

SUMMATIVE ASSESSMENT - I, 2014

गणित / MATHEMATICS

कक्षा - X / Class - X

Time Allowed : 3 hours

Date: 20-9-2014

Maximum Marks: 90

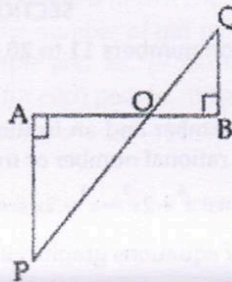
General Instructions:

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 the given figure, if $\angle A = 90^\circ$, $\angle B = 90^\circ$, $AO = 6$ cm, $OB = 4.5$ cm and $AP = 4$ cm, then find QB.



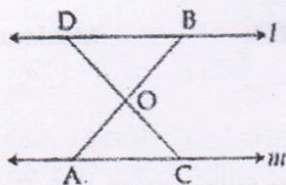
- 2 Find the value of $\frac{1}{3} \cdot \frac{\cos 36^\circ}{\sin 54^\circ} - \frac{3}{2} \cdot \frac{\sec 16^\circ}{\operatorname{cosec} 74^\circ}$.
- 3 In a $\triangle ABC$, write $\tan \frac{A+B}{2}$ in terms of angle C.
- 4 A teacher asks the students to find the average marks obtained by the students in the class. What the student will calculate : mean, mode or median ?

SECTION-B

Question numbers 5 to 10 carry two marks each.

- 5 Find LCM of numbers whose prime factorisation are expressible as 3×5^2 and $3^2 \times 7^2$
- 6 Show that any positive even integer can be written in the form $6q$, $6q+2$ or $6q+4$, where q is an integer.
- 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.

- 8 In the figure, $l \parallel m$, AB and CD intersect at O. Prove that $\Delta OAC \sim \Delta OBD$. 2



- 9 Simplify : 2
 $(1 - \sin A)(\tan A + \sec A)$

- 10 The widths of 50 leaves of a plant were measured in mm and their cumulative frequency distribution is shown in the following table. Make frequency distribution table for this. 2

Width in (mm)	≥ 20	≥ 30	≥ 40	≥ 50	≥ 60	≥ 70	≥ 80
Cumulative frequency	50	44	28	20	15	7	0

SECTION-C

Question numbers 11 to 20 carry three marks each.

- 11 Is product of a rational number and an irrational number, a rational number? Is product of two irrational numbers a rational number or irrational number? Justify giving examples. 3
- 12 If three zeroes of a polynomial $x^4 + 2x^3 - x^2 - 2x$ are 0, 1 and -1 , then find all the zeroes. 3
- 13 Solve the following pair of equations graphically : 3

$$2x - y = 3$$

$$3x + 2y = 8$$

- 14 A man earns ₹ 600 per month more than his wife. One-tenth of the man's salary and one-sixth of the wife's salary amount to ₹ 1500, which is saved every month. Find their incomes. 3
- 15 In a right angled ΔABC , $\angle B = 90^\circ$. If $\frac{AB}{AC} = \frac{1}{\sqrt{2}}$, find $\frac{BC}{AC}$. 3
- 16 Prove that the ratio of areas of two similar triangles is equal to square of the ratio of the Corresponding sides. 3
- 17 Prove that : 3

$$\frac{\sec \theta + \tan \theta}{\sec \theta - \tan \theta} = \left(\frac{1 + \sin \theta}{\cos \theta} \right)^2$$

- 18 Given a right angled ΔABC , right angled at C in which $\tan A = \sqrt{3}$, $\tan B = \frac{1}{\sqrt{3}}$, show that 3

$$\sin A \cdot \cos B - \cos A \cdot \sin B = \frac{1}{2}$$

19. Find the mode of the following data:

3

Height (in Cm.)	120 - 130	130 - 140	140 - 150	150 - 160	160 - 170	Total
No. of girls	2	8	12	20	8	50

20. The following frequency distribution shows ages of employees of an office:

3

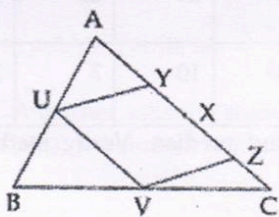
Age (in years)	20-25	25-30	30-35	35-40	40-45	45-50	50-55
Number of employees	6	16	12	10	8	10	15

Find the median age of the employees.

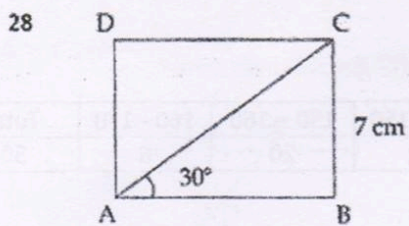
SECTION-D

Question numbers 21 to 31 carry four marks each.

21. State Euclid division Lemma. Using it show that square of any positive integer is either of the form $5m$ or $5m \pm 1$, where m is an integer. 4
22. Some people collected money to be donated in two Old Age Homes. A part of the donation is fixed and remaining depends on the number of old people in the home. If they donated Rs. 14,500 in the home having 60 people and Rs. 19,500 with 85 people, find the fixed part of donation and the amount donated for each people. What is the inspiration behind this? 4
23. Find all other zeroes of the polynomial $x^4 - 2x^3 - 21x^2 + 62x - 40$, if two of its zeroes are 4 and -5. 4
24. Find the polynomial of the least degree which should be subtracted from the polynomial $x^4 + 2x^3 - 4x^2 + 6x - 3$ so that it is exactly divisible by $x^2 - x - 1$. 4
25. In $\triangle ABC$, X is any point on AC . If Y, Z, U and V are the middle points of AX, XC, AB and BC respectively, then prove that $UY \parallel VZ$ and $UV \parallel YZ$. 4



26. $\triangle ABC$ is right angled at C . If $BC = a$, $CA = b$, $AB = c$ and p is length of perpendicular drawn from C on AB , then prove that 4
- (i) $cp = ab$
- (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$
27. If $\frac{\operatorname{cosec} A}{\sec B} = p$ and $\frac{\cot A}{\sec B} = q$ then prove that $(p^2 - q^2) \cdot \cot^2 A = q^2$ 4



In the adjoining figure, ABCD is a rectangle with breadth BC = 7 cm and $\angle CAB = 30^\circ$. Find the length of side AB of the rectangle and length of diagonal AC. If the $\angle CAB = 60^\circ$, then what is the size of the side AB of the rectangle [use $\sqrt{3} = 1.73$ and $\sqrt{2} = 1.41$, if required]

29 If $m = \cos A - \sin A$ and $n = \cos A + \sin A$, then show that

$$\frac{m}{n} - \frac{n}{m} = - \frac{4 \sin A \cos A}{\cos^2 A - \sin^2 A} = - \frac{4}{\cot A - \tan A}$$

30 The frequency distribution given below shows the height of 60 students of a class. If mean of the data is 157, find the missing frequencies x and y .

Height (in cm)	144-148	148-152	152-156	156-160	160-164	164-168
Number of students	x	8	15	y	16	6

31 In a shopping complex, annual profits of shops are given in the following frequency distribution table :

Profit (in lakhs ₹)	More than or equal to 4	More than or equal to 8	More than or equal to 12	More than or equal to 16	More than or equal to 20	More than or equal to 24	More than or equal to 28	More than or equal to 32
Number of shops	40	38	26	24	14	10	7	3

Draw a 'more than type' ogive. From the curve, find median. Verify median by actual calculations.