2 = BC \times CD$

26 Prove "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". 4

27 If $\cos\theta = \frac{3}{5}$, find the value of $\left(\frac{5\,\text{cosec}\theta - 4\tan\theta}{\sec\theta + \cot\theta}\right)$. 4

28 If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$. 4

29 Prove that : 4

$$\sqrt{\sec^2\theta + \text{cosec}^2\theta} = (\tan\theta + \cot\theta)$$

30 In a class test, marks obtained by 120 students are given in the following frequency distribution. If it is given that mean is 59, find the missing frequencies x and y. 4

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Number of students	1	3	7	10	15	x	9	27	18	y

31 In an apple orchard, the number of apples on 80 trees are as follows : 4

Number of apples	40-60	60-80	80-100	100-120	120-140	140-160	160-180
Number of trees	12	11	14	16	13	9	5

Find the mode and median of the above data.

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$3\,3\,6 + 27 + 18 + 9 = 90$