

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION
SAMPLE PAPER 09 (2017-18)

SUBJECT: MATHEMATICS(041)

BLUE PRINT : CLASS X

Unit	Chapter	VSA (1 mark)	SA – I (2 marks)	SA – II (3 marks)	LA (4 marks)	Total	Unit Total
Number system	Real Numbers	1(1)	2(1)	3(1)	--	6(3)	6(3)
Algebra	Polynomials	--	--	3(1)	--	3(1)	20(8)
	Pair of Linear Equations in two variables	--	2(1)	3(1)	--	5(2)	
	Quadratic Equations	1(1)	--	--	4(1)*	5(2)	
	Arithmetic progression	1(1)	2(1)	--	4(1)	7(3)	
Coordinate Geometry	Coordinate Geometry	1(1)	2(1)	3(1)*	--	6(3)	6(3)
Trigonometry	Introduction to Trigonometry	1(1)	--	3(1)*	4(1)	8(3)	12(4)
	Some Applications of Trigonometry	--	--	--	4(1)	4(1)	
Geometry	Triangles	1(1)	--	3(1)*	4(1)*	8(3)	15(5)
	Circles	--	--	3(1)	--	3(1)	
	Constructions	--	--	--	4(1)	4(1)	
Mensuration	Areas Related to Circles	--	--	3(1)	--	3(1)	10(3)
	Surface Areas and Volumes	--	--	3(1)*	4(1)	7(2)	
Statistics & probability	Statistics	--	--	3(1)	4(1)*	7(2)	11(4)
	Probability	--	4(2)	--	--	4(2)	
	Total	6(6)	12(6)	30(10)	32(8)	80(30)	80(30)

Note: * - Internal Choice Questions

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MAX. MARKS : 80
DURATION : 3 HRS

General Instruction:

- (i) All questions are compulsory.
 - (ii) This question paper contains **30** questions divided into four Sections A, B, C and D.
 - (iii) **Section A** comprises of 6 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 8 questions of **4 marks** each.
 - (iv) There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
 - (v) Use of Calculators is not permitted
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SECTION – A

Questions 1 to 6 carry 1 mark each.

1. Show that 12^n cannot end with the digit 0 or 5 for any natural number n .
2. If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then find the value of k .
3. For what values of k are the points $(8, 1)$, $(3, -2k)$ and $(k, -5)$ collinear ?
4. Find the 20th term of the A.P. $-5, \frac{-5}{2}, 0, \frac{5}{2}, \dots$
5. If $\tan 9\theta = \cot \theta$ and $9\theta < 90^\circ$, then find the value of $\operatorname{cosec} 5\theta$.
6. A girl walks 200 towards East and she walks 150m towards North. Find the distance of the girl from the starting point.

SECTION – B

Questions 6 to 12 carry 2 marks each.

7. If two adjacent vertices of a parallelogram are $(3, 2)$ and $(-1, 0)$ and the diagonals intersect at $(2, -5)$, then find the coordinates of the other two vertices.
8. Prove that $\sqrt{2}$ is an irrational number.
9. Find the probability that in a leap year there will be 53 Tuesdays.
10. Two different dice are thrown together. Find the probability that the product of the numbers appeared is less than 18.
11. If seven times the 7th term of an A.P. is equal to eleven times the 11th term, then what will be its 18th term?
12. Solve for x and y : $47x + 31y = 63$; $31x + 47y = 15$.

SECTION – C

Questions 13 to 22 carry 3 marks each.

13. If d is the HCF of 56 and 72, find x, y satisfying $d = 56x + 72y$. Also show that x and y are not unique.

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

OR

Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

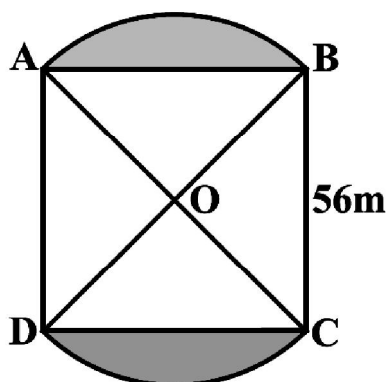
15. Show that ΔABC with vertices A (-2, 0), B (0, 2) and C (2, 0) is similar to ΔDEF with vertices D (-4, 0), F (4, 0) and E (0, 4).

OR

Find the coordinates of the points of trisection of the line segment joining the points (3, -2) and (-3, -4).

16. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

17. In the below figure, two circular flower beds have been shown on two sides of a square lawn ABCD of side 56 m. If the centre of each circular flower bed is the point of intersection O of the diagonals of the square lawn, find the sum of the areas of the lawn and the flower beds.



18. A solid sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel?

OR

A well of diameter 3 m is dug 14 m deep. The soil taken out of it is spread evenly all around it to a width of 5 m to form an embankment. Find the height of the embankment.

19. Evaluate:
$$\frac{\cos^2 40^\circ + \cos^2 50^\circ}{\sin^2 40^\circ + \sin^2 50^\circ} + \frac{4(\cos 70^\circ \operatorname{cosec} 20^\circ)}{7(\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)}$$

OR

Prove that:
$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$

20. Draw the graphs of the equations $4x - y - 8 = 0$; $2x - 3y + 6 = 0$. Also determine the vertices of the triangle formed by the lines and x-axis.

21. If α, β are the zeroes of the polynomials $f(x) = x^2 - 3x + 6$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta} + \alpha^2 + \beta^2 - 2\alpha\beta$
22. The following table show the marks of 85 students of a class X in a school. Find the modal marks of the distribution:

Marks(Below)	10	20	30	40	50	60	70	80	90	100
Number of Students	5	9	17	29	45	60	70	78	83	85

SECTION – D

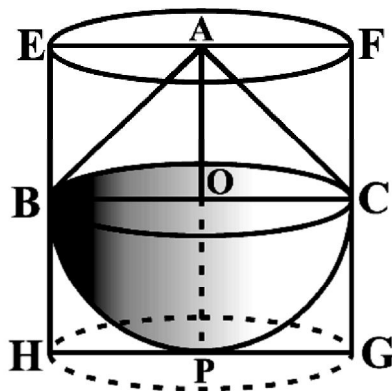
Questions 23 to 30 carry 4 marks each.

23. Draw a circle of radius of 3 cm. Take two points P and Q on one of its diameters extended on both sides, each at a distance of 7 cm on opposite sides of its centre. Draw tangents to the circle from these two points P and Q.
24. From the top of a hill, the angles of depression of two consecutive kilometer stones due east are found to be 45° and 30° respectively. Find the height of the hill.
25. If the quadratic equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ in x, has equal roots, then show that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$.

OR

In a rectangular park of dimensions 50 m \times 40 m, a rectangular pond is constructed so that the area of grass strip of uniform width surrounding the pond would be 1184 m². Find the length and breadth of the pond.

26. Prove that $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$.
27. A child puts one five-rupee coin of her saving in the piggy bank on the first day. She increases her saving by one five-rupee coin daily. If the piggy bank can hold 190 coins of five rupees in all, find the number of days she can continue to put the five-rupee coins into it and find the total money she saved. Write your views on the habit of saving.
28. A solid toy is in the form of a hemisphere surmounted by a right circular cone (see the below figure). The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)



29. Prove that “In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.

OR

Prove that “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”.

30. Following is the age distribution of a group of students. Draw the cumulative frequency curve less than type and hence obtain the median from the graph.

Age(in years)	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16
No. of students	36	42	52	60	68	84	96	82	66	48	50	16

OR

Find the missing frequencies in the following frequency distribution table, if the total frequency is 100 and median is 32.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	10	x	25	30	y	10