KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32
SAMPLE PAPER TEST 06 (STANDARD) (2019-20)

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. \( n^2 - 1 \) is divisible by 8, if \( n \) is
   (a) an integer      (b) a natural number      (c) an odd integer      (d) an even integer

2. The decimal expansion of the rational number \( \frac{11}{2^3 \times 5^3} \) 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?
   \[ 2x + ky = 6 \text{ and } 4x + 6y = 0 \]
   (a) \( k = 3 \)      (b) \( k \neq 3 \)      (c) \( k = -3 \)      (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) \(\left(\frac{3}{2}, 2\right)\)

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 \[ \frac{\sin^2 22^\circ + \sin^2 68^\circ + \cos^2 22^\circ + \cos^2 68^\circ}{\sin 22^\circ \cos 22^\circ + \cos 63^\circ \sin 27^\circ + \tan 45^\circ} \] 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) \( 29^\circ \)      (b) \( 30^\circ \)      (c) \( 26^\circ \)      (d) \( 36^\circ \)

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) not defined
10. For the following distribution:

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>10</td>
</tr>
<tr>
<td>5-10</td>
<td>15</td>
</tr>
<tr>
<td>10-15</td>
<td>12</td>
</tr>
<tr>
<td>15-20</td>
<td>20</td>
</tr>
<tr>
<td>20-25</td>
<td>9</td>
</tr>
</tbody>
</table>

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 the 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 \( \frac{1}{4} \) is a root of the equation \( x^2 + kx - \frac{5}{4} = 0 \), 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. In the given figure, AB, AC and AD are tangents. If \( AB = 5 \) cm, find \( AD \).

OR

TP is a tangent to the circle with centre O. If \( \angle TOQ = 120^0 \), find the diameter of the circle when \( OT = 10 \) cm.
17. Show that $12^n$ cannot end with the digit 0 or 5 for any natural number $n$.

18. Find the value(s) of $k$, if the quadratic equation $3x^2 - k \sqrt{5} x + 4 = 0$ has equal roots.

19. Find the eleventh term from the last term of the AP: $27, 23, 19, ..., -65$.

20. In given figure, ST $\parallel$ RQ, PS = 3 cm and SR = 4 cm. Find the ratio of the area of $\triangle PST$ to the area of $\triangle PRQ$.

![Diagram](image)

SECTION – B

Questions 21 to 26 carry 2 marks each.

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

![Diagram](image)

22. Two dairy owners A and B sell flavoured milk filled to capacity in mugs of negligible thickness, which are cylindrical in shape with a raised hemispherical bottom. The mugs are 14 cm high and have diameter of 7 cm as shown in given figure. Both A and B sell flavoured milk at the rate of Rs. 80 per litre. The dairy owner A uses the formula $\pi r^2 h$ to find the volume of milk in the mug and charges Rs. 43.12 for it. The dairy owner B is of the view that the price of actual quantity of milk should be charged. What according to him should be the price of one mug of milk?

![Diagram](image)

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

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

OR
25. 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.

26. ABCD is a trapezium in which AB \parallel DC and its diagonals intersect each other at the point O. Show that \( \frac{AO}{BO} = \frac{CO}{DO} \).

OR

In \( \triangle PQR \), S and T are on PQ and PR respectively such that \( \frac{PS}{SQ} = \frac{PT}{TR} \) and \( \angle PST = \angle PRQ \). Prove that PQR is an isosceles triangle.

26. If the sides AB, BC and CA of \( \triangle ABC \) touch a circle at F, D and E respectively, then prove that \( AF + BD + CE = \frac{1}{2} \times \text{Perimeter of } \triangle ABC \).

SECTION – C

Questions 27 to 34 carry 3 marks each.

27. Show that exactly one of the numbers n, n + 2 or n + 4 is divisible by 3.

OR

Use Euclid’s division lemma to show that the cube of any positive integer is of the form 9m, 9m + 1 or 9m + 8.

28. Find all the zeroes of the polynomial \( 3x^4 + 6x^3 - 2x^2 - 10x - 5 \) if two of its zeroes are \( \frac{\sqrt{5}}{3} \) & \( -\frac{\sqrt{5}}{3} \).

29. Solve the following pair of linear equations:
   \[152x - 378y = -74\]
   \[-378x + 152y = -604\]

OR

Seven times a two digit number is equal to four times the number obtained by reversing the order of its digits. If the difference of the digits is 3, determine the number.

30. 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.
31. Prove that \( \frac{\cos \theta - \sin \theta + 1}{\cos \theta + \sin \theta - 1} = \cos ec \theta + \cot \theta \)

OR

If \( \sin A + \cos A = \sqrt{2} \), then evaluate: \( \tan A + \cot A \).

32. An AP consists of 37 terms. The sum of the three middle most terms is 225 and the sum of the last three terms is 429. Find the AP.

33. In given figure ABPC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region

34. Mohan selected a project to prepare more than and less than ogive of the marks obtained by the 100 students in Mathematics Board Examination of the class. After collecting the data, he analyzed the data and prepared a report on the marks of the class. Using the report, he drew the following graph as given below:

Based on the above graph, answer the following questions:
(i) Identify less than type ogive and more than type ogive from the given graph.
(ii) Find the median marks of the class.
(iii) Obtain the Mode marks of the data if mean marks of the class is 58.
SECTION – D
Questions 35 to 40 carry 4 marks each.

35. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

36. A train travelling at a uniform speed for 360 km would have taken 48 minutes less to travel the same distance if its speed were 5 km/hour more. Find the original speed of the train.

OR
In a class test, the sum of Shefali’s marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects.

37. Draw a triangle ABC with side BC = 7 cm, \( \angle B = 45^0 \), \( \angle A = 105^0 \). Then, construct a triangle whose sides are \( \frac{4}{3} \) times the corresponding sides of \( \triangle ABC \).

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.

38. The angles of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are 30° and 60°, respectively. Find the height of the tower and also the horizontal distance between the building and the tower.

39. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?

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.

40. The following frequency distribution shows the distance (in metres) thrown by 68 students in a Javelin throw competition.

<table>
<thead>
<tr>
<th>Distance (in m)</th>
<th>0 – 10</th>
<th>10 – 20</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
<th>60 – 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students</td>
<td>4</td>
<td>5</td>
<td>13</td>
<td>20</td>
<td>14</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

Draw a less than type Ogive for the given data and find the median distance thrown using this curve.