

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION
SAMPLE PAPER 06 (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. Express each of the following positive integers as the product of its prime factors: (i) 140 (ii) 156
2. For what value of p , are $2p + 1$, 13 , $5p - 3$ three consecutive terms of an AP?
3. If $x = -\frac{1}{2}$ is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$, find the value of k .
4. If the mid-point of the line segment joining the points $P(6, b - 2)$ and $Q(-2, 4)$ is $(2, -3)$, find the value of b .
5. In $\triangle ABC$, right-angled at B , $AB = 5$ cm and $\angle ACB = 30^\circ$ then find the length of the side BC .
6. The areas of two similar triangles $\triangle ABC$ and $\triangle DEF$ are 144 cm^2 and 81 cm^2 , respectively. If the longest side of larger $\triangle ABC$ be 36 cm, then find the longest side of the similar triangle $\triangle DEF$.

SECTION – B

Questions 6 to 12 carry 2 marks each.

7. If $A(5, 2)$, $B(2, -2)$ and $C(-2, t)$ are the vertices of a right angled triangle with $\angle B = 90^\circ$, then find the value of t .
8. Two tankers contain 850 litres and 680 litres of kerosene oil respectively. Find the maximum capacity of a container which can measure the kerosene oil of both the tankers when used an exact number of times.
9. Two different dice are rolled together. Find the probability of getting : (i) the sum of numbers on two dice to be 5 . (ii) even numbers on both dice.
10. A box contains 20 cards numbered from 1 to 20 . A card is drawn at random from the box. Find the probability that the number on the drawn card is (i) divisible by 2 or 3 (ii) a prime number

11. Solve for x and y: $(a-b)x + (a+b)y = a^2 - 2ab - b^2$; $(a+b)(x+y) = a^2 + b^2$

12. Find the middle term of the A.P. 6, 13, 20, ... , 216.

SECTION – C

Questions 13 to 22 carry 3 marks each.

13. Show that the product of three consecutive natural numbers is divisible by 6.

14. BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = 5 BC^2$.

OR

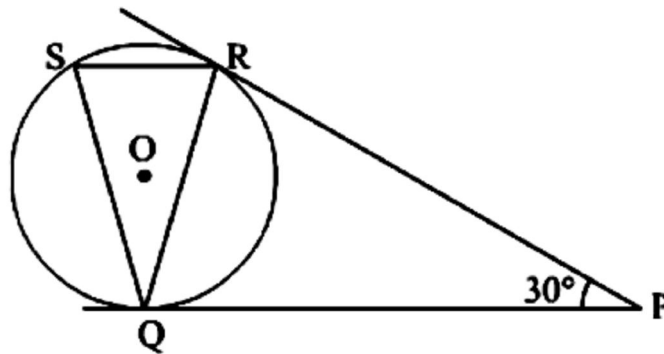
In a ΔPQR , $PR^2 - PQ^2 = QR^2$ and M is a point on side PR such that $QM \perp PR$. Prove that $QM^2 = PM \times MR$.

15. If A(-4, 8), B(-3, -4), C(0, -5) and D(5, 6) are the vertices of a quadrilateral ABCD, find its area.

OR

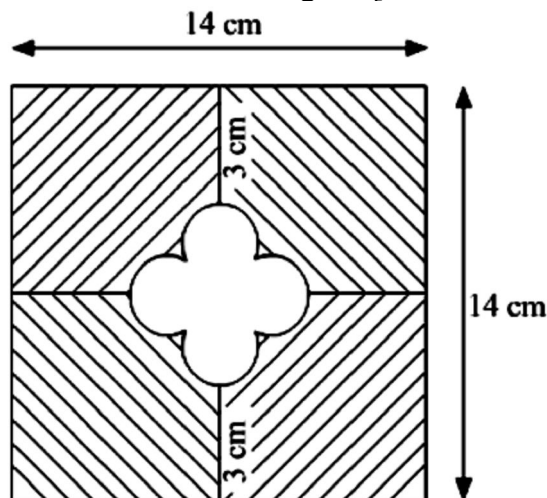
Find the area of the triangle ABC with A(1, -4) and mid-points of sides through A being (2, -1) and (0, -1).

16. In the below figure, tangents PQ and PR are drawn from an external point P to a circle with centre O, such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to the tangent PQ. Find $\angle RQS$.



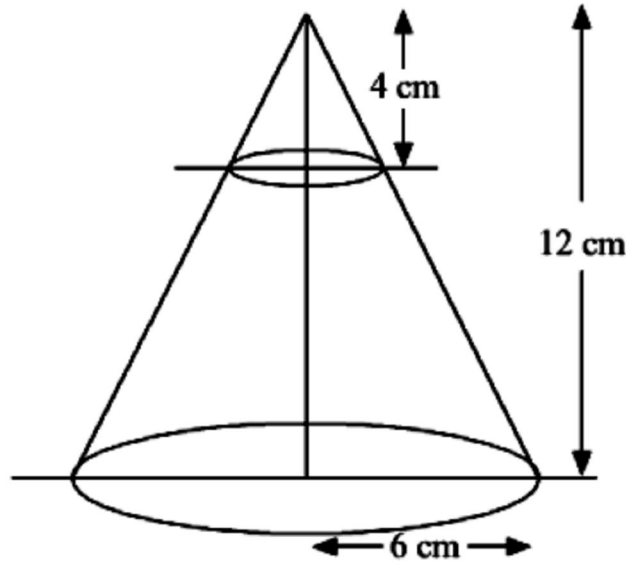
17. Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis, and shade the triangular region.

18. In the below figure, find the area of the shaded region. [Use $\pi = 3.14$]



19. Find all the zeroes of the polynomial $2x^4 - 9x^3 + 5x^2 + 3x - 1$, if two of its zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$.

20. In the below figure, from the top of a solid cone of height 12 cm and base radius 6 cm, a cone of height 4 cm is removed by a plane parallel to the base. Find the total surface area of the remaining solid.



OR

A well of diameter 4 m is dug 14 m deep. The earth taken out is spread evenly all around the well to form a 40 cm high embankment. Find the width of the embankment.

21. 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 $(\tan \theta + \sin \theta) = m$ and $(\tan \theta - \sin \theta) = n$ prove that $(m^2 - n^2)^2 = 16mn$

22. Find the mode marks from the following data:

Marks	Below 10	Below 20	Below 30	Below 40	Below 50
Number of students	15	45	90	102	120

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. From a point P on the ground the angle of elevation of the top of a tower is 30° and that of the top of a flag staff fixed on the top of the tower, is 60° . If the length of the flag staff is 5 m, find the height of the tower.

24. Construct a triangle ABC with $BC = 7$ cm, $\angle B = 60^\circ$ and $AB = 6$ cm. Construct another triangle whose sides are times the corresponding sides of $\triangle ABC$.

25. Ramkali required Rs 2,500 after 12 weeks to send her daughter to school. She saved Rs 100 in the first week and increased her weekly saving by Rs 20 every week. Find whether she will be able to send her daughter to school after 12 weeks. What value is generated in the above situation?

26. The numerator of a fraction is 3 less than its denominator. If 2 is added to both the numerator and the denominator, then the sum of the new fraction and original fraction is $\frac{29}{20}$. Find the original fraction.

OR

Solve for x : $\frac{2}{x+1} + \frac{3}{2(x-2)} = \frac{23}{5x}, x \neq 0, -1, 2$

27. A solid wooden toy is in the form of a hemisphere surrounded by a cone of same radius. The radius of hemisphere is 3.5 cm and the total wood used in the making of toy is . Find the height of the toy. Also, find the cost of painting the hemispherical part of the toy at the rate of Rs 10 per cm^2 .

28. Prove that: $\frac{\tan^3 \alpha}{1 + \tan^2 \alpha} + \frac{\cot^3 \alpha}{1 + \cot^2 \alpha} = \sec \alpha \operatorname{cosec} \alpha - 2 \sin \alpha \cos \alpha$

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

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. Find the missing frequencies f_1 and f_2 in table given below; it is being given that the mean of the given frequency distribution is 145.

Class	100-120	120-140	140-160	160-180	180-200	Total
Frequency	10	f_1	f_2	15	5	80

OR

The following table gives the heights (in meters) of 360 trees:

Height (in m)	Less than 7	Less than 14	Less than 21	Less than 28	Less than 35	Less than 42	Less than 49	Less than 56
No. of trees	25	45	95	140	235	275	320	360

From the above data, draw an ogive and find the median