

**KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION**  
**SAMPLE PAPER 04 (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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**CLASS : X**

**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

**SECTION – A**

**Questions 1 to 6 carry 1 mark each.**

1. Find the common difference of the AP:  $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \dots$
2. Show that  $12^n$  cannot end with the digit 0 or 5 for any natural number  $n$ .
3. Find the value of  $k$  for which the quadratic equation  $4x^2 - 3kx + 1 = 0$  has two real equal roots.
4. If  $A(6, -1)$ ,  $B(1, 3)$  and  $C(k, 8)$  are three points such that  $AB = BC$ , find the value of  $k$ .
5. If  $\cos \theta = \frac{1}{2}$ ,  $\sin \phi = \frac{1}{2}$  then find the value of  $\theta + \phi$ .
6. In triangle  $ABC$ ,  $DE \parallel BC$  and  $\frac{AD}{DB} = \frac{3}{5}$ . If  $AC = 4.8$  cm, find  $AE$ .

**SECTION – B**

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

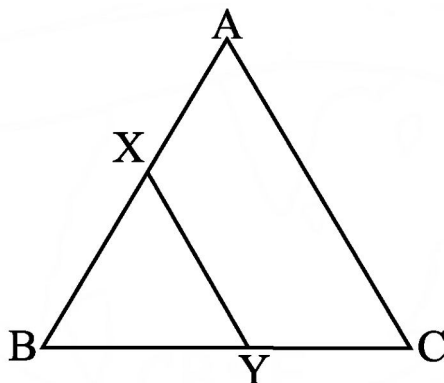
7. Prove that the points  $(7, 10)$ ,  $(-2, 5)$  and  $(3, -4)$  are the vertices of an isosceles right triangle.
8. Find the least number which when divided by 6, 15 and 18 leave remainder 5 in each case.
9. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability that the drawn card is (i) neither a king nor a queen (ii) red queen card.
10. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a prime-number less than 23 (ii) a perfect square number.
11. Find the value of  $k$ , so that the following system of equations has no solution:  
 $3x + y = 1$ ;  $(2k - 1)x + (k - 1)y = (2k - 1)$ .
12. How many three digit natural numbers are divisible by 7?

## SECTION – C

Questions 13 to 22 carry 3 marks each.

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

14. In the below figure, the line segment XY is parallel to side AC of  $\triangle ABC$  and it divides the triangle into two equal parts of equal areas. Find the ratio  $\frac{AX}{AB}$ .



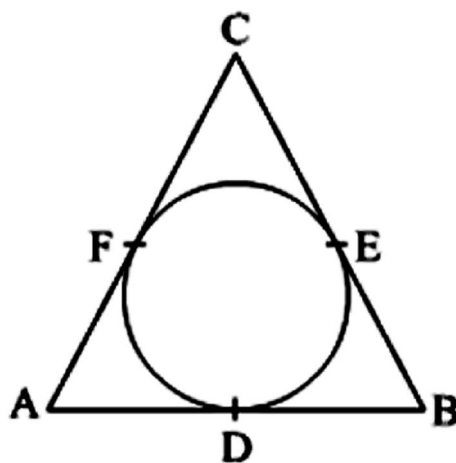
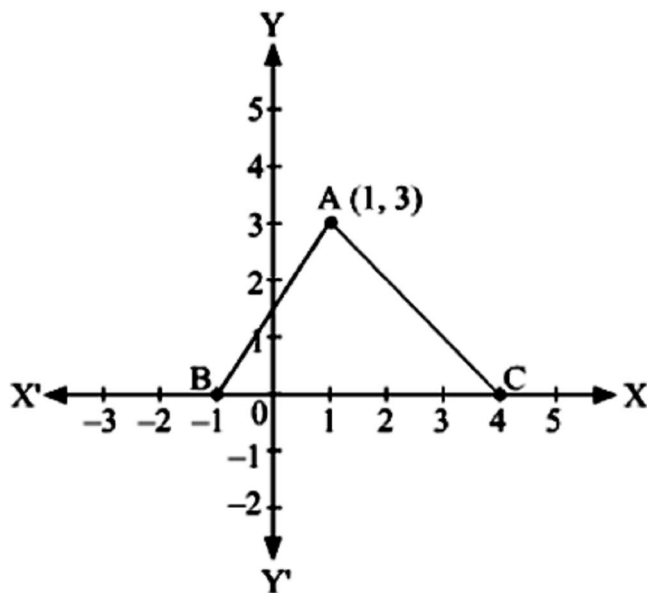
OR

Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that  $\triangle ABC \sim \triangle PQR$ .

15. The three vertices of a parallelogram ABCD are  $A(3, -4)$ ,  $B(-1, -3)$  and  $C(-6, 2)$ . Find the coordinates of vertex D.

OR

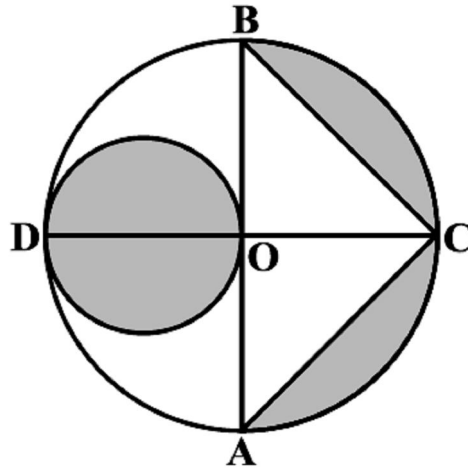
In the below figure, find the area of triangle ABC (in sq. units).



16. In the above right sided figure, a circle inscribed in triangle ABC touches its sides AB, BC and AC at points D, E and F respectively. If  $AB = 12$  cm,  $BC = 8$  cm and  $AC = 10$  cm, then find the lengths of AD, BE and CF.

17. The sum of a two-digit number and the number formed by interchanging its digit is 110. If 10 is subtracted from the original number, the new number is 4 more than 5 times the sum of the digits of the original number. Find the original number.

18. In the below figure, AB and CD are two diameters of a circle with centre O, which are perpendicular to each other. OB is the diameter of the smaller circle. If OA = 7 cm, find the area of the shaded region. (use  $\pi = 22/7$ )



19. If  $\alpha$  and  $\beta$  are the zeroes of the quadratic polynomial  $f(x) = 3x^2 - 4x + 1$ , then find a quadratic polynomial whose zeroes are  $\frac{\alpha^2}{\beta}$  and  $\frac{\beta^2}{\alpha}$ .

20. A vessel is in the form of hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the total surface area of the vessel. (use  $\pi = 22/7$ )

OR

A wooden toy was made by scooping out a hemisphere of same radius from each end of a solid cylinder. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the volume of wood in the toy. (use  $\pi = 22/7$ )

21. Evaluate:  $\frac{3 \cos 55^\circ}{7 \sin 35^\circ} - \frac{4(\cos 70^\circ \operatorname{cosec} 20^\circ)}{7(\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)}$

OR

If  $x = a \sin \theta + b \cos \theta$  and  $y = a \cos \theta + b \sin \theta$ , prove that  $x^2 + y^2 = a^2 + b^2$ .

22. An aircraft has 120 passenger seats. The number of seats occupied during 100 flights is given below:

No. of seats	100-104	104-108	108-112	112-116	116-120
Frequency	15	20	32	18	15

Determine the mean number of seats occupied over the flights

### SECTION – D

Questions 23 to 30 carry 4 marks each.

23. A fire in a building B is reported on telephone to two fire stations P and Q, 20 km apart from each other on a straight road. P observes that the fire is at an angle of  $60^\circ$  to the road and Q observes that it is at an angle of  $45^\circ$  to the road.  
 (a) Which station should send its team and how much will this team have to travel?  
 (b) What according to you, are the values displayed by the teams at fire stations P and Q.
24. Construct a triangle with sides 5 cm, 4 cm and 6 cm. Then construct another triangle whose sides are  $\frac{2}{3}$  times the corresponding sides of first triangle.

25. Find the number of terms of the AP  $18, 15\frac{1}{2}, 13, \dots, -49\frac{1}{2}$  and find the sum of all its terms.

26. A peacock is sitting on the top of a pillar, which is 9m high. From a point 27 m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal at what distance from the whole is the snake caught?

**OR**

In a class test, the sum of the marks obtained by P in mathematics and science is 28. Had he got 3 more marks in mathematics and 4 marks less in science, the product of marks obtained in the two subjects would have been 180. Find the marks obtained by him in the two subjects separately.

27. A bucket open at the top, and made up of a metal sheet is in the form of a frustum of a cone. The depth of the bucket is 24 cm and the diameters of its upper and lower circular ends are 30 cm and 10 cm respectively. Find the cost of metal sheet used in it at the rate of Rs 10 per 100  $\text{cm}^2$ . [Use  $\pi = 3.14$ ]

28. If  $\sec \theta = x + \frac{1}{4x}$ , Prove that  $\sec \theta + \tan \theta = 2x$  or  $\frac{1}{2x}$ .

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. From the following data, draw the two types of cumulative frequency curves and determine the median from the graph.

Height(in cm)	Frequency
140-144	3
144-148	9
148-152	24
152-156	31
156-160	42
160-164	64
164-168	75
168-172	82
172-176	86
176-180	34

**OR**

Compare the modal ages of two groups of students appearing for an entrance examination:

Age(in years)	16-18	18-20	20-22	22-24	24-26
<b>Group A</b>	50	78	46	28	23
<b>Group B</b>	54	89	40	25	17