KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32
SAMPLE PAPER TEST 09 (BASIC) (2019-20) (SAMPLE ANSWERS)

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. Which of the following rational number have non-terminating repeating decimal expansion?
   (a) \(\frac{31}{3125}\)  (b) \(\frac{71}{512}\)  (c) \(\frac{23}{200}\)  (d) None of these
   Ans: (d) None of these

2. For some integer m, every even integer is of the form :
   (a) \(4q\)  (b) \(4q + 2\)  (c) both (a) and (b)  (d) None of these
   Ans: (c) both (a) and (b)

3. The number of zeroes of a quadratic polynomial \(p(x) = x^2 – 3x + 2\) is
   (a) 1  (b) 2  (c) both (a) and (b)  (d) None of these
   Ans: (b) 2

4. For some integers p and 3, there exist unique integers q and r such that \(p = 3q + r\). Possible values of \(r\) are
   (a) 0 or 1  (b) 0, 1 or 2  (c) 0, 1, 2 or 3  (d) none of these
   Ans: (b) 0, 1 or 2

5. If \(\alpha\) and \(\beta\) are zeroes of the polynomial \(x^2 + 8x – 5\), then \(\alpha\beta = \)
   (a) 8  (b) -8  (c) 5  (d) -5
   Ans: (d) -5

6. C is the mid-point of PQ, if P is (4, x), C is (y, –1) and Q is (–2, 4), then x and y respectively are
   (a) –6 and 1  (b) –6 and 2  (c) 6 and –1  (d) 6 and –2
   Ans: (a) –6 and 1

7. The distance of the point P(–3, –5) from the x-axis is
   (a) 3  (b) 5  (c) –3  (d) –5
   Ans: (b) 5

8. If in a lottery, there are 5 prizes and 20 blanks, then the probability of getting a prize is
9. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then ∠POA is equal to
(a) 50° (b) 60° (c) 70° (d) 80°
Ans: (a) 50°

10. If the coordinates of the point of intersection of less than ogive and more than ogive is (13, 20), then the value of median is
(a) 13 (b) 20 (c) 33 (d) 7
Ans: (a) 13

11. \( \sin^2\theta + \sin^2(90^\circ - \theta) = \) _______
Ans: 1

12. The distance of the point (3, –4) from the origin is _____
Ans: 5 units

13. If \( \sin A = \frac{5}{13} \), the value of cot A is _______
Ans: \( \frac{12}{5} \)

14. The number of solutions of the following pair of linear equations: \( x + 2y - 8 = 0 \) and \( 2x + 4y = 16 \) is _______
Ans: infinite many solutions

OR
If \( x = 3 \) is one root of the quadratic equation \( x^2 - 2kx - 6 = 0 \), then the value of \( k \) is _____.
Ans: \( k = \frac{1}{2} \)

15. In the given figure, \( \frac{AD}{BD} = \frac{AE}{EC} \) and \( \angle ADE = 70^\circ, \angle BAC = 50^\circ \), then angle \( \angle BCA = \) _______
Ans: 60°

\[ \begin{align*}
\text{A} & \quad \text{D} \\
\text{B} & \quad \text{E} \\
\text{C} & \quad \text{C}
\end{align*} \]

16. A lot of 45 bulbs contain 12 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is good?
Ans: \( \frac{33}{45} = \frac{11}{15} \)

17. Find the value of \( 2 \tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ \).
Ans: 2
OR
Find the value of \( \cos 38^\circ \cos 52^\circ - \sin 38^\circ \sin 52^\circ \)
Ans: 0

18. \( \Delta ABC \sim \Delta PQR \). Area of \( \Delta ABC = 81 \text{ cm}^2 \) and area of \( \Delta PQR = 121 \text{ cm}^2 \). If altitude AD = 9 cm, then find PM.
Ans: PM = 11 cm

19. Find the area of a quadrant of a circle whose area is 154 cm\(^2\).
Ans: \( \pi r^2 = 154 \Rightarrow \text{Area of quadrant} = \frac{1}{4} \pi r^2 = \frac{1}{4} \times 154 = 38.5 \text{ cm}^2 \)

20. What is the common difference of an A.P. in which \( a_{21} - a_7 = 84 \)?
Ans: \( d = 6 \)

**SECTION – B**

Questions 21 to 26 carry 2 marks each.

21. A bag contains cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that number is divisible by both 2 and 3.
Ans: The numbers divisible by 2 and 3 both = 6, 12, 18, 24
\[ P (\text{number divisible by 2 and 3}) = \frac{4}{25} \]
OR
One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting (i) a red face card (ii) a heart card
Ans: (i) \( \frac{6}{52} = \frac{3}{26} \) (ii) \( \frac{13}{52} = \frac{1}{4} \)

22. Two dice, one blue and one grey, are thrown at the same time. Write down all the possible outcomes. What is the probability that the sum of the two numbers appearing on the top of the dice is (i) 8? (ii) 13?
Ans: (i) \( \frac{5}{36} \) (ii) 0

23. If \( \sin (A - B) = \frac{1}{2}, \cos (A + B) = \frac{1}{2}, \) \( 0^\circ < A + B \leq 90^\circ, A > B, \) find A and B.
Ans: NCERT Trigonometry Example-8, p-186
OR
In \( \Delta OPQ \), right-angled at P, OP = 7 cm and OQ – PQ = 1 cm. Determine the values of \( \sin Q \) and \( \cos Q \).
Ans: NCERT Trigonometry Example-5, p-180

24. To warn ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned. (Use \( \pi = 3.14 \))
Ans: NCERT Exercise 12.2 Q12 p-231

25. Divide the polynomial \( p(x) = x^4 - 3x^2 + 4x + 5 \) by the polynomial \( g(x) = x^2 + 1 - x \) and find the quotient and remainder.
Ans: NCERT Exercise 2.3 Q1(ii) p-36

26. Prove that the parallelogram circumscribing a circle is a rhombus.
Ans: NCERT Exercise 10.2 Q11
27. Prove that $\sqrt{5}$ is an irrational number.
   \textbf{Ans: NCERT Exercise 1.3 Q1}

OR

Find the HCF and LCM of 510 and 92 and verify that HCF \times LCM = \text{Product of two given numbers}.

\begin{align*}
\text{Ans: } 92 &= 2^2 \times 23 \quad \text{and} \quad 510 = 30 \times 17 = 2 \times 3 \times 5 \times 17 \\
\text{HCF (510, 92)} &= 2 \\
\text{LCM (510, 92)} &= 2^2 \times 23 \times 3 \times 5 \times 14 = 23460 \\
\text{HCF (510, 92)} \times \text{LCM (510, 92)} &= 2 \times 23460 = 46920 \\
\text{Product of two numbers} &= 510 \times 92 = 46920 \\
\text{Hence, HCF} \times \text{LCM} &= \text{Product of two numbers}
\end{align*}

28. In the below figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A & X'Y' at B. Prove that $\angle AOB = 90^\circ$.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure.png}
\end{figure}

\textbf{Ans: NCERT Exercise 10.2 Q9}

29. The below figure depicts a racing track whose left and right ends are semicircular.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{race-track.png}
\end{figure}

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.

\textbf{Ans: NCERT Exercise 12.3 Q8 p-236}

30. The below figure shows the arrangement of desks in a classroom. Ashima, Bharti and Camella are seated at A, B and C respectively. Bharti observes that their position will form a triangle ABC. Find the area of triangle so formed.
Ans: Coordinates of A is (1, 3), B is (4, 7) and C is (6, 3)
base = 5 units, height = 4 units
Area of triangle ABC = \((1/2) \times 5 \times 4 = 10\) square units

31. Find the zeroes of the quadratic polynomial \(3x^2 + 5x - 2\) and verify the relationship between the zeroes and the coefficients.

Ans: NCERT Polynomials p-29 (Zeroes are \(\frac{1}{3}\) and \(-2\))

32. Express the trigonometric ratios \(\sin A\), \(\sec A\), and \(\tan A\) in terms of \(\cot A\).

Ans: NCERT Exercise 8.4 Q1 p-194

OR

Prove that \(\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A\). 

Ans: \(LHS = \frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = \frac{\cos^2 A + (1 + \sin A)^2}{(1 + \sin A) \cos A}\)

\[= \frac{\cos^2 A + 1 + 2 \sin A}{(1 + \sin A) \cos A} = \frac{2 + 2 \sin A}{(1 + \sin A) \cos A}\]

\[(\text{since } \sin^2 A + \cos^2 A = 1)\]

\[= \frac{2(1 + \sin A)}{(1 + \sin A) \cos A} = \frac{2}{\cos A} = 2 \sec A = RHS\]

33. Draw the graphs of the equations \(5x - y = 5\) and \(3x - y = 3\). Determine the co-ordinates of the vertices of the triangle formed by these lines and the y axis.

Ans: NCERT Exercise 3.7 Q6 p-68
34. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle.

**OR**

Draw a line segment of length 12 cm and divide it in the ratio 3 : 4.

**SECTION – D**

**Questions 35 to 40 carry 4 marks each.**

35. As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. (use $\sqrt{3} = 1.732$)

**Ans:** NCERT Exercise 9.1 Q13 p-204

36. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field.

**Ans:** NCERT Exercise 4.3 Q6 p-88

37. Prove that “The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.”

**OR**

State and prove Basic Proportionality theorem.

38. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on (see the below figure). In how many rows are the 200 logs placed and how many logs are in the top row?

**Ans:** NCERT Exercise 5.3 Q19 p-114

**OR**

If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms.

**Ans:** NCERT Exercise 5.3 Q9 p-113

39. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.

**Ans:** NCERT Exercise 13.3 Q5 p-251

**OR**

How many silver coins, 1.75 cm in diameter and of thickness 2 mm, must be melted to form a cuboid of dimensions 5.5 cm × 10 cm × 3.5 cm?

**Ans:** NCERT Exercise 13.3 Q6 p-251

40. From the following data find the median age of 100 residents of a colony who took part in swachh bharat abhiyan:

<table>
<thead>
<tr>
<th>Age (in yrs.) More than or equal to</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of residents</td>
<td>50</td>
<td>46</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>

Draw less than type ogive and hence find median from the graph.
Ans:

<table>
<thead>
<tr>
<th>Age (in yrs.)</th>
<th>No. of residents</th>
<th>cf</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 10</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>10 – 20</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>20 – 30</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>30 – 40</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>40 – 50</td>
<td>7</td>
<td>47</td>
</tr>
<tr>
<td>50 – 60</td>
<td>3</td>
<td>50</td>
</tr>
</tbody>
</table>

\[
\frac{N}{2} = \frac{50}{2} = 25
\]

\[
\text{Median} = l + \left[ h \left( \frac{N}{2} - c.f. \right) \right] = 20 + \left[ 10 \left( \frac{25 - 10}{20} \right) \right] = 20 + \frac{15}{2} = 27.5
\]