

**KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION**  
**SAMPLE PAPER 01 (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)	
	<b>Total</b>	<b>6(6)</b>	<b>12(6)</b>	<b>30(10)</b>	<b>32(8)</b>	<b>80(30)</b>	<b>80(30)</b>

**Note: \* - Internal Choice Questions**

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**MAX. MARKS : 80**  
**DURATION : 3 HRS**

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**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. ABC and BDE are two equilateral triangles such that  $BD = \frac{2}{3}BC$ . Find the ratio of the areas of triangles ABC and BDE.
2. Find the coordinates of the point on y-axis which is nearest to the point  $(-2, 5)$ .
3. If  $\sin A = \frac{1}{2}$ , find the value of  $\frac{2 \sec A}{1 + \tan^2 A}$ .
4. Find the values of  $k$  for quadratic equation  $2x^2 + kx + 3 = 0$ , so that they have two equal roots.
5. Express 7429 as a product of its prime factors.
6. Which term of the AP: 3, 8, 13, 18, ..... Is 78?

**SECTION – B**

**Questions 6 to 12 carry 2 marks each.**

7. A box contains cards numbered 11 to 123. A card is drawn at random from the box. Find the probability that the number on the drawn card is (i) a square number (ii) a multiple of 7
8. A box contains 12 balls of which some are red in colour. If 6 more red balls are put in the box and a ball is drawn at random, the probability of drawing a red ball doubles than what it was before. Find the number of red balls in the bag.
9. Using Euclid's division algorithm, find the HCF of 2160 and 3520.
10. Solve  $2x + 3y = 11$  and  $2x - 4y = -24$  and hence find the value of 'm' for which  $y = mx + 3$ .
11. Find the ratio in which the line segment joining the points  $(-3, 10)$  and  $(6, -8)$  is divided by  $(-1, 6)$ .
12. The sum of first n terms of an AP is given by  $S_n = 2n^2 + 3n$ . Find the sixteenth term of the AP.

## SECTION – C

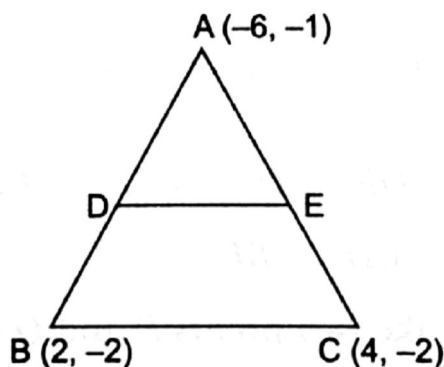
Questions 13 to 22 carry 3 marks each.

13. Prove that  $5 - 2\sqrt{3}$  is an irrational number.

14. Four points A(6, 3), B(-3, 5), C(4, -2) and D(x, 3x) are given such that  $\frac{\Delta DBC}{\Delta ABC} = \frac{1}{2}$ , find x.

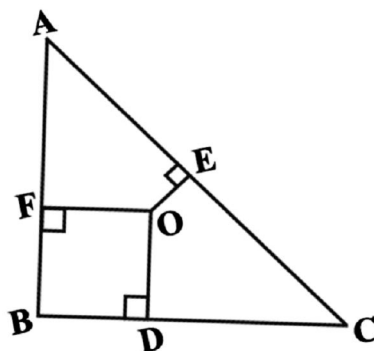
OR

In the given below figure, in  $\Delta ABC$ , D and E are the midpoint of the sides BC and AC respectively. Find the length of DE. Prove that  $DE = \frac{1}{2} AB$



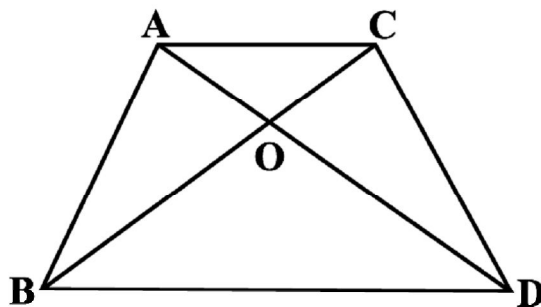
15. In the below figure, O is a point in the interior of a triangle ABC,  $OD \perp BC$ ,  $OE \perp AC$  and  $OF \perp AB$ . Show that

- (i)  $OA^2 + OB^2 + OC^2 - OD^2 - OE^2 - OF^2 = AF^2 + BD^2 + CE^2$ ,  
 (ii)  $AF^2 + BD^2 + CE^2 = AE^2 + CD^2 + BF^2$ .



OR

In the below figure, ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that  $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$



16. Evaluate without using tables: 
$$\frac{\sec \theta \operatorname{cosec}(90^\circ - \theta) - \tan \theta \cot(90^\circ - \theta) + (\sin^2 35^\circ + \sin^2 55^\circ)}{\tan 10^\circ \tan 20^\circ \tan 45^\circ \tan 70^\circ \tan 80^\circ}$$

OR

Prove that: 
$$\frac{1}{\operatorname{cosec} A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\operatorname{cosec} A + \cot A}$$

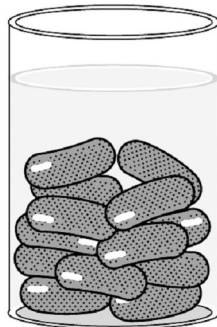
17. The below figure depicts a racing track whose left and right ends are semicircular.



The distance between the two inner parallel line segments is 60 m and they are each 106 m long. If the track is 10 m wide, find :

- (i) the distance around the track along its inner edge
- (ii) the area of the track.

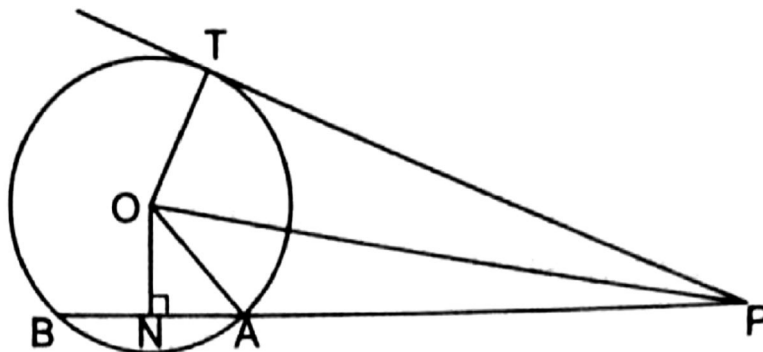
18. A gulab jamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns, each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm (see below figure).



OR

A cone of maximum size is carved out from a cube of edge 14 cm. Find the surface area of the remaining solid after the cone is carved out.

19. In the given below figure, from an external point P, a tangent PT and a secant PAB is drawn to a circle with centre O. ON is perpendicular on the chord AB. Prove that PA · PB = PT<sup>2</sup>.



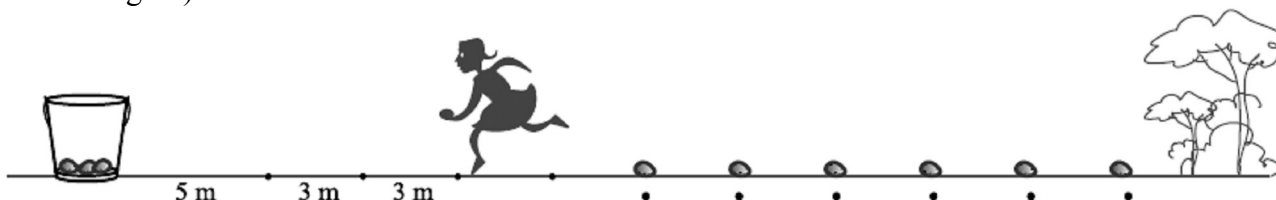
20. If two zeroes of the polynomial  $x^4 + 3x^3 - 20x^2 - 6x + 36$  are  $\sqrt{2}$  and  $-\sqrt{2}$ , find the other zeroes of the polynomial.
21. Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?
22. Find the mode of the following frequency distribution:

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of students	15	30	45	12	18

### SECTION – D

**Questions 23 to 30 carry 4 marks each.**

23. An aeroplane at an altitude of 300 m observes the angles of depression of opposite points on the two banks of a river to be  $45^\circ$  and  $60^\circ$ . Find the width of the river.
24. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.
- OR**
- An aeroplane left 40 minutes late due to heavy rains and in order to reach its destination, 1600 km away in time, it had to increase its speed by 400 km/hour from its original speed. Find the original speed of the aeroplane.
25. Prove that “The ratio of the areas of two similar triangles is equal to the square of the ratio of their 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.
26. Akshay took a right circular cylinder having base diameter 12cm and height 15cm and filled it completely with ice-cream. He then went to a slum area and distributed the ice-cream filled in cones of height 12cm and diameter 6cm each having a hemispherical shape on the top to the needy children. Find the number of children who will get ice cream in these cones. What are the values of Akshay that are depicted here ?
27. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line (see below figure).



A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run?

28. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.

29. Prove that  $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$

30. If the median of the distribution given below is 28.5, find the values of  $x$  and  $y$ .

<b>C. I.</b>	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Total
<b>F</b>	5	$x$	20	15	$y$	5	100

**OR**

Draw more than ogive for the following frequency distribution:

<b>Marks</b>	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
<b>Number of students</b>	5	8	6	10	6	6

Also find the median from the graph and verify that by using the formula.