

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION
SAMPLE PAPER 07 (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. Find the 9th term from the end (towards the first term) of the A.P. 5, 9, 13, ..., 185.
2. State the Fundamental theorem of Arithmetic.
3. If $x = \frac{2}{3}$ and $x = -3$ are roots of the quadratic equation $ax^2 + 7x + b = 0$, find the values of a and b.
4. If the points A(x, 2), B(-3, -4) and C(7, -5) are collinear, then find the value of x.
5. If $\cot 2\theta = \tan 4\theta$, where 2θ and 4θ are acute angles, find the value of $\sin 3\theta$.
6. ABC and BDE are two equilateral triangles such that D is the midpoint of BC. Find the ratio of the areas of triangles ABC and BDE.

SECTION – B

Questions 6 to 12 carry 2 marks each.

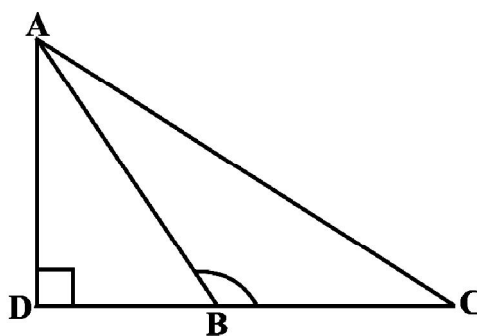
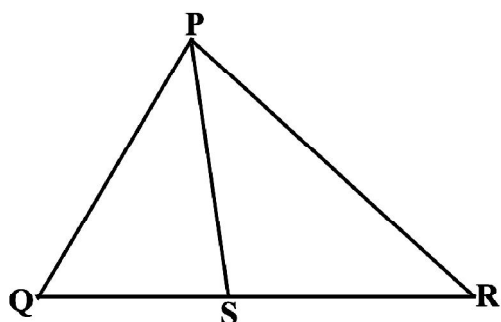
7. Find the ratio in which y-axis divides the line segment joining the points A(5, -6) and B(-1, -4).
8. Find the smallest 4-digit number which is divisible by 18, 24 and 32.
9. Cards marked with number 3, 4, 5, ..., 50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears (i) a perfect square number (ii) a number divisible by 5
10. In a single throw of a pair of different dice, what is the probability of getting (i) a prime number on each dice? (ii) a total of 9 or 11?
11. Find the value of a and b for which each of the following systems of linear equations has a infinite number of solutions: $2x + 3y = 7$; $(a + b + 1)x + (a + 2b + 2)y = 4(a + b) + 1$.
12. How many terms of the A.P. 18, 16, 14, be taken so that their sum is zero?

SECTION – C

Questions 13 to 22 carry 3 marks each.

13. Prove that one and only one out of n , $n + 2$ and $n + 4$ is divisible by 3, where n is any positive integer.

14. In the below left figure, PS is the bisector of $\angle QPR$ of ΔPQR . Prove that $\frac{QS}{SR} = \frac{PQ}{PR}$



OR

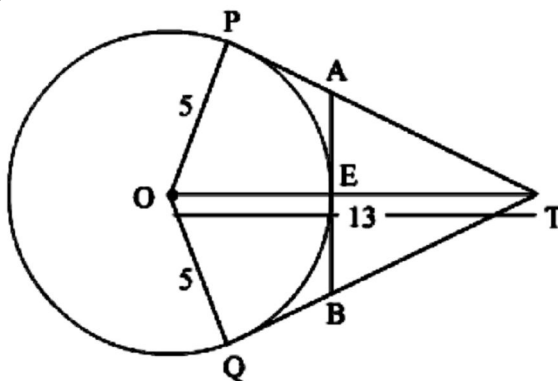
In the above right sided figure, ABC is a triangle in which $\angle ABC > 90^\circ$ and $AD \perp CB$ produced. Prove that $AC^2 = AB^2 + BC^2 + 2 BC \cdot BD$.

15. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from Q(2, -5) and R(-3, 6), find the coordinates of P.

OR

Prove that the area of a triangle with vertices $(t, t - 2)$, $(t + 2, t + 2)$ and $(t + 3, t)$ is independent of t .

16. In the below figure, O is the centre of a circle of radius 5 cm. T is a point such that $OT = 13$ cm and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB, where TP and TQ are two tangents to the circle.



17. The present age of a woman is 3 years more than three times the age of her daughter. Three years hence, the woman's age will be 10 years more than twice the age of her daughter. Find their present ages.

18. If α and β are the zeroes of the quadratic polynomial $f(x) = 2x^2 - 5x + 7$, then find a quadratic polynomial whose zeroes are $2\alpha + 3\beta$ and $2\beta + 3\alpha$.

19. Find the mean marks by step deviation method from the following data:

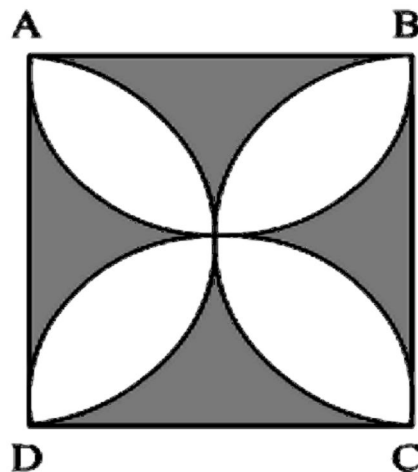
Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	4	10	18	28	40	70

20. A well of diameter 4 m is dug 21 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 3 m to form an embankment. Find the height of the embankment.

OR

The sum of the radius of base and height of a solid right circular cylinder is 37 cm. If the total surface area of the solid cylinder is 1628 sq. cm, find the volume of the cylinder.

21. In the below figure, ABCD is a square of side 14 cm. Semi-circles are drawn with each side of square as diameter. Find the area of the shaded region.



22. Evaluate:
$$\frac{\sec \theta \operatorname{cosec}(90^\circ - \theta) - \tan \theta \cot(90^\circ - \theta) + (\sin^2 35^\circ + \sin^2 55^\circ)}{\tan 10^\circ \tan 20^\circ \tan 45^\circ \tan 70^\circ \tan 80^\circ}$$

OR

If $a^2 \sec^2 \theta - b^2 \tan^2 \theta = c^2$, prove that $\sin^2 \theta = \frac{c^2 - a^2}{c^2 - b^2}$

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45° . The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30° . Find the speed of flying of the bird. (Take $\sqrt{3} = 1.732$).
24. Draw two concentric circles of radii 3 cm and 5 cm. Construct a tangent to smaller circle from a point on the larger circle. Also measure its length.
25. A passenger, while boarding the plane, slipped from the stairs and got hurt. The pilot took the passenger in the emergency clinic at the airport for treatment. Due to this, the plane got delayed by half an hour. To reach the destination 1500 km away in time, so that the passengers could catch the connecting flight, the speed of the plane was increased by 250 km/hour than the usual speed. Find the usual speed of the plane. What value is depicted in this question?

OR

A thief runs with a uniform speed of 100 m/minute. After one minute, a policeman runs after the thief to catch him. He goes with a speed of 100 m/minute in the first minute and increases his speed by 10 m/minute every succeeding minute. After how many minutes the policeman will catch the thief. What value is depicted in this question?

26. If the sum of first 7 terms of an A.P. is 49 and that of its first 17 terms is 289, find the sum of first n terms of the A.P.
27. A bucket open at the top is in the form of a frustum of a cone with a capacity of 12308.8 cm^3 . The radii of the top and bottom circular ends are 20 cm and 12 cm, respectively. Find the height of the bucket and the area of metal sheet used in making the bucket. (use $\pi = 3.14$)

28. If $\sec \theta + \tan \theta = m$, show that $\left(\frac{m^2 - 1}{m^2 + 1} \right) = \sin \theta$

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 “The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.”

30. If the median of the distribution given below is 14.4, find the values of x and y .

C. I.	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30	Total
F	4	x	5	y	1	20

OR

Draw more than ogive for the following frequency distribution:

Heights (in cms)	145-150	150-155	155-160	160-165	165-170	170-175
Number of persons	8	10	9	15	10	8

Also find the median from the graph..