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SAMPLE PAPER TEST 10 (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. \( \pi \) is
   (a) an integer          (b) a rational number  (c) an irrational number (d) none of these
   Ans: (c) an irrational number

2. The product of two numbers is 1600 and their HCF is 5. The LCM of the numbers is
   (a) 8000,
   (b) 1600,
   (c) 320,
   (d) 1605
   Ans: (c) 320

3. Euclid’s division lemma states that for any positive integers a and b, there exist unique integers q and r such that a = bq + r, where r must satisfy
   (a) 1 < r < b
   (b) 0 < r \leq b
   (c) 0 \leq r < b
   (d) 0 < r < b
   Ans: (c) 0 \leq r < b

4. If \( \alpha \), \( \beta \) are the zeroes of the polynomial \( x^2 + 6x + 2 \), then \( \frac{1}{\alpha} + \frac{1}{\beta} = ? \)
   (a) 3
   (b) -3
   (c) 12
   (d) -12
   Ans: (b) -3

5. The zeroes of the quadratic polynomial \( x^2 + 88x + 125 \) are
   (a) both positive
   (b) both negative
   (c) one positive and one negative
   (d) both equal
   Ans: (b) both negative

6. If P(−1,1) is the midpoint of the line segment joining A(−3,b) and B(1, b + 4) then b = ?
   (a) 1
   (b) −1
   (c) 2
   (d) 0
   Ans: (b) −1

7. The distance of the point (−3, 4) from x-axis is
   (a) 3
   (b) −3
   (c) 4
   (d) 5
   Ans: (c) 4

8. If in a lottery, there are 5 prizes and 20 blanks, then the probability of getting a prize is
   (a) \( \frac{2}{5} \)
   (b) \( \frac{4}{5} \)
   (c) \( \frac{1}{5} \)
   (d) 1
   Ans: (e) \( \frac{1}{5} \)
9. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 60°, then \( \angle POA \) is equal to
   (a) 50°   (b) 60°   (c) 70°   (d) 80°
   Ans: (b) 60°

10. If the ‘less than type’ ogive and ‘more than type’ ogive intersect each other at (20, 15) then the median of the given data is
   (a) 5   (b) 15   (c) 20   (d) 35
   Ans: (c) 20

11. \( \sin^2 30° + 4 \cot^2 45° - \sec^2 60° = \) _______
   Ans: \( \frac{1}{4} \)

12. The distance of the point (-6, 8) from the origin is _____
   Ans: 10 units

13. If \( \cos \theta = \frac{4}{5} \), the value of \( \tan \theta \) is _______
   Ans: \( \frac{3}{4} \)

14. The number of solutions of the following pair of linear equations: \( x + 2y - 5 = 0 \) and \( 2x + 4y = 16 \) is _______
   Ans: No solution

   OR

15. In \( \triangle ABC \), D and E are points on sides AB and AC respectively such that DE || BC and AD : DB = 3 : 1. If EA = 6.6 cm then AC = ______
   Ans: AC = 8.8 cm

16. A lot of 45 bulbs contain 9 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is good?
   Ans: \( \frac{45 - 9}{45} = \frac{36}{45} = \frac{4}{5} \)

17. Find the value of \( 2 \tan^2 45° + \cos^2 30° + \sin^2 30° \).
   Ans: 3

   OR

If \( \tan \theta = \cot (30° + \theta) \), find the value of \( \theta \).
   Ans: \( 90° - \theta = 30° + \theta \Rightarrow 20 = 60° \Rightarrow \theta = 30° \)

18. A vertical stick 12 m long casts a shadow 8 m long on the ground. At the same time a tower casts the shadow 40 m long on the ground. Determine the height of the tower.
   Ans: 60 m

19. If the perimeter and the area of a circle are numerically equal, then find the radius of the circle.
   Ans: 2 units

20. Find the 10th term of the AP : 2, 7, 12, . . .
   Ans: 47

**SECTION – B**

Questions 21 to 26 carry 2 marks each.

21. A lot consists of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that (i) She will buy it? (ii) She will not buy it?
   Ans: NCERT Exercise 15.1 Q21 p-310

   OR

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting (i) a king of red colour (ii) a red face card
   Ans: NCERT Exercise 15.1 Q14 p-309
22. A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square number.

Ans: NCERT Exercise 15.1 Q17 p-309

23. Show that \( \tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1 \)

Ans: NCERT Exercise 8.3 Q2(i) p-189

OR

In \( \Delta PQR \), right-angled at \( Q \), \( PR + QR = 25 \) cm and \( PQ = 5 \) cm. Determine the values of \( \sin P \) and \( \cos P \)

Ans: NCERT Exercise 8.1 Q10 p-181

24. Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle, is bisected at the point of contact.

Ans: NCERT Circle Example 1, p-211

25. Find a quadratic polynomial, the sum and product of whose zeroes are – 3 and 2, respectively.

Ans: NCERT Polynomials Example-4, p-31

26. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades.

Ans: NCERT Exercise 12.2 Q11 p-231

SECTION – C

Questions 13 to 22 carry 3 marks each.

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

Ans: NCERT Exercise 1.1 Q5, p-7

OR

Find the HCF and LCM of 6, 72 and 120, using the prime factorisation method.

Ans: NCERT Real Numbers Example-8, p-10

28. Draw a line segment of length 7.6 cm and divide it in the ratio 5 : 8. Measure the two parts.

Ans: NCERT Exercise 11.1 Q1 p-219

OR

Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length.

Ans: NCERT Exercise 11.2 Q2 p-221

29. If \( \tan (A + B) = \sqrt{3} \) and \( \tan (A – B) = \frac{1}{\sqrt{3}} \); \( 0^\circ < A + B \leq 90^\circ ; A > B \), find A and B.

Ans: NCERT Exercise 8.2 Q3 p-187

OR

Prove that \( \cos A – \sin A + 1 \over \cos A + \sin A – 1 \) = \( \cos ec A + \cot A \)

Ans: NCERT Exercise 8.4 Q5(v) p-194

30. If two zeroes of the polynomial \( 2x^4 – 3x^3 – 3x^2 + 6x – 2 \) are \( \sqrt{2} \) and \( – \sqrt{2} \), find the other zeroes of the polynomial.

Ans: NCERT Polynomials Example-9, p-35

31. Solve \( 2x + 3y = 11 \) and \( 2x – 4y = – 24 \) and hence find the value of ‘m’ for which \( y = mx + 3 \).

Ans: NCERT Exercise 3.3 Q2, p-53
32. The below figure shows the arrangement of desks in a classroom. Arun, Bharath, Charan and Deepak are seated at A, B, C and D respectively. Deepak observes that their position forming a quadrilateral ABCD and he wants to find out the type of the quadrilateral. How can you help Deepak to find the same?

![Desks Arrangement Diagram](image)

Ans: A(1, 4), B(2, 7), C(6, 4) and D(5, 1)

AB = CD = √10, BC = AD = 5 and AC ≠ BD

∴ ABCD is a parallelogram

33. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2 ∠OPQ.

Ans: NCERT Circle Example 2, p-212

34. Find the area of the shaded region in below figure, where ABCD is a square of side 14 cm.

![Shaded Region Diagram](image)

Ans: NCERT Areas Related to Circles Example-5, p-233
SECTION – D
Questions 23 to 30 carry 4 marks each.

35. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60°. From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower and the width of the canal.
Ans: NCERT Exercise 9.1 Q11 p-204

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.
Ans: NCERT Quadratic Equation Example-15, p-87

OR
An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11 km/h more than that of the passenger train, find the average speed of the two trains.
Ans: NCERT Exercise 4.3 Q10, 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
Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

38. The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.
Ans: NCERT Exercise 5.3 Q5 p-113

OR
If the sum of the first 14 terms of an AP is 1050 and its first term is 10, find the 20th term.
Ans: NCERT AP Example-12, p-109

39. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm².
Ans: NCERT Exercise 13.1 Q8 p-245

OR
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?
Ans: NCERT Exercise 13.3 Q8 p-252

40. Draw less than ogive for the following frequency distribution:

<table>
<thead>
<tr>
<th>Marks</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>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

Also find the median from the graph.

Ans: The less than cumulative frequency distribution table :

<table>
<thead>
<tr>
<th>Marks</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>5</td>
</tr>
<tr>
<td>Less than 20</td>
<td>13</td>
</tr>
<tr>
<td>Less than 30</td>
<td>19</td>
</tr>
<tr>
<td>Less than 40</td>
<td>29</td>
</tr>
<tr>
<td>Less than 50</td>
<td>35</td>
</tr>
<tr>
<td>Less than 60</td>
<td>40</td>
</tr>
</tbody>
</table>
Median from less than ogive:

Median = 31.5