Sample Paper 2011 - 2012
Mathematics S.A – I
Class X

Time: 3 hrs   Maximum Marks: 80

General Instructions:
- All questions are compulsory.
- The question paper consists of 34 questions divided into four sections – A, B, C and D. Section - A contains 10 questions of 1 mark each, Section B is of 8 questions of 2 marks each, Section C is of 10 questions of 3 marks each and section D is of 6 questions of 4 marks each.
- There is no overall choice. However, an internal choice has been provided in one question of two marks each, three questions of three marks each and two questions of six marks each.
- In question on construction, the drawing should be neat and exactly as per the given measurements
- Use of calculator is not permitted.

SECTION – A

1. If two positive integers m and n are expressible in the form $m = pq^3$ and $n = p^3q^2$, where p and q are prime number, then HCF (m,n) :
   a. pq b. pq^2 c. p^3q^3 d. p^2q^3

2. If $x = a \cos A$ and $y = b \sin A$, then $b^2x^2 + a^2y^2$ is:
   a. a^2b^2 b. ab c. a^4b^4 d. $a^2 + b^2$

3. If α and β are the zeroes of the polynomial $f(x)=ax^2 + bx + c$, then $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is equal to:
   a. $\frac{b^2 - 2ac}{a^2}$ b. $\frac{b^2 - 2ac}{c^2}$ c. $\frac{b^2 + 2ac}{a^2}$ d. None of the above.

4. If n is any natural number then $9^{2n} - 4^{2n}$ always divisible by:
   a. 5   b. 13   c. both a and b   d. None of the above

5. 4. $\frac{\sin a}{1-\cot a} + \frac{\cos a}{1-\tan a}$ is equal to:
   a. 0   b. 1   c. $\sin a + \cos a$ d. $\sin a - \cos a$

6. The value of k for which the system of equation $2x + 3y = 5$, $4x + ky = 10$ has infinite number of solution is:
   a. 1   b. 3   c. 6   d. 0

7. In ΔABC, PQ||BC and AP:PB = 1:2 then $\frac{ar(\Delta APQ)}{ar(\Delta ABC)}$ is

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a. 1 : 9   b. 1 : 4   c. 2 : 9   d. None of the above

8. $Sec^4A - Sec^2A$ is equal to

a. $tan^2A - tan^4A$ b. $tan^4A - tan^2A$ c. $tan^4A + tan^2A$ d. $tan^2A + sec^4A$

9. The median of a given frequency distribution is found graphically with the help of :

a. Histogram b. frequency polynomial   c. frequency curve   d. O - give

10. If sec A = $x + \frac{1}{4x}$ then sec A + tan A:

a. 2x   b. $\frac{1}{2x}$ c. Both a and b   d. None of the above

SECTION - B

11. Find the value of k for which the zeroes are α and β of the polynomial $x^2 - 5x + k$ such that α - β = 1

12. Equilateral triangles are drawn on the sides of a right triangle; show that the area of the triangle on the hypotenuse is equal to the sum of the area of triangles on the other two sides.

13. For which value of a and b does the following pair of linear equation have an infinite number of solution. $2x + 3y = 7$ and $(a - b)x + (a + b)y = 3a + b - 2$.

14. In ∆ABC, AD is the bisector of ∠ A, meeting side BC at D. If AB = 5 cm, BD = 2 cm and CD = 3cm find AC.

15. If sec A = Cosec (4A – 20), where 4A is an acute angle, find the value of A.

16. Find the value of p, if the mean is 7.5, $\sum f_i x_i = 303 + 9p$ and sum of frequency is $41 + p$

17. Use Euclid's Division Lemma to show that the cube of any positive integer is of the form 9m, 9m + 1 or 9m + 8.

18. Find the median of the daily wages of the workers form the following data :
20, 25, 17, 18, 8, 15, 22, 11, 9, 14

SECTION – C

19. Prove that $\sqrt{5}$ is an irrational number.

20. In ∆ABC, XY ‖ AC and XY divides the triangle into two parts of equal areas. Find the ratio $\frac{AX}{AB}$.

21. If the median of the distribution is 28.5. find the value of x and y.

C.I	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	Total
Frequency	5	x	20	15	y	5	60

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22. Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

23. The boat goes 25 km upstream and 33 km downstream in 8 hours. It can go 40 km upstream and 77 km downstream in 15 hours. Find the speed of the stream and that of the boat in still water.

24. In $\triangle ABC$, right angle at C and $CD \perp AB$ prove that $BC^2 \times AD = AC^2 \times BD$.

25. Prove that $(1 + \cot \alpha - \csc \alpha) (1 + \tan \alpha + \sec \alpha) = 2$

26. Show that any positive odd integer is of the form $6q + 1$, $6q + 3$, $6q + 5$ and even integer is of the form $6q$, $6q + 2$ and $6q + 4$.

27. If $3 \sin \alpha + 5 \cos \alpha = 5$ prove that $5 \sin \alpha - 3 \cos \alpha = \pm 3$

28. Find the mode from the following data.

C.I	0 – 7	7 – 14	14 – 21	21 – 28	28 – 35	35 – 42	42 – 49
Frequency	19	25	36	72	51	43	28

SECTION - D

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29. Students of a class are made to stand in rows. If one student is extra in a row, there would be 2 rows less. If one student is less in a row there would be 3 rows more. Find the number of students in the class.

30. If $\sec A + \tan A = m$, show that $\dfrac{m^2 - 1}{m^2 + 1} = \sin A$

31. State and prove Thale's Theorem.

Using the above theorem, Show that $\dfrac{AE}{ED} = \dfrac{BF}{FC}$ ...When ABCD is a trapezium with AB ‖ DC, E and F are points on non – parallel sides AD and BC respectively, Such that EF ‖ AB

32. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work and also that taken by 1 man alone.

33. If $x \sin^3 A + y \cos^3 A = \sin A. \cos A$ and $x \sin A = y \cos A$, prove that $x^2 + y^2 = 1$.

34. During the medical check up of 35 students of class their weights were recorded as follows:

Weight (in kg)	Less than 38	Less than 40	Less than 42	Less than 44	Less than 46	Less than 48	Less than 50	Less than 52
No. of students	0	3	5	9	14	28	32	35

Draw more than type O – give from the above given data.

Mohan Singh
Saraf Public School
Khatima, Uttarakhand
Mob. 9258777432
E-Mail: mr_mohansinghua@rediff.com

There is no destiny beyond and above ourselves; we are ourselves the architects of our future.

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