KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION

SAMPLE PAPER 02 (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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SUBJECT: MATHEMATICS **MAX. MARKS : 80**
CLASS : X **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. For what value of k will k + 9, 2k – 1 and 2k + 7 are the consecutive terms of an A.P.?

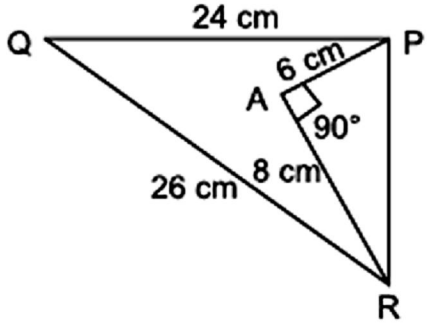
2. If product of two numbers is 3691 and their LCM is 3691, find their HCF.

3. If –5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

4. Find a relation between x and y if the points (x, y), (1, 2) and (7, 0) are collinear.

5. If A, B and C are the interior angles of triangle ABC, find $\tan\left(\frac{B+C}{2}\right)$

6. In the below figure, PQ = 24 cm, QR = 26 cm, PAR = 90°, PA = 6 cm and AR = 8 cm. Find QPR.



SECTION – B
Questions 6 to 12 carry 2 marks each.

7. Let P and Q be the points of trisection of the line segment joining the points A(2, –2) and B(–7, 4) such that P is nearer to A. Find the coordinates of P and Q.

8. In a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?

9. Three different coins are tossed together. Find the probability of getting (i) exactly two heads (ii) at least two heads

10. A card is drawn at random from a well-shuffled pack of 52 playing cards. Find the probability of getting (i) neither a red card nor a queen (ii) a face card or a spade card.

11. For what value of k, the following pair of linear equations has infinite number of solutions:
$kx + 3y = (2k + 1)$; $2(k + 1)x + 9y = (7k + 1)$.

12. If the ratio of the sum of first n terms of two A.P's is (7n + 1) : (4n + 27), find the ratio of their 10th terms.

SECTION – C

Questions 13 to 22 carry 3 marks each.

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

14. Obtain all the zeroes of $3x^4 + 6x^3 - 2x^2 - 10x + 5$, if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

15. The perpendicular from A on side BC of a ΔABC intersects BC at D such that DB = 3 CD. Prove that $2AB^2 = 2AC^2 + BC^2$.

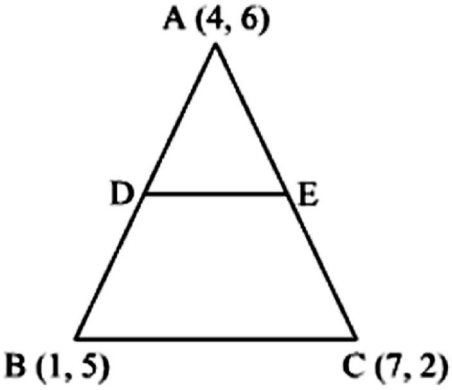
OR

In an equilateral triangle ABC, D is a point on side BC such that BD = $\frac{1}{3}$BC. Prove that $9AD^2 = 7AB^2$.

16. If the point P(x, y) is equidistant from the points A(a + b, b − a) and B(a − b, a + b). Prove that bx = ay.

OR

In the below figure, the vertices of ΔABC are A(4, 6), B(1, 5) and C(7, 2). A line-segment DE is drawn to intersect the sides AB and AC at D and E, respectively, such that $\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{3}$. Calculate the area of ΔADE and compare it with area of ΔABC.

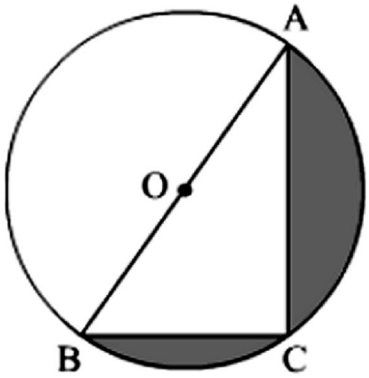


17. A conical vessel, with base radius 5 cm and height 24 cm, is full of water. This water is emptied into a cylindrical vessel of base radius 10 cm. Find the height to which the water will rise in the cylindrical vessel. [Use π=22/7]

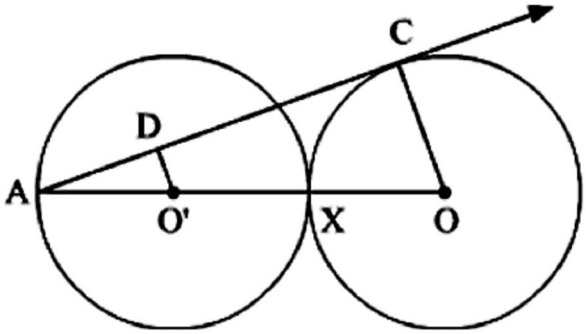
OR

A sphere of diameter 12 cm, is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $3\frac{5}{9}$ cm. Find the diameter of the cylindrical vessel.

18. In the below figure, O is the centre of a circle such that diameter AB = 13 cm and AC = 12 cm. BC is joined. Find the area of the shaded region. (Take $\pi = 3.14$)



19. In the below figure, two equal circles, with centres O and O', touch each other at X.OO' produced meets the circle with centre O' at A. AC is tangent to the circle with centre O, at the point C. O'D is perpendicular to AC. Find the value of DO'/CO.



20. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?

21. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

OR

Evaluate: $\dfrac{2\sin 68^0}{\cos 22^0} - \dfrac{2\cot 15^0}{5\tan 75^0} - \dfrac{3\tan 45^0 \tan 20^0 \tan 40^0 \tan 50^0 \tan 70^0}{5}$

22. Find the mode age of the patients from the following distribution :

Age(in years)	6-15	16-25	26-35	36-45	46-55	56-65
No. of patients	6	11	21	23	14	5

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. From a point Y, 40 m vertically above X, the angle of elevation of the top Q of tower is 45°. Find the height of the tower PQ and the distance PX. (Use $\sqrt{3} = 1.73$).

24. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of 60° to each other.

25. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government to provide place and the canvas for 1500 tents to be fixed by the government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8 m and height 3.5 m, with conical upper part of same base radius but of height 2.1 m. If the canvas used to make the tents costs Rs 120 per sq.m, find the amount shared by each school to set up the tents. What value is generated by the above problem? [Use $\pi=22/7$]

26. The houses in a row are numbered consecutively from 1 to 49. Show that there exists a value of X such that sum of numbers of houses proceeding the house numbered X is equal to sum of the numbers of houses following X.

27. Solve for x : $\frac{1}{(x-1)(x-2)}+\frac{1}{(x-2)(x-3)}=\frac{2}{3}, x\neq 1,2,3$

OR

Solve for x : $\frac{1}{x+1}+\frac{2}{x+2}=\frac{4}{x+4}, x\neq -1,-2,-4$

28. 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 "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".

29. Prove that : $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}=1+\sec A\cos ecA$.

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 50.

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	f_1	32	f_2	19	120

OR

For the following distribution, draw the cumulative frequency curve more than type and hence obtain the median from the graph.

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of Students	6	15	29	41	60	70

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