

KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32
SAMPLE PAPER 09 (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 product of smallest prime number and the smallest composite number is
(a) 2 (b) 4 (c) 6 (d) 8
2. The decimal expansion of the rational number $\frac{11}{2^3 \times 5^2}$ will terminate after:
(a) one decimal place (b) two decimal places
(c) three decimal places (d) more than three decimal places.
3. For what value of k, does the pair of linear equations given below has a unique solution?
 $2x + ky = 6$ and $4x + 6y = 0$
(a) $k = 3$ (b) $k \neq 3$ (c) $k \neq -3$ (d) none of these
4. If the line segment joining the points P and Q(3, -4) is bisected at origin, then the coordinates of P are
(a) (-3, 4) (b) (-3, -4) (c) (3, 4) (d) $(\frac{3}{2}, 2)$
5. If the points (7, -2), (5, 1) and (3, k) are collinear then the value of k is
(a) 4 (b) 10 (c) -4 (d) 0
6. The point on x-axis which is equidistant from points (-1, 0) and (5, 0) is
(a) (0, 2) (b) (2, 0) (c) (3, 0) (d) (0, 3)
7. The value of the expression $\left[\frac{\sin^2 22^\circ + \sin^2 68^\circ}{\cos^2 22^\circ + \cos^2 68^\circ} + \sin^2 63^\circ + \cos 63^\circ \sin 27^\circ \right]$ is
(a) 3 (b) 0 (c) 1 (d) 2
8. If $\sin 3A = \cos (A - 26^\circ)$, where 3A is an acute angle, find the value of A.
(a) 29° (b) 30° (c) 26° (d) 36°
9. In a right triangle ABC, right-angled at B, if $\tan A = 1$, then the value of $2 \sin A \cos A =$
(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) n.d.

10. For the following distribution:

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

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

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

11. A sphere of maximum volume is cut out from a solid hemisphere of radius 7 cm then the ratio of the volume of the hemisphere to that of the cut out sphere is _____

12. In an AP, if $a = 3$, $n = 8$, $S_n = 192$, then the value of d is _____

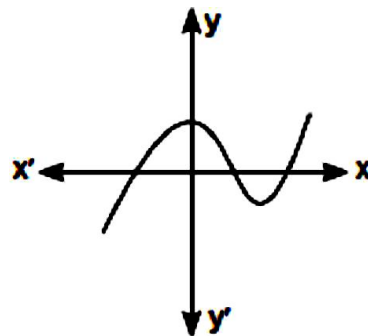
13. A girl walks 200 towards East and she walks 150m towards North then the distance of the girl from the starting point is _____

14. Cards bearing numbers 3 to 20 are placed in a bag and mixed thoroughly. A card is taken out from the bag at random then the probability that the number on the card taken out is an even number is _____

15. If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then the value of k is _____

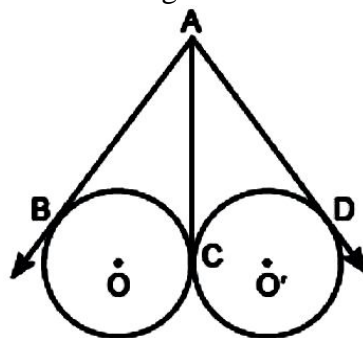
OR

The graph of $y = f(x)$ is given below, for some polynomial $f(x)$, the number of zeroes of $f(x)$ is _____



16. Show that 12^n cannot end with the digit 0 or 5 for any natural number n .

17. In the given figure, AB, AC and AD are tangents. If $AB = 5$ cm, find AD.



OR

A point P is 26 cm from the centre of the circle. The length of the tangent drawn from P to the circle is 24 cm. Find the radius of the circle.

18. If two roots of $2x^2 + bx + c = 0$ are reciprocal of each other then find the value of c .

19. Find the 20th term of the A.P. $-5, -\frac{5}{2}, 0, \frac{5}{2}, \dots$

20. The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of first triangle is 9 cm., what is the corresponding side of the other triangle ?

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. Find the probability that in a leap year there will be 53 Tuesdays.

OR

Two different dice are thrown together. Find the probability that the product of the numbers appeared is less than 18.

22. Diagonals of a trapezium PQRS intersect each other at the point O, $PQ \parallel RS$ and $PQ = 3 RS$. Find the ratio of the areas of triangles POQ and ROS.

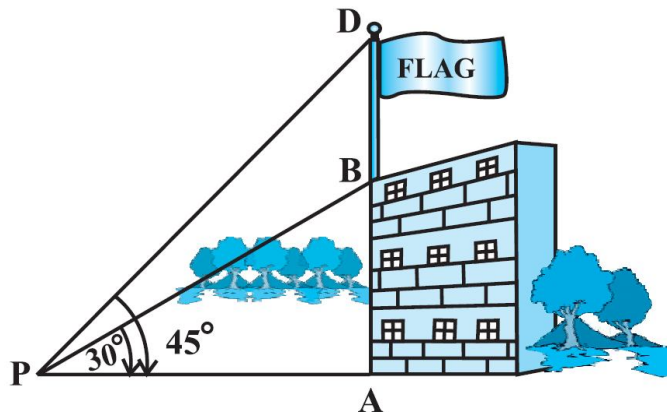
OR

Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

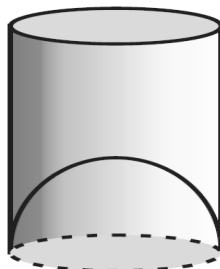
23. If seven times the 7th term of an A.P. is equal to eleven times the 11th term, then what will be its 18th term?

24. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

25. From a point P on the ground the angle of elevation of the top of a 50 m tall building is 30° . A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45° . Find the length of the flagstaff.



26. Manoj is a juice seller. One day 100 workers are injured due to an accident occurred in a factory. Manoj felt pity about the workers and decided to help all the affected workers by providing juice. He is serving all the patients using glasses as shown in below figure. The inner diameter of the cylindrical glass was 5 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was 10 cm, find the actual capacity of juice required for 100 patients.



SECTION – C

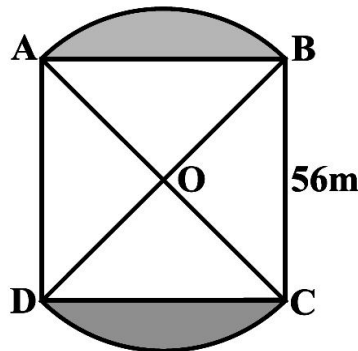
Questions 27 to 34 carry 3 marks each.

27. If d is the HCF of 56 and 72, find x, y satisfying $d = 56x + 72y$. Also show that x and y are not unique.

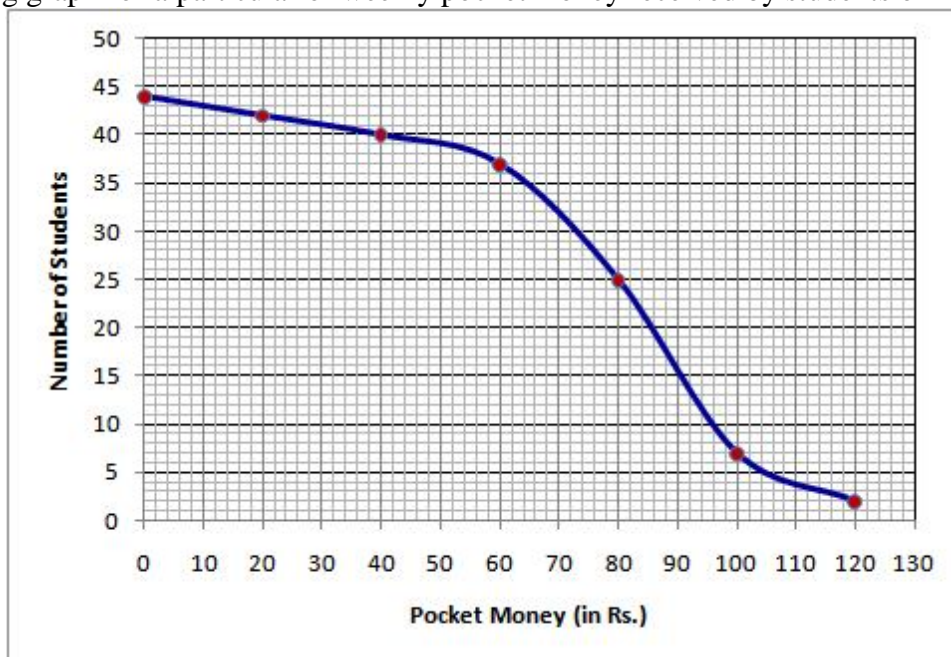
OR

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

28. In the below figure, two circular flower beds have been shown on two sides of a square lawn ABCD of side 56 m. If the centre of each circular flower bed is the point of intersection O of the diagonals of the square lawn, find the sum of the areas of the lawn and the flower beds.



29. Ajay collected the details of weekly pocket money received by students of his class. The total number of students is 44. After collecting the data, he analyzed the data and prepared a report on the weekly pocket money received by students of his class. Using this report, he drew the following graph for a particular of weekly pocket money received by students of his class:



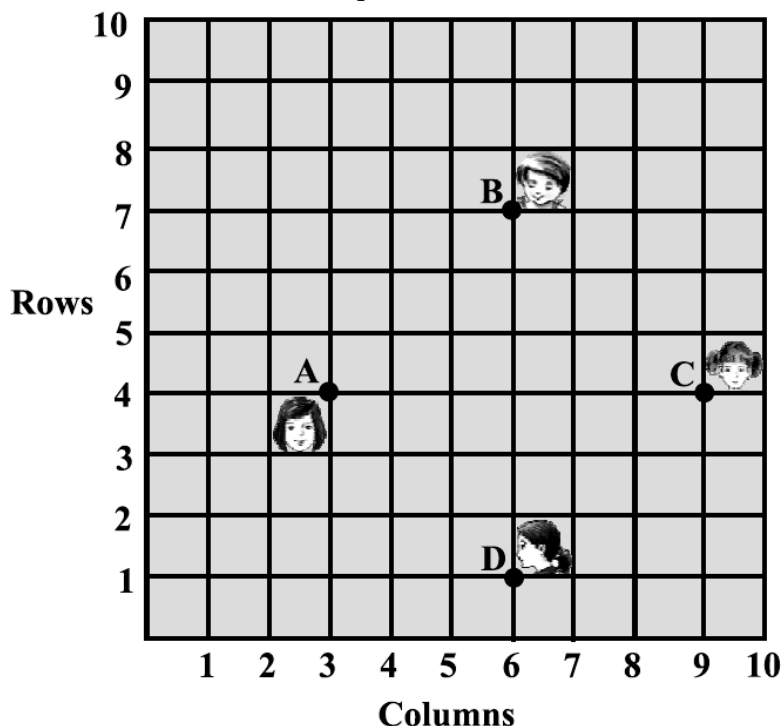
Based on the above graph, answer the following questions:

- Form the frequency distribution table for the data.
 - Find the median weekly pocket money of his class from the graph and verify the result by using formula.
 - Obtain the Mode of the data if mean weekly pocket money is 86 cm
30. Draw the graphs of the equations $4x - y - 8 = 0$; $2x - 3y + 6 = 0$. Also determine the vertices of the triangle formed by the lines and x-axis.

OR

Solve for x and y : $47x + 31y = 63$; $31x + 47y = 15$.

31. In a classroom, 4 friends are seated at the points A, B, C and D as shown in below figure. Champa and Chameli walk into the class and after observing for a few minutes Champa asks Chameli, "Don't you think ABCD is a square?" Chameli disagrees. Chameli performed certain calculations and claimed that ABCD is a square. State how did she arrive at this conclusion.



32. Evaluate:
$$\frac{\cos^2 40^\circ + \cos^2 50^\circ}{\sin^2 40^\circ + \sin^2 50^\circ} + \frac{4(\cos 70^\circ \operatorname{cosec} 20^\circ)}{7(\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)}$$

OR

Prove that:
$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$

33. If α, β are the zeroes of the polynomials $f(x) = x^2 - 3x + 6$, then find the value of
$$\frac{1}{\alpha} + \frac{1}{\beta} + \alpha^2 + \beta^2 - 2\alpha\beta$$

34. A child puts one five-rupee coin of her saving in the piggy bank on the first day. She increases her saving by one five-rupee coin daily. If the piggy bank can hold 190 coins of five rupees in all, find the number of days she can continue to put the five-rupee coins into it and find the total money she saved.

SECTION – D

Questions 35 to 40 carry 4 marks each.

35. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{4}$ times the corresponding sides of the given triangle.

OR

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

36. The angle of elevation of an aeroplane from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . If the plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed in km/hr of the plane.

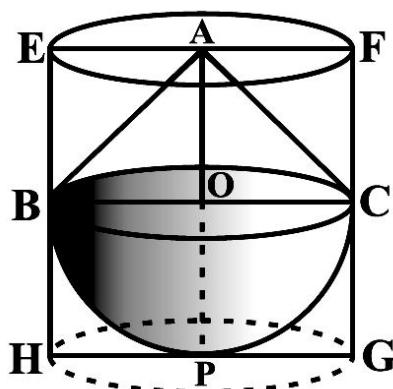
37. If the quadratic equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ in x, has equal roots, then show that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$.

OR

In a rectangular park of dimensions $50\text{ m} \times 40\text{ m}$, a rectangular pond is constructed so that the area of grass strip of uniform width surrounding the pond would be 1184 m^2 . Find the length and breadth of the pond.

38. 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”.

39. A solid toy is in the form of a hemisphere surmounted by a right circular cone (see the below figure). The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)



OR

A solid sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel?

40. Find the missing frequencies in the following frequency distribution table, if the total frequency is 100 and median is 32.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	10	x	25	30	y	10