

KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32
SAMPLE PAPER 03 (2019-20)

SUBJECT: MATHEMATICS(041) (STANDARD)

BLUE PRINT : CLASS X

Unit	Chapter	MCQ (1 mark)	FIB (1 mark)	VSA (1 mark)	SA-I (2 marks)	SA-II (3 marks)	LA (4 marks)	Total	Unit Total
Number system	Real Numbers	2(2)	--	1(1)	--	3(1)*	--	6(3)	6(3)
Algebra	Pair of Linear Equations in two variables	1(1)	--	--	--	3(1)*	--	4(2)	20(11)
	Polynomials	--	1(1)*	--	--	3(1)	--	3(1)	
	Quadratic Equations	--		1(1)	--	--	4(1)*	6(3)	
	Arithmetic progression	--	1(1)	1(1)	2(1)	3(1)	--	7(5)	
Coordinate Geometry	Coordinate Geometry	3(3)	--	--	--	3(1)**	--	6(4)	6(4)
Trigonometry	Introduction to Trigonometry	3(3)	--	--	--	3(1)*	--	6(4)	12(6)
	Some Applications of Trigonometry	--	--	--	2(1)**	--	4(1)	6(2)	
Geometry	Triangles	--	1(1)	1(1)	2(1)*	--	4(1)	8(4)	15(7)
	Circles	--	--	1(1)*	2(1)	--	--	3(2)	
	Constructions	--	--	--	--	--	4(1)*	4(1)	
Mensuration	Areas Related to Circles	--	--	--	--	3(1)	--	3(1)	10(4)
	Surface Areas and Volumes	--	1(1)	--	2(1)**	--	4(1)*	7(3)	
Statistics & probability	Statistics	1(1)	--	--	--	3(1)**	4(1)	8(3)	11(5)
	Probability	--	1(1)	--	2(1)*	--	--	3(2)	
Total		10(10)	5(5)	5(5)	12(6)	24(8)	24(6)	80(30)	80(40)

Note: * - Internal Choice Questions and Yellow shaded with ** - PISA type questions

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SUBJECT: MATHEMATICS
CLASS : X

MAX. MARKS : 80
DURATION : 3 HRS

General Instruction:

- (i) All the questions are compulsory.
(ii) The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
(iii) **Section A** comprises of 20 questions of **1 mark** each. **Section B** comprises of 6 questions of **2 marks** each. **Section C** comprises of 8 questions of **3 marks** each. **Section D** comprises of 6 questions of **4 marks** each.
(iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three 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 20 carry 1 mark each.

1. The decimal expansion of $\frac{63}{72 \times 175}$ is
(a) terminating (b) non-terminating
(c) non termination and repeating (d) an irrational number
2. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$; x, y are prime numbers, then HCF (a, b) is
(a) xy (b) xy^2 (c) x^3y^3 (d) x^2y^2
3. The value of c for which the pair of equations $cx - y = 2$ and $6x - 2y = 3$ will have no solution is
(a) 3 (b) -3 (c) -12 (d) no value
4. If triangle ABC is right angled at C, then the value of $\sec(A+B)$ is
(a) 0 (b) 1 (c) $\frac{2}{\sqrt{3}}$ (d) not defined
5. If $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$, ($\theta \neq 90^\circ$) then the value of θ is
(a) $\sqrt{2} - 1$ (b) $\sqrt{2} + 1$ (c) $\sqrt{2}$ (d) $-\sqrt{2}$
6. Given that $\sin \alpha = \frac{\sqrt{3}}{2}$ and $\cos \beta = 0$, then the value of $\beta - \alpha$ is
(a) 0° (b) 90° (c) 60° (d) 30°
7. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
(a) 5 (b) 12 (c) 11 (d) $7 + \sqrt{5}$
8. The distance of the point P (-3, -4) from the x-axis (in units) is
(a) 3 (b) -3 (c) 4 (d) 5
9. If A($m/3, 5$) is the mid-point of the line segment joining the points Q (-6, 7) and R (-2, 3), then the value of m is
(a) -12 (b) -4 (c) 12 (d) -6

10. The upper limit of the median class in the given below data is

Class	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
Frequency	25	15	10	6	24	12	8

- (a) 40 (b) 50 (c) 60 (d) 70

11. The next term of the A.P. $\sqrt{7}, \sqrt{28}, \sqrt{63}, \dots$ is _____

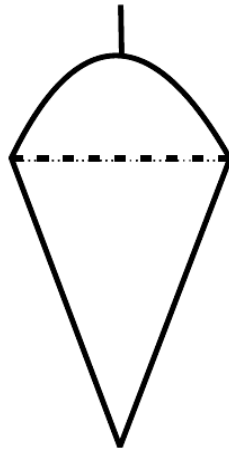
12. If one of the roots of the quadratic equation $(k^2 + 4)x^2 + 13x + 4k$ is reciprocal of the other then $k = \underline{\hspace{2cm}}$

OR

If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3 , then $a = \underline{\hspace{2cm}}$

13. One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is _____

14. A plumbline (sahul) is the combination of (see below figure) _____

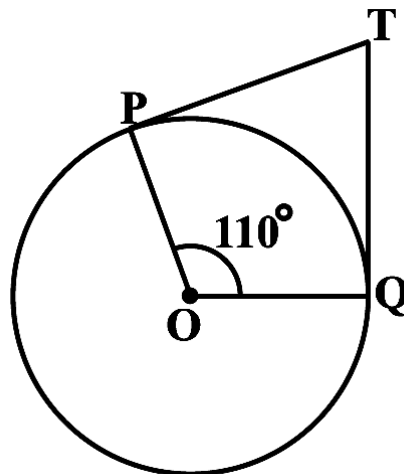


15. A vertical pole of length 20 m casts a shadow 10 m long on the ground and at the same time a tower casts a shadow 50 m long, then the height of the tower is _____

16. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Find the Length PQ.

OR

In the below figure, if TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110^\circ$, then find $\angle PTQ$.



17. Find the 30th term of the AP: 10, 7, 4,

18. Without actually performing the long division, find if $\frac{987}{10500}$ will have terminating or non-terminating (repeating) decimal expansion. Give reasons for your answer.
19. If 2 is a root of the quadratic equation $3x^2 + px - 8 = 0$ and the quadratic equation $4x^2 - 2px + k = 0$ has equal roots, find the value of k.
20. Sides of 2 similar triangles are in the ratio 4 : 9. What is the ratio areas of these triangles.

SECTION – B

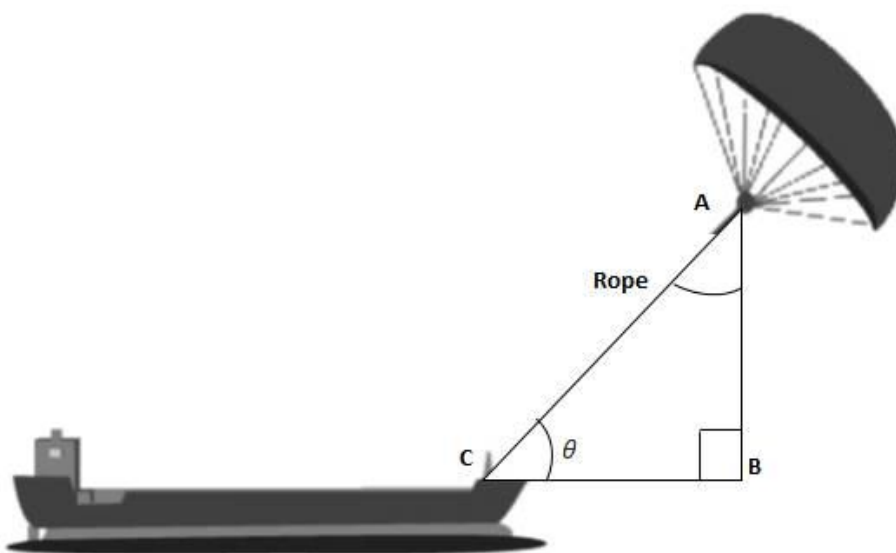
Questions 21 to 26 carry 2 marks each.

21. A dice is rolled twice. Find the probability that (i) 5 will not come up either time. (ii) 5 will come up exactly one time.

OR

A bag contains cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that the number on this card is (i) divisible by both 2 and 3 (ii) a two digit number

22. For what value of k, the following pair of linear equations has infinite number of solutions:
 $2x + (k - 2)y = k$; $6x + (2k - 1)y = (2k + 5)$.
23. The sum of the first n terms of an A.P. is $5n - n^2$. Find the nth term of this A.P.
24. 'Skysails' is that genre of engineering science that uses extensive utilization of wind energy to move a vessel in the sea water. The 'Skysails' technology allows the towing kite to gain a height of anything between 100 metres – 300 metres. The sailing kite is made in such a way that it can be raised to its proper elevation and then brought back with the help of a 'telescopic mast' that enables the kite to be raised properly and effectively.
 Based on the following figure related to sky sailing, answer the questions:



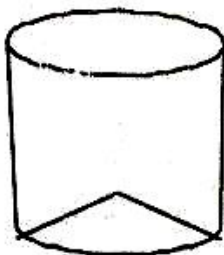
- (i) In the given figure, if $\sin\theta = \cos(3\theta - 30^\circ)$, where θ and $3\theta - 30^\circ$ are acute angles, then find the value of θ .
- (ii) What should be the length of the rope of the kite sail in order to pull the ship at the angle (calculated above) and be at a vertical height of 200 m?
25. Isha is 10 years old girl. On the result day, Isha and her father Suresh were very happy as she got first position in the class. While coming back to their home, Isha asked for a treat from her father as a reward for her success. They went to a juice shop and asked for two glasses of juice.

Aisha, a juice seller, was serving juice to her customers in two types of glasses. Both the glasses had inner radius 3cm. The height of both the glasses was 10cm.

First type: A Glass with hemispherical raised bottom.



Second type: A glass with conical raised bottom of height 1.5 cm.



Isha insisted to have the juice in first type of glass and her father decided to have the juice in second type of glass. Out of the two, Isha or her father Suresh, who got more quantity of juice to drink and by how much?

26. A quadrilateral ABDC is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.

SECTION – C

Questions 27 to 34 carry 3 marks each.

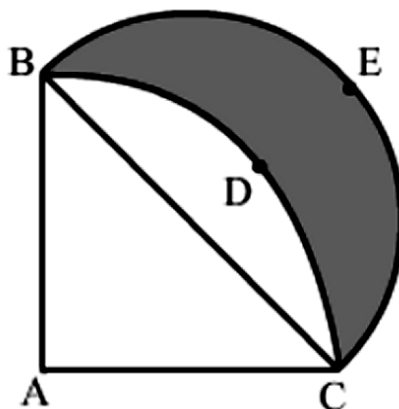
27. Given that $\sqrt{5}$ is an irrational number, prove that $7 - 2\sqrt{5}$ is an irrational number.

OR

Find the largest number which divides 2053 and 967 and leaves a remainder of 5 and 7 respectively.

28. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder comes out to be $(ax + b)$, find a and b.

29. In the below figure, ABCD is a quadrant of a circle of radius 28 cm and a semi circle BEC is drawn with BC as diameter. Find the area of the shaded region. [Use $\pi = \frac{22}{7}$]



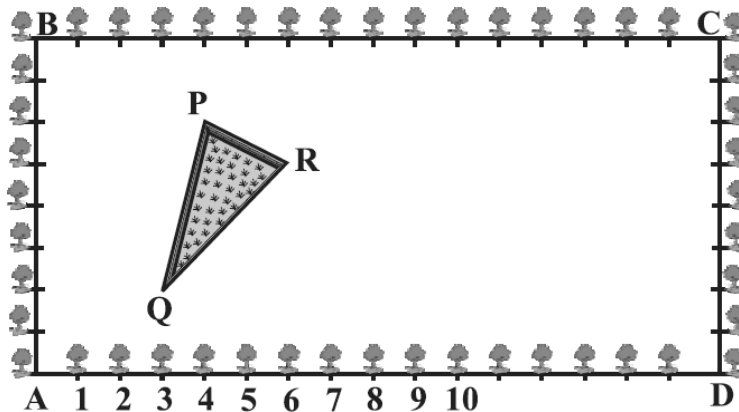
30. If S_n denotes the sum of the first n terms of an A.P., prove that $S_{30} = 3(S_{20} - S_{10})$.

31. The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.

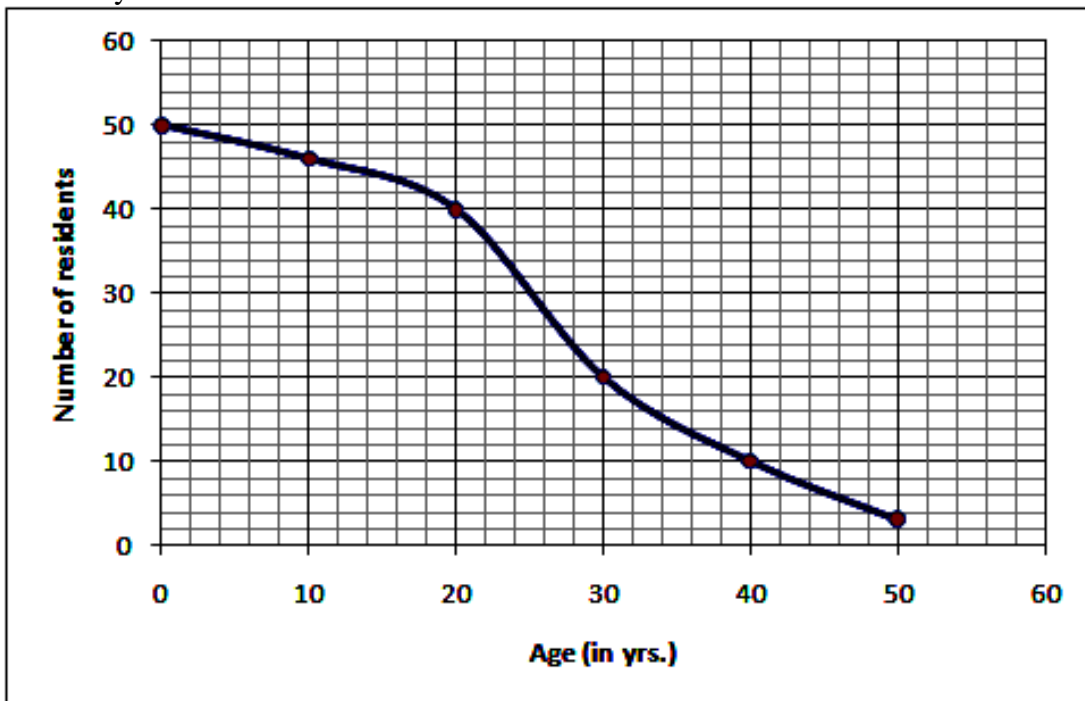
OR

Solve the following system of equations: $6x + 3y = 6xy$ and $2x + 4y = 5xy$

32. Students of a class were given a rectangular plot of land ABCD for gardening activity. Saplings of Gulmohar were planted on the boundary such that distance between any two consecutive saplings is 1 m. Further, there is a triangular grassy lawn in the plot as shown in the below figure. The students are to sow seeds of flowering plants on the remaining area of the plot.
- (i) Taking A as origin, find the coordinates of the points P, Q and R.
- (ii) Find the area of the triangular grassy lawn.



33. On 2nd October, 100 residents of a colony took part in Swachh Bharat Abhiyan. A student collected the number of residents with respect to their ages. After collecting the data, he analyzed the data and prepared a report on the Swachh Bharat Abhiyan. Using this report, he drew the following graph for a particular of 100 residents of a colony took part in Swachh Bharat Abhiyan:



Based on the above graph, answer the following questions:

- (i) Form the frequency distribution table for the data.
- (ii) Find the median age of 100 residents of a colony who took part in Swachh Bharat Abhiyan by using graph and actual calculations.

34. If $A + B = 90^\circ$, prove that $\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$

OR

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

SECTION – D

Questions 35 to 40 carry 4 marks each.

35. The angle of elevation of the top of a chimney from the foot of a tower is 60° and the angle of depression of the foot of the chimney from the top of the tower is 30° . If the height of the tower is 40 m, find the height of the chimney.

36. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

OR

Construct a triangle PQR, in which $PQ = 6$ cm, $QR = 7$ cm and $PR = 8$ cm. Then construct another triangle whose sides are $\frac{4}{5}$ times the corresponding sides of ΔPQR .

37. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

38. A petrol tank is in the form of a frustum of a cone of height 20 m with diameters of its lower and upper ends as 20 m and 50 m respectively. Find the cost of petrol which can fill the tank completely at the rate of Rs. 70 per litre. Also find the surface area of the tank.

OR

Water is flowing at the rate of 15km/hour through a pipe of diameter 14cm into a cuboidal pond which is 50m long and 44m wide. In what time will the level of water in the pond rise by 21cm?

39. 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”.

40. The median of the following data is 28. Find the values of x and y , if the total frequency is 50.

Marks	0-7	7-14	14-21	21-28	28-35	35-42	42-49
No. of Students	3	x	7	11	y	16	9