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## SAMPLE PAPER - 2013 [ Set - I ]

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### MATHEMATICS, SA - 1

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*Time allowed : 3 hours*

*Maximum Marks : 90*

#### **General Instructions**

1. All questions are compulsory.
2. The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 8 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 10 questions of 4 marks each.
3. Question numbers 1 to 8 in Section A are multiple choice questions where you are to select one correct option out of the given four.
4. There is no overall choice. However, internal choices has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculator is not permitted.

#### **SECTION A**

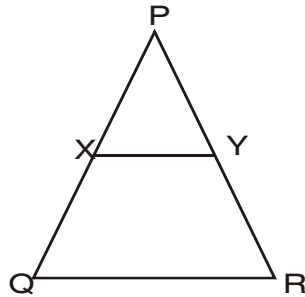
Question numbers 1 to 8 carry one mark each. For each question, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

1. The largest number which divides 70 and 125, leaving remainders 5 and 8 respectively, is :  

(a) 65	(b) 875
(c) 1750	(d) 13
2. The zeroes of a quadratic polynomial  $x^2 + 99x + 127$  are :

- (a) both positive (b) both negative  
 (c) one positive one negative (d) both equal

3. In the given figure  $XY \parallel QR$  and  $\frac{PX}{XQ} = \frac{1}{2}$  then :



- (a)  $XY = QR$  (b)  $XY = \frac{1}{3} QR$   
 (c)  $(XY)^2 = (QR)^2$  (d)  $XY = \frac{1}{2} QR$
4. If  $\sin(60^\circ + A) = 1$ , then the value of  $\operatorname{cosec} A$  is :  
 (a) 1 (b) 0  
 (c)  $\frac{1}{2}$  (d) 2.
5. The H.C.F. of the smallest composite number and the smallest prime number is :  
 (a) 0 (b) 1  
 (c) 8 (d) 2.
6. The value of  $k$  for which the pair of equations  $kx - 5y = 2$ ;  $6x + 2y = 7$  has no solution, is :  
 (a) 15 (b) -15  
 (c) 10 (d) 3
7. If  $\sec^2 \theta \cdot (1 + \sin \theta) \cdot (1 - \sin \theta) = k$ , then the value of  $k$  is :  
 (a) 0 (b) 1  
 (c) -1 (d) 2



Find the mode for the following frequency distribution :

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	10	15	30	80	40	20	5

### SECTION C

Question number 15 to 24 carry three marks each.

15. If the areas of two similar triangles are equal, then prove that the triangles are congruent.
16. Find the zeroes of the following quadratic polynomial and verify the relationship between the zeroes and the coefficients of

$$x^2 + \frac{1}{6}x - 2$$

17. Write the denominator of the rational number  $\frac{257}{5000}$  in the form  $2^m \times 5^n$  where m, n are non-negative integers. Hence, write its decimal expansion, without actual division.

OR

Show that any positive even integer is of the form  $6q$ ,  $6q + 2$  or  $6q + 4$ , where q is some integer.

18. If  $\sin (A + B) = 1$  and  $\cos (A - B) = \frac{\sqrt{3}}{2}$ , and  $0^\circ < (A + B) \leq 90^\circ$ ,  $A > B$ , find A and B and hence find  $\cos 2B$ .
19. Divide  $5x^3 - 13x^2 + 21x - 14$  by  $3 - 2x + x^2$  and verify the division lemma.
20. The sum of two numbers is 8. If their sum is four times their difference, find the numbers.

OR

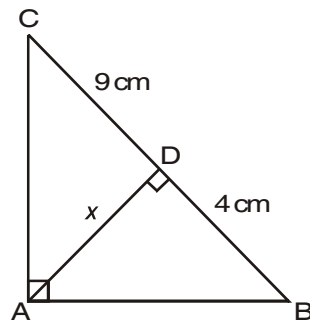
Solve for x and y.

$$ax + by = a - b; bx - ay = a +$$

21. Find the mean of the following distribution :

Class	0–10	10–20	20–30	30–40	40–50
Frequency	7	10	15	8	10

22. In the given figure,  $\triangle ABC$  is right angled at A;  $AD \perp BC$ ,  $BD = 4$  and  $DC = 9$  cm. Find  $x$  .



OR

Diagonals of a trapezium PQRS intersect each other at the point O.  $PQ \parallel RS$  and  $PQ = 3RS$ . Find the ratio of the areas of triangles POQ and ROS.

23. Prove that :  $\frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} = 2 + \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta}$

24. Find the median of the following distribution :

Class	5–14	15–24	25–34	35–44	45–54	55–64
Frequency	6	11	21	23	14	5

## SECTION D

Question number 25 to 34 carry four marks each.

25. Prove that  $\sqrt{5}$  is an irrational number. Hence show that  $3 + 2\sqrt{5}$  is irrational.

26. Represent the following pair of equations graphically and write the coordinates of points where the lines intersect y-axis :

$$x + 3y = 6; 2x - 3y = 12.$$

27. Prove that :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \cdot \operatorname{cosec} \theta.$$

28. The median of the following data is 32.5 :

Class	Frequency
0–10	x
10–20	5
20–30	9
30–40	12
40–50	y
50–60	3
60–70	2
<b>Total</b>	<b>40</b>

Find the values of x and y.

29. Find all the zeroes of the polynomial  $4x^4 - 20x^3 + 23x^2 + 5x - 6$ , if two of its zeroes are 2 and 3.

**OR**

8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish the same work in 14 days. Find the number of days taken by one man alone to complete the work and also one boy alone to complete the work.

30. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of the corresponding sides.

**OR**

Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

31. Evaluate :  $2(\cos^4 60^\circ + \sin^4 30^\circ) - (\tan^2 60^\circ + \cot^2 45^\circ) + 3 \sec^2 30^\circ$ .

32. In an isosceles  $\triangle ABC$  with  $AB = AC$ ,  $BD$  is the perpendicular drawn from the vertex  $B$  to the side  $AC$ . Prove that  $BD^2 - CD^2 = 2CD \cdot AD$ .

33. Evaluate :

$$\frac{\sec \theta \cdot \operatorname{cosec}(90^\circ - \theta) - \tan \theta \cdot \cot(90^\circ - \theta) + \sin^2 55^\circ + \sin^2 35^\circ}{\tan 10^\circ \cdot \tan 20^\circ \cdot \tan 60^\circ \cdot \tan 70^\circ \cdot \tan 80^\circ}$$

34. The frequency distribution of marks obtained by 53 students out of 100 in a certain examination is given below :

Marks	No. of Students
0–10	5
10–20	3
20–30	4
30–40	3
40–50	3
50–60	4
60–70	7
70–80	9
80–90	7
90–100	8

Draw a 'less than type' ogive for the given data.

