

ATREYA VIDYANIKETAN

(A Unit of Chaitanya Educational Trust)
Affiliated to CBSE, Delhi. Affiliation No. 830389

Class: X

PERIODIC TEST - 2 [2024 - 2025]

Total Marks: 80

Date: 03-10-2024

SUBJECT: ALGEBRA & ARITHMETIC

Timings: 3 Hrs

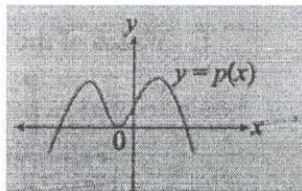
General Instructions:

- Section A consists of 20 questions of 1 mark each.
- Section B consists of 5 questions carrying 2 marks each.
- Section C consists of 6 questions carrying 3 marks each.
- Section D consists of 4 questions carrying 5 marks each.
- Section E consists of 3 questions (Case Study) carrying 4 marks each.

SECTION - A

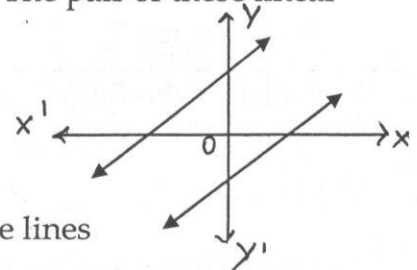
- 1) The number of zeros of a polynomial $p(x)$ where graph of $y = p(x)$ is given in the figure

- 3
- 4
- 0
- 5



- 2) In the given figure, graph of two linear equations are shown. The pair of these linear equations is:

- Consistent with unique solution
- Consistent with infinitely many solutions
- Inconsistent
- Inconsistent but can be made consistent by extending these lines



- 3) Harsh correctly solved a pair of linear equations in two variables and found their only point of intersection as $(3, -2)$, one of the line was $x - y = 5$. Which of the following could have been the other line?

- | | | | |
|--------------------|---------------------|----------------------|----------------------|
| (i) $3x - 3y = 15$ | (ii) $2x - 3y = 12$ | (iii) $2x - 3y = 14$ | |
| a) Only (i) | b) only (ii) | c) only (i) & (ii) | d) only (ii) & (iii) |

- 4) For which values of (P) will the lines represented by the following pair of linear equations be parallel: $3x - y - 5 = 0$ and $6x - 2y - p = 0$

- | | | | |
|------------------------------|-------|------------------|------------------|
| a) All real values except 10 | b) 10 | c) $\frac{5}{2}$ | d) $\frac{1}{2}$ |
|------------------------------|-------|------------------|------------------|

- 5) The pair of equation $x = 0$ and $x = -7$ has

- | | | | |
|-----------------|-----------------|---------------------------|----------------|
| a) One solution | b) two solution | c) infinity many solution | d) no solution |
|-----------------|-----------------|---------------------------|----------------|

- 6) The n^{th} term of AP $a, 3a, 5a \dots$ is

- | | | | |
|---------|----------------|----------------|----------|
| a) na | b) $(2n - 1)a$ | c) $(2n + 1)a$ | d) $2na$ |
|---------|----------------|----------------|----------|

7) The next term of the AP $\sqrt{8}, \sqrt{18}, \sqrt{32} \dots$ is

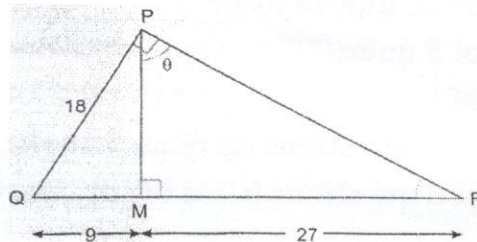
- a) $5\sqrt{2}$ b) $5\sqrt{3}$ c) $3\sqrt{3}$ d) $5\sqrt{3}$

8) A sum of ₹4000 was divided among x persons had there been 10 more persons each would have got ₹ 80 less. Which of the following represents the above situation.

- a) $x^2 + 10x + 500 = 0$ c) $8x^2 + 10x - 400 = 0$
b) $x^2 + 10x - 500 = 0$ d) $8x^2 + 10x + 400 = 0$

9) Observe the figure shown. Which of these is the value of $\cos \theta$?

- a) $\frac{1}{2}$
b) $\frac{2}{1}$
c) $\frac{2\sqrt{3}}{3}$
d) $\frac{3\sqrt{3}}{2}$



10) The value of $4(\sin^4 30^\circ + \cos^4 60^\circ) - 3(\cos^2 45^\circ - \tan^2 45^\circ)$ is

- a) $\frac{1}{2}$ b) 1 c) 2 d) 3

11) A student is trying to find the roots of $3x^2 - 10x - 8 = 0$ by splitting the middle term as follows:

Step 1: $3x^2 - 10x - 8 = 0$

Step 2: $3x^2 - mx + nx - 8 = 0$

What could be values of m and n ?

- a) $m = 8, n = 2$ b) $m = -8, n = -2$ c) $m = 12, n = 2$ d) $m = -12, n = -2$

12) Which of the following equations has the sum of its roots as 3?

- a) $2x^2 - 3x + 6 = 0$ c) $\sqrt{2}x^2 - 7x + 6 = 0$
b) $-x^2 + 3x - 3 = 0$ d) $3x^2 - 3x + 3 = 0$

13) Rakesh loves to travel and he travels every year. He has seen 8 different cities in his first year. There after every year he has seen 2 cities. If he had followed this pattern how many cities did he see by end of 10 years of travel?

- a) $5\{8 + 9(2)\}$ cities c) $5\{16 + 9(2)\}$ cities
b) $5\{8 + 10(2)\}$ d) $5\{16 + 10(2)\}$ cities

14) If $\text{HCF}(26, 169) = 13$ then $\text{LCM}(26, 169)$ is _____

- a) 26 b) 52 c) 338 ~~d) 13~~

15) Shown below is a pair of linear equations. $mx + 4y - 6 = 0$, $ny - 12x + 12 = 0$

For which of the following values of m and n do the above equations have infinity many solutions.

- a) $m = -1, n = 2$ b) $m = -1, n = -3$ c) $m = 6, n = -8$ d) $m = 6, n = -2$

- 16) Two dice are thrown together the probability that they show different numbers is:
- a) $\frac{1}{6}$ b) $\frac{5}{6}$ c) $\frac{1}{3}$ d) $\frac{2}{3}$

The questions given below consist of an Assertion (A) and a Reason (R). Use the following key to choose the appropriate answer

- a) Both A and R are correct and Reason is the correct explanation for A.
b) Both A and R are correct and Reason is not the correct explanation for A.
c) A is true but the R is false.
d) A is false and R is true.
- 17) A: The value of $\sin \theta = \frac{4}{3}$ is not possible
R: Hypotenuse is the longest side in any right angled triangle
- 18) A: The number 5^n cannot end with digit 0, where n is a natural numbers.
R: Prime factorization of 5 has only two factor 1 and 5
- 19) A: The value of $q = \pm 2$, if $x = 3, y = 1$ is the solution of the line $2x + y - q^2 - 3 = 0$
R: The solution of the line will satisfy the equation of the line.
- 20) A: Common difference of an AP in which $a_{21} - a_7 = 84$ is 14
R: n^{th} term of an AP is given by $a_n = a + (n - 1) d$

SECTION - B

- 21) If $2x + y = 13$ and $4x - y = 17$ find the value of $x - y$

OR

Sum of two numbers is 105 and their difference is 45. Find the numbers.

- 22) Evaluate: $\frac{5 \tan 60^\circ}{(\sin^2 60^\circ + \cos^2 60^\circ) \tan 30^\circ}$
- 23) One card is draw at random from a well shuffled deck of 52 cards. Find the probability that the card drawn is:
- a) Queen of hearts b) Not a jack
- 24) The sum of first 30 terms of AP is 1920. If the fourth term is 18, find its 11^{th} term.

OR

Find the value of $a_{25} - a_{15}$ for AP: 6, 9, 12, 15 ...

- 25) Find C if the system of equations $Cx + 3y + (3 - C) = 0, 12x + Cy - C = 0$ has infinity many solutions.

SECTION - C

- 26) Prove that $6 + \sqrt{2}$ is irrational

OR

The traffic lights at three different road crossing change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 am, at what time will they change together next?

- 27) a) The present age of father is three years more than three times the age of his son. Three years hence the father's age will be 10 years more than twice the age of son. Determine the present ages.

OR

Half the difference between 2 numbers is 2. Sum of greater number and twice the smaller number is 13. Find the number?

- 28) If α and β are zeros of polynomial $3x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = 19/9$. Find the value of k
- 29) Prove that $q(p^2 - 1) = 2p$ if $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$
- 30) Had Aarush scored 8 more marks in mathematics test, out of 35 marks, 7 times these marks would have been 4 less than square of his actual marks. How many marks did he get in the test?
- 31) Solve the system of linear equation graphically $x - y + 1 = 0$, $x + y = 5$.

SECTION - D

- 32) A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km / hr more than the first speed. If it takes 3 hours to complete the journey. What is its first average speed?
- 33) Prove that: $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} \theta + \cot \theta$

OR

Prove that: $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\operatorname{cosec}^2 A}{\sec^2 A - \operatorname{cosec}^2 A} = \frac{1}{1 - 2 \cos^2 A}$

- 34) The ratio of 11th term to 17th term of an AP is 3:4. Find the ratio of 5th term to 21st term of the same AP. Also find the ratio of sum of first five terms to that of first 21 terms.

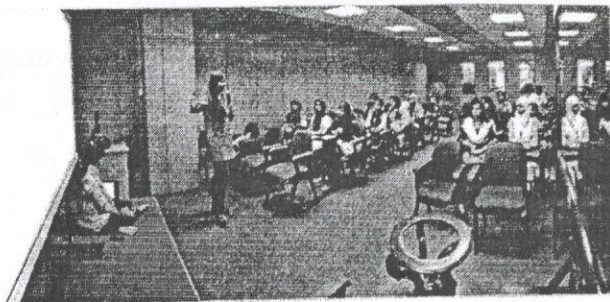
OR

The sum of four consecutive terms of AP is 32 and the ratio of the product of first and last term to the product of two middle terms is 7:15. Find the number

- 35) a) Find the zeros of a quadratic polynomial $t^2 - 15$ and hence verify the relationship between the zeros and the co-efficient
- b) Find the quadratic polynomial each with the given numbers $(\sqrt{2}, 1/3)$ are the sum and product of its zeroes respectively.

SECTION - E

- 36) A seminar is being conducted by an Educational Organisation, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively.



- a) Write the LCM of 60, 84 and 108.
- b) If in each room the same number of participants are to be seated and all of them being in the same subject, what is the maximum number of participants that can be accommodated in each room?
- c) Write the product of HCF and LCM of 60, 84 and 108.

OR

What is the minimum number of rooms required during the event?

- 37) Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic "Water Kingdom" section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are ₹ 150 per child and ₹ 250 per adult.



On a day, the cashier of the park found that 300 tickets were sold and an amount of 55,000 was collected.

Based on the above information, answer the following questions:

- a) If the number of children visited be x and the number of adults visited be y , then write the given situation algebraically.
- b) How many children visited the amusement park that day?

OR

How many adults visited the amusement park that day?

- c) How much amount will be collected if 250 children and 100 adults visit the amusement park?
- 38) Treasure Hunt is an exciting and adventurous game where participants follow a series of clues numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize. While playing a treasure hunt game, some clues (numbers) are hidden in various spots collectively forming an AP. If the number on the n th spot is $20 + 4n$, then answer the following questions to help the players in spotting the clues:



Based on the above information answer the following questions:

- a) Which number is on first spot?
- b) Which spot is numbered as 112?

OR

What is the sum of all the numbers on the first 10 spots?

- c) Which number is on the $(n - 2)^{th}$ spot?