

fuchita  
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01BKDXU  
SET-I

# SUMMATIVE ASSESSMENT - I, 2013

## MATHEMATICS

### Class - X

Time Allowed : 3 hours

Maximum Marks : 90

#### General Instructions:

All questions are compulsory.

The question paper consists of 34 questions divided into four sections A, B, C and D. Section-A comprises of 8 multiple choice 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.

There is no overall choice in this question paper

Use of calculator is not permitted.

Handwritten calculations for division:  $2120 \div 200 = 10.6$  and  $2120 \div 30 = 70.666...$

#### SECTION - A

Question numbers 1 to 8 carry 1 mark each.

1

The decimal expansion of  $\frac{141}{120}$  will terminate after how many places of decimals? 1

- (a) 3                      (b) 4                      (c) 1                      (d) 2

2

For 'a' and 'b' being coprime, then  $a^2$  and  $b^2$  are : 1

- (a) may or may not be coprime  
(b) never coprime  
(c) always coprime  
(d) prime numbers

Handwritten calculations:  $2^3 = 8$ ,  $4^3 = 64$ ,  $9^3 = 729$ ,  $1^3 = 1$ ,  $2^3 = 8$ ,  $3^3 = 27$ ,  $4^3 = 64$ ,  $5^3 = 125$ ,  $6^3 = 216$ ,  $7^3 = 343$ ,  $8^3 = 512$ ,  $9^3 = 729$

3

Which of the following pair of linear equations has no solution? 1

- (a)  $3x + 2y = 5$ ;  $2x + 3y = 5$   
(b)  $8x + 15y = 14$ ;  $4x + 5y = 7$   
(c)  $10x + 21y = 17$ ;  $20x + 42y = 34$   
(d)  $4x + 3y = 9$ ;  $8x + 6y = 19$

4

If  $ax + by = a^2 - b^2$  and  $bx + ay = 0$ , then the value of  $(x + y)$  is : 1

- (a)  $a^2 - b^2$                       (b)  $b - a$                       (c)  $a - b$                       (d)  $a^2 + b^2$

5

In  $\Delta ABC$ ,  $AC = 24$  cm,  $BC = 10$  cm and  $AB = 26$  cm, then :

- (a)  $\angle B < 90^\circ$                       (b)  $\angle C > 90^\circ$   
(c)  $\angle C = 90^\circ$                       (d)  $\angle B = 90^\circ$

Handwritten algebraic steps:  
 $ax + by = a^2 - b^2$   
 $bx + ay = 0$   
 $\rightarrow ax + by = a^2 - b^2$   
 $\rightarrow bx + ay = 0$   
 $\rightarrow abx + aby = ab(a^2 - b^2)$   
 $\rightarrow abx + aby = 0$   
 $\rightarrow abx = -aby$   
 $\rightarrow x = -\frac{ay}{b}$

6  $(\sin^2 \theta + \cos^2 \theta + \cot^2 \theta)$  is equal to :

- (A)  $\operatorname{cosec}^2 \theta$  (B)  $\tan^2 \theta$   
 (C)  $\sec^2 \theta$  (D) 1

1 + 1 = 2



$$\frac{AB}{AC} = \frac{BC}{AC}$$

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7 If C is an acute angle in a right  $\Delta ABC$ , right angled at B, then the value of  $\sin C + \cos C$  is equal to :

- (A) 1 (B) 2  
 (C) less than one (D) greater than one



8 If the 'less than' type ogive and 'more than' type ogive intersect each other at (20.5, 15.5), then the median of the given data is :

- (A) 36.0 (B) 20.5 (C) 15.5 (D) 5.5



SECTION - B

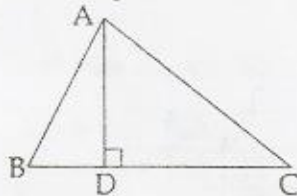
Question numbers 9 to 14 carry 2 marks each.

9 A rational number in its decimal expansion is 1.7351. What can you say about the prime factors of  $q$  when this number is expressed in the form  $\frac{p}{q}$ ? Give reason. 2

10 Can  $(x-2)$  be the remainder on the division of  $p(x) = 7x + 3$  by any polynomial  $q(x)$ ? Justify your answer. 2

11 Find the quadratic polynomial whose zeroes are  $\sqrt{2}$  and  $2\sqrt{2}$ . 2

12 In the figure,  $\Delta ABC$  is an equilateral triangle in which  $AD \perp BC$ . Prove that  $3AB^2 = 4AD^2$ . 2



13 Show that  $\frac{1 - \sin 60^\circ}{\cos 60^\circ} = 2 - \sqrt{3}$ . 2

14 Form the cumulative frequency table from the following data : 2

Marks	Number of students
less than 10	2
less than 20	12
less than 30	37
less than 40	57
less than 50	60

Write the frequencies of the classes (20 - 30) and (30 - 40)



SECTION - C

Question numbers 15 to 24 carry 3 marks each.

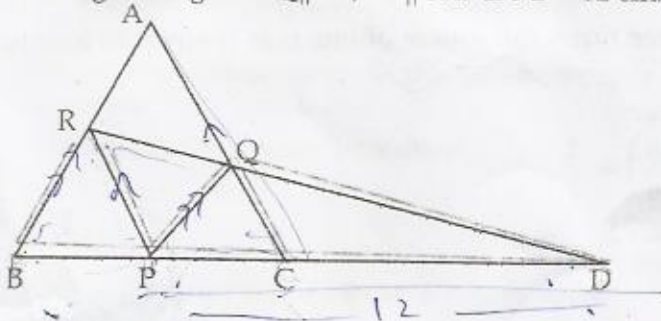
15 Prove that  $\sqrt{2} + \sqrt{3}$  is irrational. 3

16 The sum of the digits of a two digit number is 12. The number obtained by interchanging the digits exceeds the given number by 18. Find the number. 3

17 Find, for what values of a and b will the following pair of linear equation has infinitely many solution :  
 $4x + 5y = 2$  ;  $(2a + 7b)x + (a + 8b)y = 2b - a + 1$ . 3

18 Solve for x and y:  $6(ax + by) = 3a + 2b$  ;  $6(bx - ay) = 3b - 2a$ . 3

19 In the given figure  $PQ \parallel BA$ ;  $PR \parallel CA$ . If  $PD = 12$  cm. Find  $BD \times CD$ . 3



20  $\triangle ABC$  and  $\triangle PQR$  are two isosceles triangles in which  $\angle A = \angle P$ . If  $\frac{\text{ar}(\triangle ABC)}{\text{ar}(\triangle PQR)} = \frac{9}{16}$ , find  $\frac{AD}{PS}$ , where  $AD \perp BC$  and  $PS \perp QR$ . 3

21 Prove that  $\frac{\tan^2 A}{1 + \tan^2 A} + \frac{\cot^2 A}{1 + \cot^2 A} = 1$ . 3

22 Prove that :  $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0$  3

23 Find the median of the following data : 3

Classes	5 - 15	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75
Frequency	6	10	16	15	24	8	7

24 The distribution of weights (in kilograms) of 60 workers in a factory are given. Find the mean weight of a worker.

Classes wt in kg,	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70
Number of workers (f)	5	8	14	16	10	7

SECTION - D

Question numbers 25 to 34 carry 4 marks each.

25 A class of 20 boys and 15 girls is divided into  $n$  groups so that each group has  $x$  boys and  $y$  girls. Find  $x$ ,  $y$  and  $n$ . What values are referred in a class? 4

26 Obtain all the zeroes of the polynomial  $x^4 + 2x^3 - 7x^2 - 8x + 12$ , if two of its zeroes are 2 and -2. 4

27 For what value of  $k$  will the pair of equations have no solution? 4

$$3x + y = 1$$

$$(2k - 1)x + (k - 1)y = 2k + 1$$

Handwritten notes for Q27:  $x + y = 35$ ,  $x + 5y = 35$ ,  $x + y = 35$ ,  $x + y = 35$

28 In a  $\Delta ABC$ ,  $BD \perp AC$  and  $AC^2 - AB^2 = BC^2$ , prove that  $BD^2 = AD \times DC$  4

29 In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitudes. 4

30 If  $\tan \theta = \frac{20}{21}$ , Show that  $\left( \frac{1 - \sin \theta + \cos \theta}{1 + \sin \theta + \cos \theta} \right) = \frac{3}{7}$ . 4

31 Evaluate: 4

$$\frac{4 \cot^2 60^\circ + \sec^2 30^\circ - 2 \sin^2 45^\circ}{\sin^2 60^\circ + \cos^2 45^\circ}$$

Handwritten note for Q31:  $2 + \left( \frac{1 - \cos \theta}{8} \right) + 1$

32 If  $\sin \theta = \frac{c}{\sqrt{c^2 + d^2}}$  and  $d > 0$ , find the values of  $\cos \theta$  and  $\tan \theta$ . 4

33 Compute the median from the following data: 4

More than 150	0
More than 140	12
More than 130	27
More than 120	60
More than 110	105
More than 100	124
More than 90	141
More than 80	150

	0	30°	45°	60°	90°	4
sin θ	0	1/2	1/√2	√3/2	1	
cos θ	1	√3/2	1/√2	1/2	0	
tan θ	0	1/√3	1	√3	n.d.	
cosec θ	n.d.	2	√2	2/√3	1	
sec θ	1	2/√3	√2	2	n.d.	
cot θ	n.d.	√3	1	1/√3	0	

34 Find mean, median and mode of the following data: 4

Classes	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140
Frequency	6	8	10	12	6	5	3

$$mode = l + \left( \frac{f_i - f_0}{2f_i - f_0 - f_2} \right) \times h$$