ANGEL'S PUBLIC SCHOOL

SAMPLE PAPER

HALF YEARLY EXAM   SESSION 2022 – 23

CLASS – X

TIME: 3 HRS   **SUBJECT : MATHEMATICS**   **M.M:80**

GENERAL INSTRUCTIONS:

- All questions are compulsory.
- The question paper consists of 38 questions divided into FIVE sections A, B, C , D and E
- <u>Section A</u> comprises 20 objective type questions of 1 mark each.
- <u>Section B</u> comprises 6 questions of 2 marks each.
  <u>Section C</u> comprises 6 questions of 3 marks each.
- <u>Section D</u> comprises 4 questions of 5 marks each.
- <u>Section E</u> comprises 2 case study problems of 5 marks each.

<u>SECTION – A</u>

1. For some integer m, every odd integer is of the form_____.
   (a) m + 1   (b) m   (c) 2m   (d) 2m + 1

2. If the point (0 , 3) is equidistant from (5 , a) and (a , a) then the value of **a** is equal to_____.
   (a) 3 or – 3   (b) 5 or – 5   (c) 4 or – 4   (d) 2 or – 2

3. The maximum value of $1/ \cosec \theta$ ($0° \leq \theta \leq 90°$) is _____.
   (a) 1   (b) 0   (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

4. The graph of y = p(x) is given. The number of zeroes of p(x) are_____.
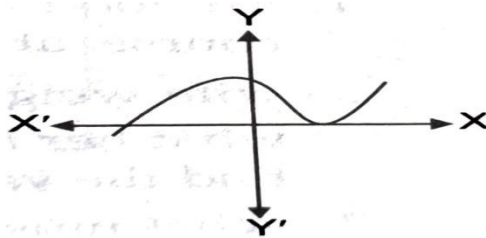
   (a) 0   (b) 2   (c)   3   (d)   4

5. The pair of equations x = 4 and y = 3, graphically represents lines which are _____.

   (a) coincident   (b) parallel   (c) intersecting at (3 , 4)   (d) intersecting at (4 , 3)

6. The quadratic equation $2y^2 - \sqrt{3} y + 1 = 0$ has _____.

   (a) more than two real roots   (b) two equal roots   (c) no real roots   (d) two distinct real roots

7. The next term of the AP $\sqrt{18}$, $\sqrt{50}$, $\sqrt{98}$, is_____.

(a) $\sqrt{146}$ (b) $\sqrt{128}$ (c) $\sqrt{162}$ (d) $\sqrt{200}$

8. The distance between the points P (6 , 0) and Q (– 2 , 0) is _____.

(a) 2 units (b) 8 units (c) 6 units (d) 4 units

9. The value of expression ($\sec^2 x - 1$) $\cot^2 x$ is _____.

(a) 2 (b) 0 (c) –1 (d) 1

10. A real number α is called zero of the polynomial f(x) when _____.

(a) $f(\alpha) = 1$ (b) $f(\alpha) = 0$ (c) $f(\alpha) = 2$ (d) None of these

11. The 11th term of the sequence defined by $a_n = (-1)^{n-1} n^3$ is _____.

(a) 1220 (b) 1221 (c) 1331 (d) 1330

12. If the points (0 , 0) , (1 , 2 ,) and (x , y) are collinear, then _____.

(a) x = y (b) 2x = y (c) x = 2y (d) 2x = – 4y

13. If $P(x) = x^2 + 5x + 2$, then the value of p(3) + p(2) + p(0) is _____.

(a) 40 (b) 44 (c) 8 (d) 42

14. If HCF of 85 and 153 is expressible in the form of 85n – 153, then the value of n is _____.

(a) 3 (b) 2 (c) 4 (d) 1

15. If $\sin A = \frac{1}{2}$ and $\cos B = \frac{1}{2}$, then the value of A + B is equal to _____.

(a) 0° (b) 60° (c) 90° (d) 30°

16. The distance of the point (–3 , 4) from the x axis is _____.

(a) 3 units (b) –3 units (c) 4 units (d) 5 units

17. Which term of the AP : 2 , –1 , –4 , …. is –70 ?

(a) 15th (b) 18th (c) 25th (d) 30th

18. A polynomial of degree zero is called a _____ polynomial .

19. If p is a prime number and p divides k^2, then p divides _____.

(i) $2k^2$ (ii) K (iii) 3k (iv) None of these

20. If $x = \sqrt{6 + \sqrt{6 + \sqrt{6....}}}$, then the value of x is _____.

(i) 1 (ii) 2 (iii) 3 (iv) 4

SECTION – B

21. If the sum of first n terms of an AP is given by, $s_n = 3n^2 - 4n$, then find its 'nth' term.
22. The roots of the quadratic equation $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$.
23. Find the H.C.F and the L.C.M of 90 and 144 by the prime factorization method.
24. Check whether 6^n can end with the digit 0 for any natural number n.

OR

The difference between the two numbers is 26 and one number is three times the other. Find the numbers.

25. Find the HCF of 1620 , 1725 and 255 by the prime factorisation method.
26. Write whether the following pair of linear equations is consistent or not.

$2x - 3y = 6$

$4x - 6y = 9$

SECTION – C

27. The HCF of 480 and 685 is expressed in the form $480x - 475$, find the value of x.

OR

If $47x + 31y = 18$ and $31x + 47y = 60$, then find the value of $x + y$.

28. Solve for x and y using the elimination method.

$2x + 3y = 46$

$3x + 5y = 74$

29. Two bells ring at the intervals of 78 seconds and 46 seconds. If they both ring at 10 O'clock in the morning together, after how many seconds will they ring together again?

30. For what value of k does the pair of equations given below has a unique solution?

$y - x = 6$

$3kx + 2y = 7$

31. In the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$, determine the coordinates of the vertices of the triangle formed by these lines and the y – axis , and shade the triangular region.

32. If p and q are the zeroes of the polynomial $x^2 - 6x + k$, then find the value of k, such that $p^2 + q^2 = 40$.

SECTION – D

33. For what value of a and b does the pair of linear equations have an infinite number of solutions?

$2x + 3y = 7$

$(a - b)x + (a + b)y = 3a + b - 2$

34. Prove that $\sqrt{3}$ is an irrational number and hence prove $2 - \sqrt{3}$ is also an irrational number.

OR

Ritu can row downstream 20 Km in 2 hours, and upstream 4 Km in 2 hours. Find her speed of rowing in still water and the speed of the stream.

35. 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/hr more. Find the original speed of the train.

36. The angle of elevation of the top of a tower from a point A on the ground is 30. On moving a distance of 20 metres towards the foot of the tower to a point B the angle of elevation increases to 60. Find the height of the tower and the distance of the tower from the point A.

SECTION – E

Case study –1

37. The students of a school are standing in rows and columns in their school playground to celebrate their annual sports day. A , B , C , D are the positions of four students as shown in the figure.
Based on the above, answer the following questions.
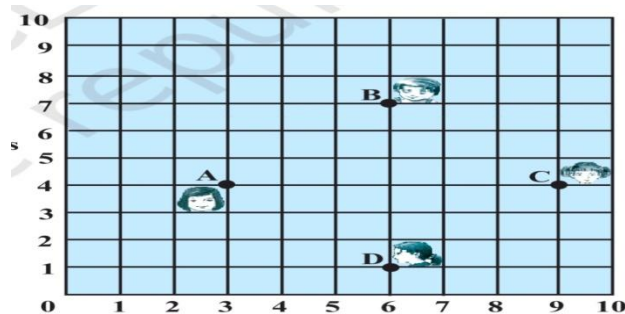
(a) The figure formed by the four points   A , B , C , D is a _____ .
   (i) square   (ii) rhombus   (iii) parallelogram   (iv) none of these
(b) If the sports teacher is sitting at the origin, then which of the four is closest to him ?
   (i) A   (ii) B   (iii) C   (iv) None of these
(c) The distance between A and C is _____ .
   (i) √37 units   (ii) √35 units   (iii) 6 units   (iii) none of these
 (d) The coordinates of the midpoint of the line segment AC are _____ .
   (i) (5/2 , 11)   (ii) (5/2 , 11/2)   (iii) (5 , 11/2)   (iv) none of these
 (e) If a point P divides the line segment AD in the ratio 1 : 2, then the coordinates of P are___.
   (i) (8/3 , 8/3)   (ii) (10/3 , 13/3)   (iii) (13/3 , 10/3)   (iv) none of these

CASE STUDY – 2

38. A book seller has 420 Science stream books and 130 Arts stream books . He wants to stack them in such a way that each stack has the same number and they take up the least area of surface.
   (a) If a number has no common factor other than 1 is called _____ .
      (i) prime   (ii) coprime   (iii) do not say anything   (iv) none of these
   (b) Maximum number of books that can be placed in each stack is _____ .
      (i) 10   (ii) 14   (iii) 12   (iv) 15
   (c) What mathematical concept is used to solve this problem?
      (i) Prime factorisation method   (ii) Area of triangle
      (iii) Arithmetic progression   (iv) None of these
   (d) Find the LCM of given book streams.
      (i) 5450   (ii) 5460   (iii) 2730   (iv) None of these
   (e) If the book seller doubled the quantity then the maximum number of books that can be placed in
       each stack is _____ .
      (i) the same   (ii) double   (iii) triple   (iv) none of these