

KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32
SAMPLE PAPER 01 (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. Let $x = \frac{7}{20 \times 25}$ be a rational number. Then x has decimal expansion, which terminates:
(a) after four places of decimal (b) after three places of decimal
(c) after two places of decimal (d) after five places of decimal
2. On dividing a positive integer n by 9, we get 7 as a remainder. What will be the remainder if $(3n - 1)$ is divided by 9?
(a) 1 (b) 2 (c) 3 (d) 4
3. If the pair of equations $2x + 3y = 7$ and $kx + \frac{9}{2}y = 12$ have no solution, then the value of k is:
(a) $\frac{2}{3}$ (b) - 3 (c) 3 (d) $\frac{3}{2}$
4. If $P\left(-\frac{a}{3}, 4\right)$ is the mid-point of the line segment joining the points Q (- 6, 5) and R (- 2, 3), then the value of a is
(a) - 4 (b) - 12 (c) 12 (d) - 6
5. The points (-4, 0), (4, 0), (0, 3) are the vertices of a
(a) right triangle (b) isosceles triangle
(c) equilateral triangle (d) scalene triangle
6. The point which divides the line segment joining the points (7, -6) and (3, 4) in ratio 1 : 2 internally lies in the
(a) I quadrant (b) II quadrant
(c) III quadrant (d) IV quadrant
7. The value of the expression $[\operatorname{cosec} (75^\circ + \theta) - \sec (15^\circ - \theta) - \tan (55^\circ + \theta) + \cot (35^\circ - \theta)]$ is
(a) - 1 (b) 0 (c) 1 (d) $\frac{3}{2}$

8. The value of $(\tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \tan 89^\circ)$ is
 (a) 0 (b) 1 (c) 2 (d) $\frac{1}{2}$
9. If $\cos 9\alpha = \sin \alpha$ and $9\alpha < 90^\circ$, then the value of $\tan 5\alpha$ is
 (a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$ (c) 1 (d) 0

10. For the following distribution :

Class	Frequency
0-5	10
5-10	15
10-15	12
15-20	20
20-25	9

the sum of lower limits of the median class and modal class is

- (a) 15 (b) 25 (c) 30 (d) 35

11. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is -1 , then the product of the other two zeroes is _____

OR

If 1 is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is _____

12. The 10th term of the AP: 5, 8, 11, 14, ... is _____
13. The perimeters of two similar triangles $\triangle ABC$ and $\triangle PQR$ are 35cm and 45cm respectively, then the ratio of the areas of the two triangles is _____
14. If the probability of an event is p , the probability of its complementary event will be _____
15. A shuttle cock used for playing badminton has the shape of the combination of _____
16. If the angle between two tangents drawn from an external point 'P' to a circle of radius 'r' and centre O is 60° , then find the length of OP.
- OR**
- If the radii of two concentric circles are 4 cm and 5 cm, then find the length of each chord of one circle which is tangent to the other circle.
17. 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.
18. Find the values of k for quadratic equation $2x^2 + kx + 3 = 0$, so that they have two equal roots.
19. The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, find the other number.
20. Which term of the AP: 3, 8, 13, 18, is 78?

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. 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

OR

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.

22. In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitudes.

OR

PQR is a triangle right angled at P and M is a point on QR such that $PM \perp QR$. Show that $PM^2 = QM \cdot MR$.

23. Prove that the rectangle circumscribing a circle is a square.

24. Sampat has set up his juice shop. He has three types of cylindrical glasses as given below:

Type-I: A cylindrical glass with inner diameter 7 cm and height as 10 cm.

Type-II: A cylindrical glass with inner diameter 4 cm and height as 14 cm.

Type-III: A cylindrical glass with inner diameter 14 cm and height as 4 cm.

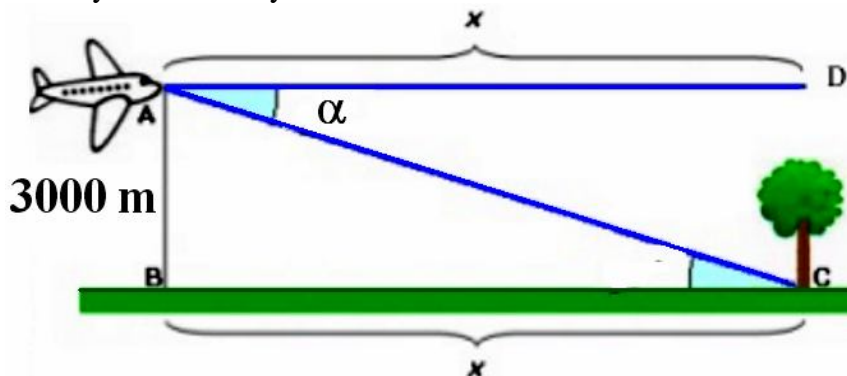
He decided to serve the customers in 'type-I' of glasses.

(a) Find the volume of the glass of type-I.

(b) Which glass has the minimum capacity?

25. The sum of first n terms of an AP is given by $S_n = 2n^2 + 3n$. Find the sixteenth term of the AP.

26. An airplane or aeroplane (informally plane) is a powered, fixed-wing aircraft that is propelled forward by thrust from a jet engine, propeller or rocket engine. Airplanes come in a variety of sizes, shapes, and wing configurations. The essential components of an airplane are a wing system to sustain it in flight, tail surfaces to stabilize the wings, movable surfaces to control the attitude of the plane in flight, and a power plant to provide the thrust necessary to push the vehicle through the air. Provision must be made to support the plane when it is at rest on the ground and during takeoff and landing. Most planes feature an enclosed body (fuselage) to house the crew, passengers, and cargo; the cockpit is the area from which the pilot operates the controls and instruments to fly the plane. A passenger is travelling in an airplane. An airplane is flying at a height of 3000 m above the level ground. He observes that the angle of depression from the plane to the foot of a tree is α , such that $\cos 3\alpha = \sin(120^\circ - 4\alpha)$. Find the distance that the airplane must fly to be directly above the tree.



SECTION – C

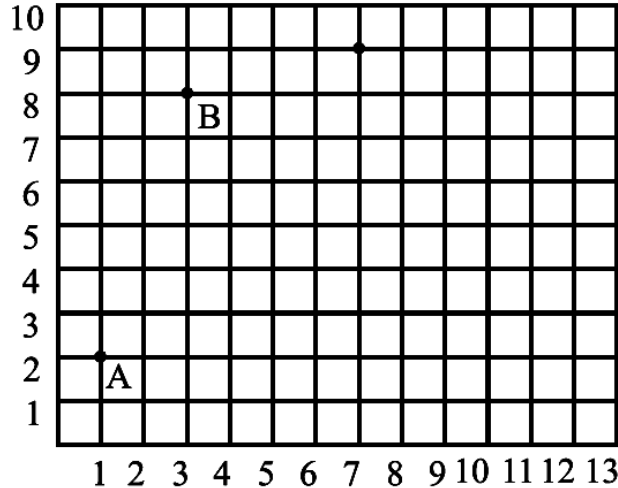
Questions 27 to 34 carry 3 marks each.

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

OR

Using Euclid's division algorithm, find the HCF of 2160 and 3520.

28. One day, three friends Aakash, Aditya and Manoj went to Children Park to play some games. While playing at one moment Aakash is at the point P, Aditya is at point A and Manoj is at point B such that Aakash's distance from Aditya and Manoj are equal. If the position of Aditya and Manoj are given as (1, 2) and (3, 8) respectively and area of PAB = 10 sq. m, then find the coordinates of P. Also find the distance of Aakash from Aditya and Manoj.



29. 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:
$$\frac{1}{\operatorname{cosec} A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\operatorname{cosec} A + \cot A}$$

30. 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.

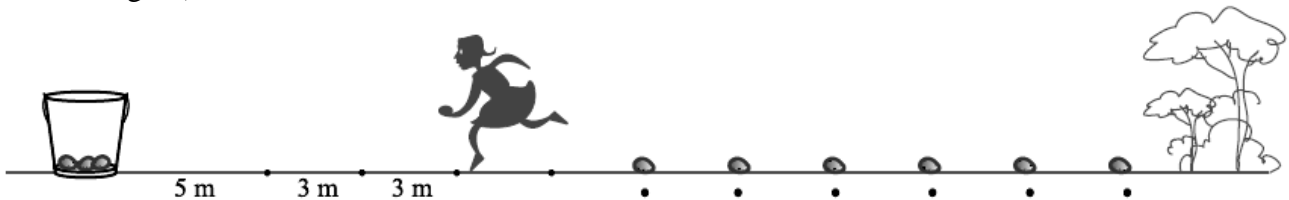
31. Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?

OR

Solve the following system of equations:

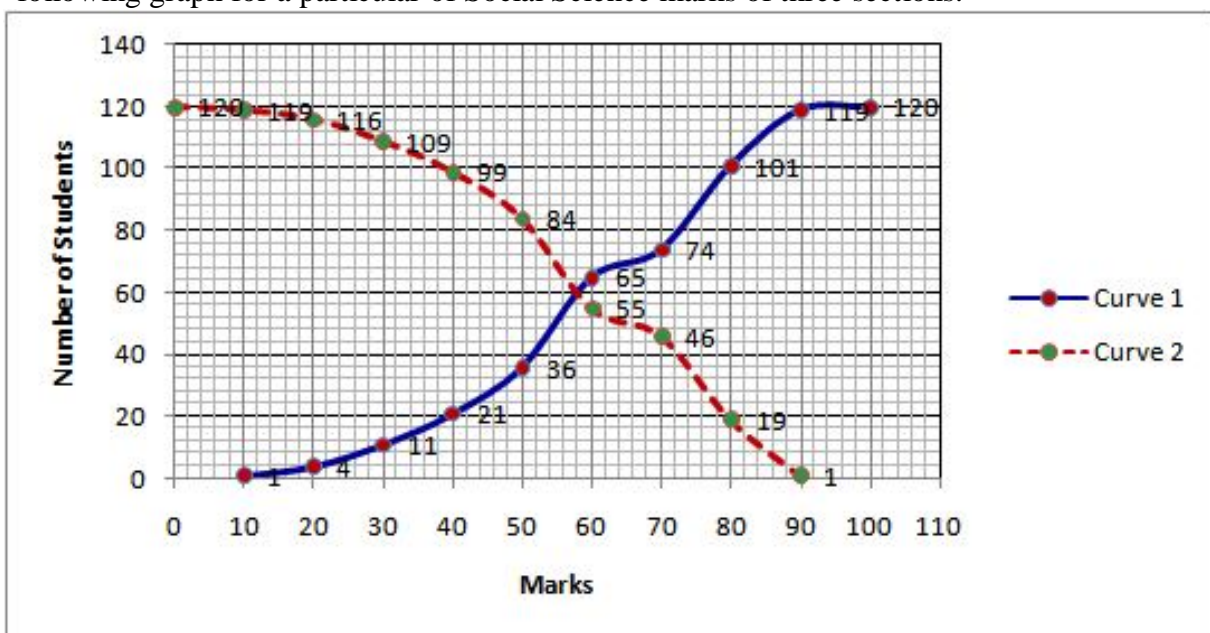
$$\frac{1}{2x} + \frac{1}{3y} = 2 \quad \text{and} \quad \frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$$

32. 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?

33. Aditya decided to collect the Social Science marks of Class 10-A, 10-B and 10-C. The total number of students of three sections is 120. After collecting the data, he analyzed the data and prepared a report on the Social Science marks of three sections. Using this report, he drew the following graph for a particular of Social Science marks of three sections:



Based on the above graph, answer the following questions:

- Identify less than type ogive and more than type ogive from the given graph.
 - Find the median Social Science marks of three sections.
 - Obtain the Mode marks of the data if mean Social Science marks of three sections is 58
34. 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.

SECTION – D

Questions 35 to 40 carry 4 marks each.

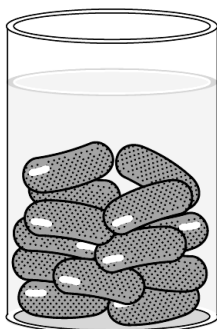
35. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45° , how long will the car take to reach the observation tower from this point?

36. 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.

37. 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.

38. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

39. Draw a triangle ABC with side $BC = 7$ cm, $B = 45^\circ$, $A = 105^\circ$. Then, construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC .

OR

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.

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

C. I.	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Total
F	5	x	20	15	y	5	100