SAINIK SCHOOL AMBIKAPUR

SUMMER VACATION HOMEWORK (2025-26)

"Dear Cadets, Have a wonderful vacation with joy, enthusiasm and Happy Learning"

Class X

Do the following by cutting and pasting activities

1. To draw the graph of a quadratic polynomial and observe:

   (i) The shape of the curve when the coefficient of x^2 is positive.

   (ii) The shape of the curve when the coefficient of x^2 is negative.

   (iii) Its number of zeroes.

2. To verify the conditions of consistency/ inconsistency for a pair of linear equations in two variables by graphical method.

3. To obtain the solution of a quadratic equation ($x^2 + 4x = 60$) by completing the square geometrically.

4. To establish a formula for the sum of first n terms of an Arithmetic Progression.

5. To verify the distance formula by graphical method.

6. Solve 50 MCQ's and Previous Year Questions of each chapter (Real Numbers, Polynomials, and Pair of Linear Equations in Two Variables)

Chapter-1 Real Numbers

1 marks:

1. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$, where a and b are prime numbers then $LCM(a, b) = $ **[BOARD 2024]**
   a) ab b) a^2b^2 c) a^3b^2 d) a^3b^3

2. If p and q are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q'? **[BOARD 2023]**
   a) pq b) p c) q d) $p + q$

3. Let a and b be two positive integers such that $a = p^3q^4$ and $b = p^2q^3$, where p and q are prime numbers. If $HCF(a, b) = p^mq^n$ and $LCM(a, b) = p^rq^s$, then $(m + n)(r + s) = $
   a) 15   b) 30   c) 35   d) 72

4. The sum of exponents of prime factors in the prime factorization of 196 is
   a) 3   b) 4   c) 5   d) 2

5. The sum of exponents of prime factors in the prime factorization of 1764 is
   a) 3   b) 4   c) 5   d) 6

6. The values of x and y in the given figure are
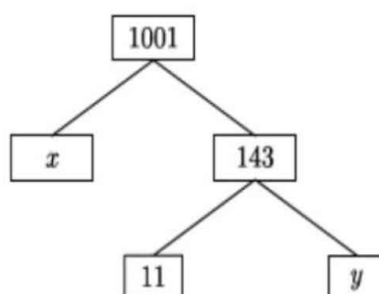
   a) 7, 13   b) 13, 7   c) 9, 12   d) 12, 9

7. The total number of factors of prime number is
   a) 1   b) 0   c) 2   d) 3

8. The HCF and LCM of 12, 21, 15 respectively are
   a) 3, 140   b) 12, 420   c) 3, 420   d) 420, 3

9. The HCF and LCM of 378, 180, 420 are **[BOARD 2024]**
   a) 6, 3980   b) 12, 3780   c) 6, 3780   d) 12, 3980

10. If the product of two co-prime numbers is 553, then their HCF is **[BOARD 2024]**
    a) 1   b) 553   c) 7   d) 79

11. The LCM of smallest two digit composite number and smallest composite number is
    a) 12   b) 4   c) 20   d) 44

12. The ratio of LCM and HCF of the least composite and the least prime numbers is

[BOARD 2023]

a) $1:2$ b) $2:1$ c) $1:1$ d) $1:3$

13. If $HCF(336, 54) = 6, LCM(336, 54)$ is

a) 2024 b) 3024 c) 1012 d) 1512

14. The value of 'a', if $HCF(x, 18) = 2 \ and \ LCM(x, 18) = 36$, is

a) 2 b) 5 c) 7 d) 4

15. HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54 then the other number is

a) 36 b) 35 c) 9 d) 81

16. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280 then the other number is

a) 20 b) 28 c) 60 d) 80

17. HCF of 144 and 198 is

a) 9 b) 18 c) 6 d) 12

18. 225 can be expressed as

a) 5×3^2 b) $5^2 \times 3$ c) $5^2 \times 3^2$ d) $5^3 \times 3$

19. 108 can be expressed as a product of its prime as

a) $2^3 \times 3^2$ b) $2^3 \times 3^3$ c) $2^2 \times 3^2$ d) $2^2 \times 3^3$

20. When 2120 is expressed as the product of its prime factors we get

a) $2 \times 5^3 \times 53$ b) $2^3 \times 5 \times 53$ c) $5 \times 7^2 \times 31$ d) $5^2 \times 7 \times 33$

21. $2\sqrt{3}$ is _____ number.

a) Integer b) rational c) irrational d) whole

22. If a and b are two positive integers such that the least prime factor of a is 3 and the least prime factor of b is 5. Then the least prime factor of $(a + b)$ is

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

23. Select the least number that is divisible by all numbers between 1 and 10 (both inclusive)

a) 2520 b) 5040 c) 1010 d) 2020

24. If 'n' is a natural number then which of the following numbers end with zero?

[BOARD 2023]

a) $(3 \times 2)^n$ b) $(2 \times 5)^n$ c) $(6 \times 2)^n$ d) $(5 \times 3)^n$

25. If $p^2 = \frac{32}{50}$ then p is_____ number.

[BOARD 2023]

a) Whole b) integer c) rational d) irrational

26. If the $HCF(2520, 6600) = 40$ and $LCM(2520, 6600) = 252 \times k$ then the value of k is

[BOARD 2024]

a) 1650 b) 1600 c) 165 d) 1625

27. If $a = 2^2 \times 3^x, b = 2^2 \times 3 \times 5, c = 2^2 \times 3 \times 7$ and $LCM(a, b, c) = 3780$ then x is

[BOARD 2024]

a) 1   b) 2   c) 3   d) 0

28. If $3825 = 3^x \times 5^y \times 17^z$ then the value of $x + y - 2z$ is   **[BOARD 2024]**

a) 0   b) 1   c) 2   d) 3

29. A pair of irrational numbers whose product is a rational number is   **[BOARD 2024]**

a) $(\sqrt{16}, \sqrt{4})$ b) $(\sqrt{5}, \sqrt{2})$ c) $(\sqrt{3}, \sqrt{27})$ d) $(\sqrt{36}, \sqrt{2})$

30. The smallest irrational number by which $\sqrt{20}$ should be multiplied so as to get a rational number, is   **[BOARD 2024]**

a) $\sqrt{20}$ b) $\sqrt{2}$ c) 5   d) $\sqrt{5}$

31. The greatest number which divides 281 and 1249, leaving remainder 5 and 7 respectively, is   **[BOARD 2024]**

a) 23   b) 276   c) 138   d) 69

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)
c) Assertion (A) is true but reason (R) is false
d) Assertion (A) is false but reason (R) is true

32. **Assertion (A):** If HCF of 510 and 92 is 2 then their LCM is 32460.
   Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

33. **Assertion (A):** If the product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
   Reason (R): HCF is always factor of LCM.

34. **Assertion (A):** If $HCF(90, 144) = 18, LCM(90, 144) = 720$
   Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

35. **Assertion (A):** The HCF of two numbers is 5 and their product is 150 then their LCM is 30.
   Reason (R): $HCF(a, b) + LCM(a, b) = a \times b$

36. **Assertion (A):** The HCF of two numbers is 9 and their LCM is 2016. If one number is 54 then the other number is 336.
   Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

37. **Assertion (A):** The number 6^n never end with digit 0 for any natural number n.
   Reason (R): The number 9^n never end with digit 0 for any natural number n.

38. **Assertion (A):** The number 5^n never ends with digit 0 for any natural number n.
    Reason (R): Prime factorisation of 5 has only two factors, 1 and 5. **[BOARD 2023]**

39. **Assertion (A):** The largest number that divides 70 and 125 which leaves remainder 5 and 8 is 13.
    Reason (R): $HCF(65, 117) = 13$

2 marks:

1. Explain why $(7 \times 13 \times 11) + 11$ and $(7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) + 3$ are composite numbers. **[BOARD 2024]**

2. Explain whether $(3 \times 12 \times 101) + 4$ is a prime number or a composite number.

3. Given that $HCF(306, 1314) = 18$. Find $LCM(306, 1314)$.

4. Check whether 4^n can end with the digit 0 for any natural number n.
    [BOARD 2023 & BOARD 2024]

5. Show that $5\sqrt{6}$ is an irrational number.

6. If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$ where a and b are prime numbers then verify $LCM(p, q) \times HCF(p, q) = pq$.

7. Prove that $3 + \sqrt{5}$ is an irrational number. **[BOARD 2023]**

8. Prove that $6 - \sqrt{7}$ is an irrational number. **[BOARD 2023]**

9. Two numbers are in the ratio 2:3 and their LCM is 180. What is the HCF of these numbers? **[BOARD 2023]**

10. Using prime factorization find HCF and LCM of 96 and 120. **[BOARD 2023]**

11. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively. **[BOARD 2023]**

12. Find the greatest 3-digit number which is divisible by 18, 24 and 36.
    [BOARD 2023]

13. Find the least number which when divided by 12, 16 and 24 leaves remainder 7 in each case. **[BOARD 2023]**

14. Find the smallest natural number by which 1200 should be multiplied so that the square root of the product is a rational number.

15. In a school, there are two sections of class X. There are 40 students in the first section and 48 students in the second section. Determine the minimum number of books required for their class library so that they can be distributed equally among students of both sections. **[BOARD 2024]**

16. Complete the following factor tree and find the composite number x.
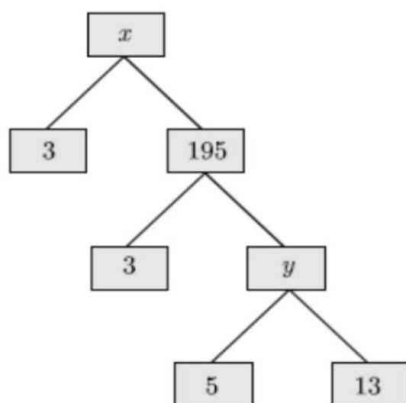
17. Complete the following factor tree and find the composite number x.
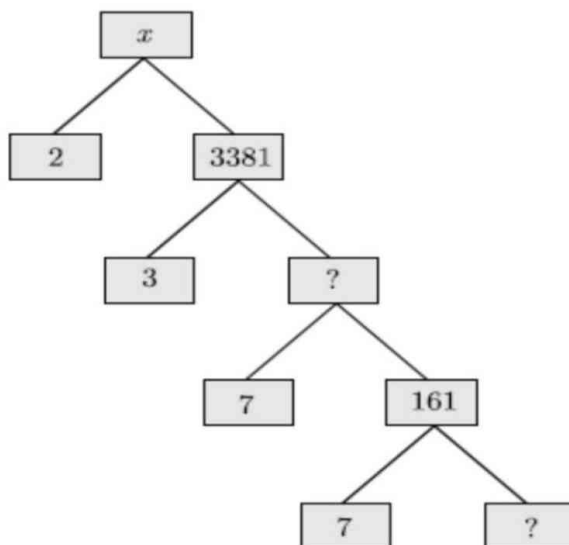
3 marks:

1. Prove that $\sqrt{5}$ is an irrational number.   **[BOARD 2023]**
2. Given that $\sqrt{3}$ is an irrational, prove that $5 + 2\sqrt{3}$ is an irrational number.
                                                                                 [BOARD 2024]
3. Given that $\sqrt{5}$ is an irrational, prove that $2\sqrt{5} - 3$ is an irrational number.
4. Given that $\sqrt{3}$ is an irrational, prove that $\frac{2-\sqrt{3}}{5}$ is an irrational number.
                                                                                 [BOARD 2024]
5. Given that $\sqrt{2}$ is an irrational, prove that $5 + 3\sqrt{2}$ is an irrational number.
6. Prove that $\left(\sqrt{2} + \sqrt{3}\right)^2$ is irrational number, given that $\sqrt{6}$ is an irrational number.
                                                                                 [BOARD 2024]
7. Write the smallest number which is divisible by both 306 and 657.
8. Find HCF and LCM of 16 and 36 by prime factorization and check your answer.
9. Find HCF and LCM of 26, 65 and 117 using prime factorization.   **[BOARD 2023]**
10. Find HCF and LCM of 378, 180 and 420 by prime factorization. Verify that $HCF \times LCM$ = product of two numbers.
11. Find by prime factorization the LCM of the numbers 18180 and 7575. Also find the HCF of two numbers.   **[BOARD 2023]**
12. 144 cartons of Coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same height and if it equal contain cartons of the same drink, what would be the greatest number of cartons each stack would have?
13. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?   **[BOARD 2024]**
14. Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again?   **[BOARD 2023]**
15. Four bells toll at an interval of 8, 12, 15 and 18 seconds respectively. All the four begin to toll together. Find the number of times they toll together in one hour excluding the one at the start.

5

16. The length, breadth and height of a room are 8m 50cm, 6m 25cm and 4m 75cm respectively. Find the length of the longest rod that can measure the dimensions of the room exactly.

17. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm respectively. Find the minimum distance each should walk so that each can cover the same distance in complete steps.

18. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m, at what time will they change together next? **[BOARD 2023]**

19. National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same artform and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room?

20. In a teacher's workshop the number of teacher teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same numbers of teachers are seated and all of them are of same subject. **[BOARD 2024]**

Case Based Questions:

1. February 14 is celebrated as International Book Giving Day and many countries in the world celebrate this day. Some people in India also started celebrating this day and donated the following number of books of various subjects to a public library: History = 96, Science = 240, Mathematics = 336.

    These books have to be arranged in minimum number of stacks such that each stack contains books of only one subject and the number of books on each stack is the same. **[BOARD 2023]**

    Based on the above information, answer the following questions:
    (i)   How many books are arranged in each stack? **1**
    (ii)   How many stacks are used to arrange all the Mathematics books? **1**
    (iii) (a) Determine the total number of stacks that will be used for arranging all the books. **2**

    OR

    (b) If the thickness of each book of History, Science and Mathematics is 1·8 cm, 2·2 cm and 2·5 cm respectively, then find the height of each stack of History, Science and Mathematics books. **2**

2. Three sets of English, Hindi and Mathematics books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of Mathematics books is 336. Assuming that the books are of the same thickness.

(i)   Find the number of stacks of Hindi books?   1
(ii) Find the number of stacks of English books?   2

OR

      Find the number of stacks of Mathematics books?   2
(iii) What is the number of books that can be stored in each stack?   1

3. Teaching Mathematics through activities is a powerful approach that enhances students' understanding and engagement. Keeping this in mind, Ms. Muktha planned a prime number game for class 5 students. She announces the number 2in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number, the last student got 173250.   **[BOARD 2024]**

Now, Muktha asked some questions as given below to the students:
(i)   What is the least prime number used by students?   1
(ii) How many students are in the class?   2

OR

      What is the highest prime number used by students?   2
(iii) Which prime number has been used maximum times?   1

Chapter-2 Polynomials

1 marks:

1. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2 then the value of k is

   [BOARD 2023]

   a) 10 b) -10 c) 5 d) -5

2. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2 then the value of k is

   a) 5/6 b) -5/6 c) 6/5 d) -6/5

3. If one zero of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3 then the value of k is

   a) 4/3 b) -4/3 c) 2/3 d) -2/3

4. If -1 is a zero of the polynomial $kx^2 - 4x + k$, the value of k is

   a) -4 b) -2 c) 2 d) 4

5. If -1 is a zero of the polynomial $x^2 - 7x - 8$ then other zero is,

   a) 4 b) 8 c) 1 d) -4

6. If one zero of the polynomial $3x^2 + 8x + k$ is the reciprocal of the other, then value of k is

   a) 3 b) -3 c) 1/3 d) -1/3

7. If one zero of the polynomial $6x^2 + 37x - (k-2)$ is the reciprocal of the other, then value of k is

   [BOARD 2023]

   a) -4 b) -6 c) 4 d) 6

8. If one zero of the polynomial $x^2 - 3kx + 4k$ be twice the other, then the value of k is

   [BOARD 2023]

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

9. If sum of the zeros of the quadratic polynomial $2x^2 - k\sqrt{2}x + 1$ is $\sqrt{2}$ then the value of k is

   [BOARD 2024]

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

10. The sum of zeros of the polynomial $\sqrt{2}x^2 - 17$ are

    [BOARD 2023]

    a) $\frac{17\sqrt{2}}{2}$ b) $-\frac{17\sqrt{2}}{2}$ c) 0 d) 1

11. If the zeros of the quadratic polynomial $x^2 + (a+1)x + b$ are 2 and -3 then

    a) $a = -7, b = -1$ b) $a = 5, b = -1$ c) $a = 2, b = -6$ d) $a = 0, b = -6$

1

12. If α and β are the zeros of a polynomial $x^2 - 1$ then the value of $\alpha + \beta$ is

[BOARD 2023]

   a) 2   b) 1   c) -1   d) 0

13. If α and β ($\alpha > \beta$) are the zeros of a polynomial $-x^2 + 8x + 9$ then $(\alpha - \beta)$ is

[BOARD 2024]

   a) -10   b) 10   c) ± 10 d) 8

14. If α and β are the zeros of a polynomial $px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$ then p is

[BOARD 2024]

   a) -2/3   b) 2/3   c) 1/3   d) -1/3

15. If α and β are the zeros of a polynomial $ax^2 - 5x + c$ and $\alpha + \beta = \alpha\beta = 10$ then

[BOARD 2023]

   a) $a = 5, c = \frac{1}{2}$ b) $a = 1, c = \frac{5}{2}$ c) $a = \frac{5}{2}, c = 1$ d) $a = \frac{1}{2}, c = 5$

16. If α and β are the zeros of a polynomial $x^2 - 4\sqrt{3}x + 3$ then the value of $\alpha + \beta - \alpha\beta$ is

   a) $\sqrt{3}(2 - \sqrt{3})$ b) $\sqrt{3}(2 + \sqrt{3})$ c) $\sqrt{3}(4 + \sqrt{3})$ d) $\sqrt{3}(4 - \sqrt{3})$

17. If α and β are the zeros of a polynomial $x^2 + 2x + 1$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is   **[BOARD 2023]**

   a) -2   b) 2   c) 0   d) 1

18. If α and β are the zeros of a polynomial $4x^2 - 3x - 7$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is   **[BOARD 2024]**

   a) $\frac{7}{3}$ b) $-\frac{7}{3}$ c) $\frac{3}{7}$ d) $-\frac{3}{7}$

19. If α and β are the zeros of a polynomial $2x^2 - 13x + 6$, then $\alpha + \beta$ is

   a) -3   b) 3   c) 13/2   d) -13/2

20. If α and β are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $(\alpha - \beta)^2$ is

   a) 2   b) 1   c) -1   d) -6

21. If α and β are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $\alpha^2 + \beta^2$ is

[BOARD 2023 & BOARD 2024]

   a) -7   b) 1   c) -1   d) -6

22. If α and β are the zeros of a polynomial $x^2 - ax - b$ then the value of $\alpha^2 + \beta^2$ is

[BOARD 2023]

   a) $a^2 - 2b$ b) $a^2 + 2b$ c) $b^2 - 2a$ d) $b^2 + 2a$

23. If α and β are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is

   a) $\frac{4}{25}$ b) $-\frac{4}{25}$ c) $\frac{4}{5}$ d) $-\frac{4}{5}$

24. If α and β are the zeros of a polynomial $x^2 - x - 4$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is

   a) 15/4   b) -15/4   c) 4   d) 15

25. If p and q are the zeros of a polynomial $2x^2 - 7x + 3$ the value of $p^2 + q^2$ will be

   a) $\frac{39}{5}$ b) $\frac{5}{39}$ c) $\frac{37}{4}$ d) $\frac{4}{37}$

26. If p and q are the zeros of a polynomial $2x^2 - 7x + 3$ the value of $p + q - pq$ will be

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

27. If m and n are the zeros of a polynomial $3x^2 + 11x - 4$ then the value of $\frac{m}{n} + \frac{n}{m}$ will be

   a) $\frac{12}{145}$ b) $-\frac{12}{145}$ c) $-\frac{145}{12}$ d) $\frac{145}{12}$

28. If a and b are the zeros of a polynomial $x^2 + ax + b$, the value of a and b are

   a) 1 and 2   b) 1 and -2   c) -2 and 1   d) 2 and 1

29. If the sum of the zeros of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to their product then k

   a) 1/3   b) -1/3   c) 2/3   d) -2/3

30. The sum and product of zeros of a quadratic polynomial are $2\sqrt{3}$ and 3 respectively, the quadratic polynomial will be   **[BOARD 2024]**

   a) $x^2 + 2\sqrt{3}x - 3$ b) $\left(x - \sqrt{3}\right)^2$ c) $x^2 - 2\sqrt{3}x - 3$ d) $x^2 + 2\sqrt{3}x + 3$

31. The quadratic polynomial, the sum of whose zeros is -5 and their product is 6, is

   a) $x^2 + 5x + 6$ b) $x^2 - 5x + 6$ c) $x^2 - 5x - 6$ d) $-x^2 + 5x + 6$

32. The quadratic polynomial p(x) with 3 and $-\frac{2}{5}$ as sum and product of its zeros

   a) $x^2 - 3x - \frac{2}{5}$ b) $x^2 - 3x - 2$ c) $5x^2 - 15x - 2$ d) $15x^2 - 5x + \frac{2}{5}$

33. The sum and product of the zeros of a quadratic polynomial are 3 and -10 respectively. The quadratic polynomial is

   a) $x^2 - 3x + 10$ b) $x^2 + 3x - 10$ c) $x^2 - 3x - 10$ d) $x^2 + 3x + 10$

34. The quadratic polynomial whose sum and product of the zeros are $\frac{21}{8}$ and $\frac{5}{16}$, is

   a) $16x^2 - 42x + 5$ b) $\frac{1}{16}(16x^2 - 42x + 5)$ c) $\frac{1}{12}(16x^2 + 42x + 5)$ d) $\frac{1}{12}(16x^2 + 42x - 5)$

35. A quadratic polynomial whose zeros are -3 and 4, is

   a) $x^2 - 2x + 12$ b) $x^2 + x + 12$ c) $\frac{x^2}{2} - \frac{x}{2} - 6$ d) $2x^2 + 2x - 24$

36. The maximum number of zeros a cubic polynomial can have, is

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

37. Which of the following is a quadratic polynomial having zeros $-\frac{2}{3}$ and $\frac{2}{3}$.

   a) $4x^2 - 9$ b) $\frac{4}{9}(9x^2 + 4)$ c) $x^2 + \frac{9}{4}$ d) $5(9x^2 - 4)$

38. Write a quadratic polynomial whose sum of zeros is $-\frac{1}{4}$ and product of zeros is $\frac{1}{4}$

   a) $4x^2 + x + 1$ b) $x^2 + 4x - 1$ c) $2x^2 + 3x - 1$ d) $x^2 - 2x + 1$

39. The quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $ax^2 + bx + c, a \neq 0, c \neq 0$

   a) $bx^2 + ax + c$ b) $ax^2 + cx + b$ c) $cx^2 + bx + a$ d) $bx^2 + cx + a$

40. The zeros of the polynomial $x^2 - 2x$ are

   a) 2, 4   b) 1, 3   c) 0, 2   d) 0, 4

41. The zeros of the polynomial $x^2 - 3x - m(m + 3)$ are

   a) $m, m + 3$ b) $-m, m + 3$ c) $m, -(m + 3)$ d) $-m, -(m + 3)$

42. The zeros of the polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$ are

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

43. The zeros of the polynomial $4x^2 - 12x + 9$ will be

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

44. The zeros of polynomial $ax^2 + bx + c$ are reciprocal of each other if

   a) $b = 2a$ b) $c = b$ c) $b = a$ d) $c = a$

45. If zeros of the polynomial $x^2 + 4x + 2a$ are a and $\frac{2}{a}$ then the value of a is

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

46. If the zeros of the polynomial $x^2 + (a + 1)x + b$ are 2 and -3 then

   a) $a = -7, b = -1$ b) $a = 5, b = -1$ c) $a = 2, b = -6$ d) $a = 0, b = -6$

47. The zeros of the polynomial $x^2 + px + q$ are twice the zeros of the polynomial $4x^2 - 5x - 6$. The value of p is

   a) $\frac{-5}{2}$ b) $\frac{5}{2}$ c) -5   d) 10

48. If the square of difference of the zeros of the quadratic polynomial $x^2 + px + 45$ is equal to 144 then the value of p is

   a) ± 9 b) ± 12 c) ± 15 d) ± 18

49. The number of polynomials having zeros as -3 and 5 is

   a) 1   b) 2   c) 3   d) more than 3

50. What should be the subtracted from the polynomial $x^2 - 16x + 30$ so that 15 is the zero of the resulting polynomial? **[BOARD 2024]**

   a) 30   b) 14   c) 15   d) 16

51. What should be the added from the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the resulting polynomial? **[BOARD 2024]**

   b) 1   b) 2   c) 4   d) 5

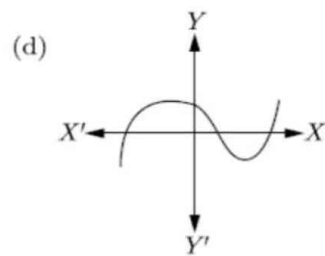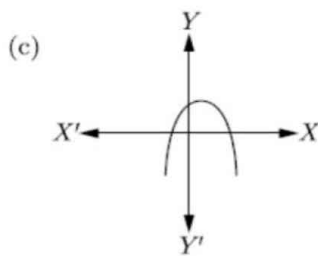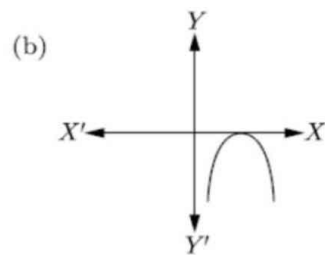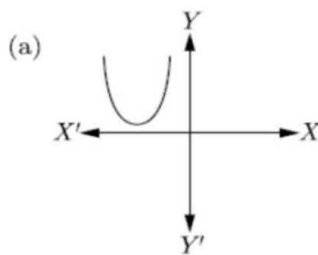52. If a polynomial p(x) is given by $p(x) = x^2 - 5x + 6$ then the value of $p(1) + p(4)$ is **[BOARD 2024]**

   a) 0   b) 4   c) 2   d) -4

53. A quadratic polynomial, one of whose zeros is $2 + \sqrt{5}$ and the sum of whose zeros is 4, is **[BOARD 2024]**

   a) $x^2 + 4x - 1$ b) $x^2 - 4x - 1$ c) $x^2 - 4x + 1$ d) $x^2 + 4x + 1$

54. Which of the following is not the graph of a quadratic polynomial?

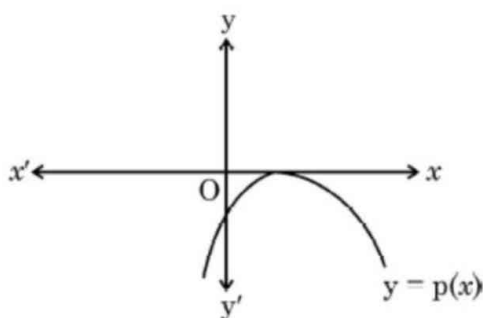55. The graph of $y = p(x)$ where $p(x)$ is a polynomial in variable x, is as follows:
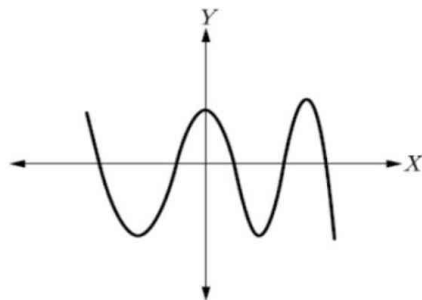
The number of zeros of p(x) is
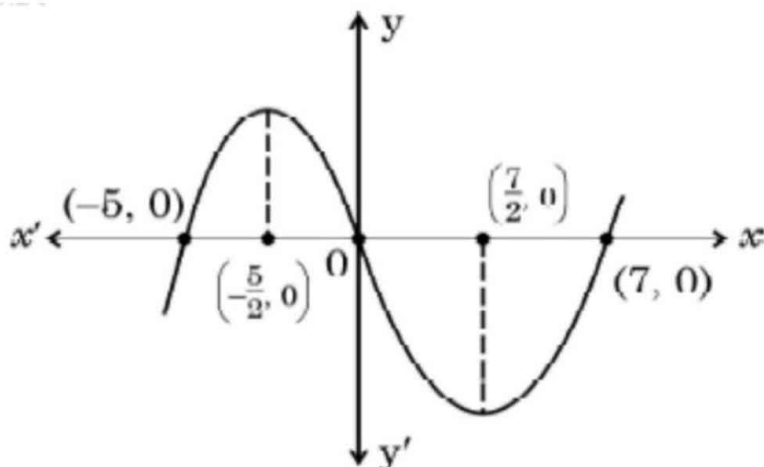
   a) 2   b) 3   c) 4   d) 5

56. In the given figure, the graph of a polynomial p(x) is shown. The number of zeros of p(x) will be
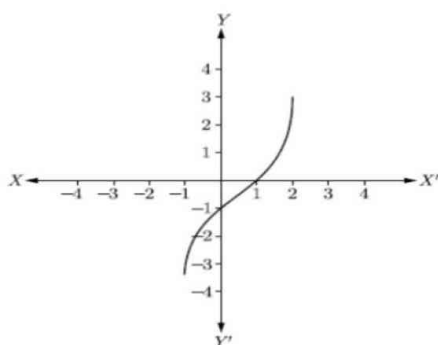
a) 1   b) 2   c) 3   d) 4

57. The graph of $y = p(x)$ is given for a polynomial $p(x)$. The number of zeros of $p(x)$ from the graph is **[BOARD 2023]**

a) 0   b) 1   c) 2   d) 3

58. The graph of $y = p(x)$ is given for a polynomial $p(x)$. The number of zeros of $p(x)$ from the graph are **[BOARD 2023]**

a) -5, 7   b) $-\frac{5}{2}, -\frac{7}{2}$ c) -5, 0, 7   d) $-5, -\frac{5}{2}, \frac{7}{2}, 7$

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

59. **Assertion (A):** If one zero of the polynomial $(k^2 + 4)x^2 + 13x + 4k$ is reciprocal of other then $k = 2$.

Reason (R): If $(x - \alpha)$ is a factor of $p(x)$ then $p(\alpha) = 0$.

60. **Assertion (A):** The polynomial $p(x) = x^2 + 3x + 3$ has two real zeros.

Reason (R): A quadratic polynomial can have at most two real zeros.

[BOARD 2023]

61. **Assertion (A):** If the graph of a polynomial touches x-axis at only one point then the polynomial cannot be a quadratic polynomial. **[BOARD 2024]**

Reason (R): A polynomial of degree n $(n > 1)$ can have at most n zeros.

62. **Assertion (A):** Degree of zero polynomial is not defined.

Reason (R): Degree of a non-zero constant polynomial is 0. **[BOARD 2024]**

2 marks:

1. Find the zeros of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$.

2. Find a quadratic polynomial the sum and product of whose zeros are 6 and 9 respectively. Hence find the zeros.

3. Find a quadratic polynomial the sum and product of whose zeros are -3 and 2 respectively. Hence find the zeros.

4. Form a quadratic polynomial p(x) with 3 and $-\frac{2}{5}$ as sum and product of its zeros respectively.

5. If α and β are the zeros of the polynomial $5x^2 - 7x + 1$ then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

6. If α and β are the zeros of the polynomial $x^2 - 4\sqrt{3}x + 3$, then find the value of $\alpha + \beta - \alpha\beta$. **[BOARD 2024]**

7. If α and β are the zeros of the polynomial $x^2 - (k - 6)x + 2(2k - 1)$ find the value of k if $\alpha + \beta = \frac{1}{2}\alpha\beta$

8. If one of the zeros of the quadratic polynomial $14x^2 - 42k^2x - 9$ is negative of the other, find the value of 'k'.

9. If one zero of the polynomial $2x^2 + 3x + \lambda$ is $\frac{1}{2}$ find the value of λ and the other zero.

10. Find the value of k such that the polynomial $x^2 - (k+6)x + 2(2k+1)$ has sum of its zeros equal to half of their product.

3 marks:

1. Find the zeros of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between zeros and coefficients.

2. Find the zeros of the quadratic polynomial $x^2 + \frac{1}{6}x - 2$ and verify the relationship between zeros and coefficients.

3. Find the zeros of the quadratic polynomial $x^2 - 15$ and verify the relationship between zeros and coefficients. **[BOARD 2024]**

4. Find the zeros of the quadratic polynomial $2x^2 - x - 6$ and verify the relationship between zeros and coefficients. **[BOARD 2024]**

5. If the zeros of the polynomial $x^2 + px + q$ are double in value to the zeros of the polynomial $2x^2 - 5x - 3$ then find the values of p and q.

6. If a, b are the zeros of the polynomial $2x^2 - 5x + 7$ then find a polynomial whose zeros are $2a + 3b \ and \ 3a + 2b$.

7. Find a quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $ax^2 + bx + c, a \neq 0, c \neq 0$.

8. Find the quadratic polynomial sum and product of whose zeros are -1 and -20 respectively. Also find the zeros of the polynomial so obtained.

9. Verify whether 2, 3 and 1/2 are the zeros of the polynomial $2x^3 - 11x^2 + 17x - 6$.

10. If the sum and product of the zeroes of the polynomial $ax^2 - 5x + c$ are equal to 10 each, find the value of 'a' and 'c'.

11. If one zero of the polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k.

12. If $\alpha \ and \ \beta$ are the zeros of a polynomial $2x^2 - 3x + 1$ then find the quadratic polynomial whose zeros are $3\alpha \ and \ 3\beta$.

13. If $\alpha \ and \ \beta$ are the zeros of a polynomial $x^2 - 4x - 5$ the find the value of $\alpha^2 + \beta^2$.

14. If $\alpha \ and \ \beta$ are the zeros of a polynomial $x^2 + x - 2$ then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$. **[BOARD 2024]**

15. What number should be added to the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the polynomial?

5 marks:

1. If α and β are the zeros of a polynomial $3x^2 + 2x + 1$ find the polynomial whose zeroes are $\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$.

2. If α and β are the zeros of a polynomial $2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$ then find the value of k.

3. If α and β are the zeros of a polynomial $6x^2 - 5x + k$ such that $\alpha - \beta = \frac{1}{6}$ then find the value of k.

4. If β and $\frac{1}{\beta}$ are zeros of the polynomial $(a^2 + a)x^2 + 61x + 6a$ find the value of α and β.

5. Find the zeros of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeros and the coefficients.

6. If α and β are the zeros of a polynomial $2x^2 - 4x + 5$, find the values of

   (i) $\alpha^2 + \beta^2$

   (ii) $\frac{1}{\alpha} + \frac{1}{\beta}$

   (iii) $(\alpha - \beta)^2$

   (iv) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

   (v) $\alpha^3 + \beta^3$
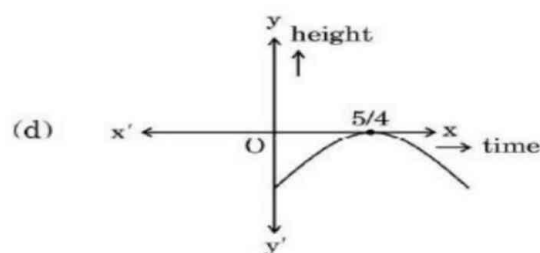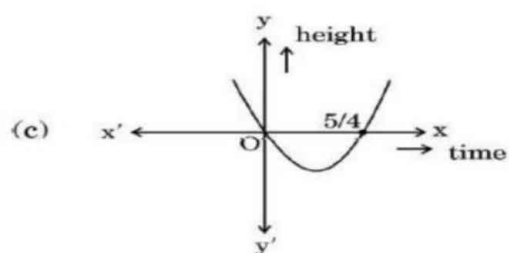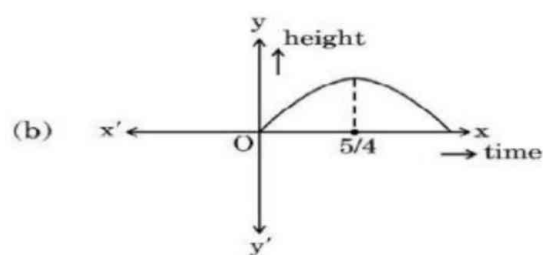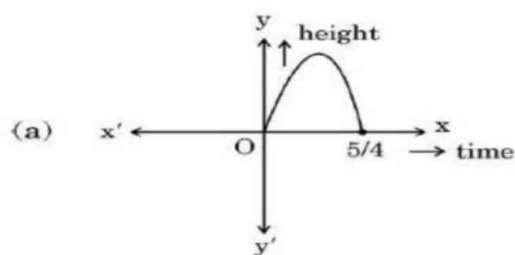
Case Based Questions:

1. In a pool at an aquarium, a dolphin jumps out of the water travelling at 20 cm per second. Its height above water level after t seconds is given by $h = 20t - 16t^2$.

   [BOARD 2023]

   Based on the above, answer the following questions :
   (i)   Find zeroes of polynomial $p(t) = 20t - 16t^2$.   **1**
   (ii)   Which of the following types of graph represents p(t)?   **1**

(a), (b), (c), (d) — height vs time graphs

(iii)   What would be the value of h at $t = \frac{3}{2}$? Interpret the result.   **2**

OR

How much distance has the dolphin covered before hitting the water level again?   **2**

2. While playing in a garden, Samaira saw a honeycomb and asked her mother what is that. Her mother replied that it's a honeycomb made by honey bees to store honey. Also, she told her that the shape of the honeycomb formed is mathematical structure. The mathematical representation of the honeycomb is shown in the graph.   **[BOARD 2023]**
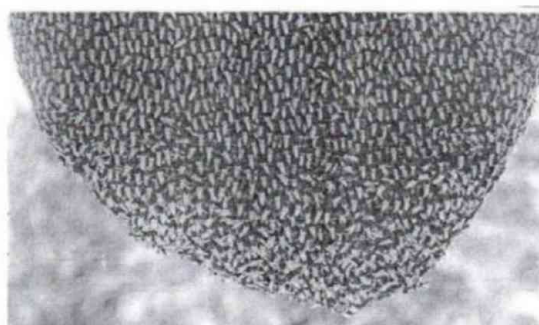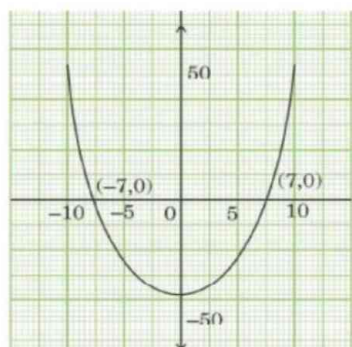

Based on the above information, answer the following questions:
(i)   How many zeros are there for the polynomial represented by the graph given?   **1**
(ii)   Write the zeros of the polynomial.   **1**
(iii) If the zeros of the polynomial $x^2 + (a+1)x + b$ are 2 and -3 then determine the values of a and b.   **2**

OR

If the square of the difference of the zeros of the polynomial $x^2 + px + 45$ is 144 then find the values of p.   **2**

3. A ball is thrown in the air so that t seconds after it is shown, its height h meter above its starting point is given by the polynomial $h = 25t - 5t^2$.   **[BOARD 2024]**
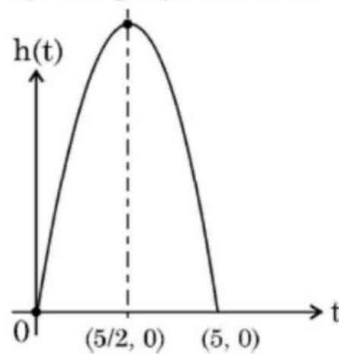
Observe the graph of the polynomial and answer the following questions:

(i)   Write zeros of the given polynomial.   **1**

(ii)   Find the maximum height achieved by the ball.   **1**

(iii) After throwing upward, how much time did the ball take to reach to the height of 30 m?   **2**

OR

Find two different values of t when the height of the ball was 20m.   **2**

11

Chapter-3 Pair of linear equations in two variables

1 marks:

1. If the system of equations $3x + y = 1$ and $(2k - 1)x + (k - 1)y = 2k + 1$ is inconsistent then k is
   a) -1
   b) 0
   c) 1
   d) 2

2. The value of k for which the system of linear equations $x + 2y = 3, \ 5x + ky + 7 = 0$ is inconsistent, is
   a) -14/3
   b) 2/5
   c) 5
   d) 10

3. The value of k for which the system of equations $x + y - 4 = 0, 2x + ky = 3$ has no solution, is
   a) -2
   b) $\neq 2$
   c) 3
   d) 2

4. For what value of k, the system of equations $kx + 3y = 1, \ 12x + ky = 2$ has no solution
   a) $k = -6$
   b) $k \neq -6$
   c) $k = 4$
   d) $k = -4$

5. The value of c for which the pair of equations $cx - y = 2 \ and \ 6x - 2y = 3$ will have no solution, is
   a) 3
   b) -3
   c) -12
   d) 12

6. For what value of p the system of equations have no solution
   $(2p - 1)x + (p - 1)y = 2p + 1, y + 3x - 1 = 0$
   a) $p = 2$
   b) $p \neq 2$
   c) $p = 4$
   d) $p \neq 4$

7. For which value(s) 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) 5/2
   c) 10
   d) 1/2

8. If the lines given by $3x + 2ky = 2 \ and \ 2x + 5y + 1 = 0$ are parallel then value of k is
   a) -5/4
   b) 2/5
   c) 15/4
   d) 3/2

9. The pair of equations $ax + 2y = 9 \ \& \ 3x + by = 18$ represent parallel lines, where a, b are integers if **[BOARD 2023]**
   a) $a = b$
   b) $3a = 2b$
   c) $2a = 3b$
   d) $ab = 6$

10. The pair of equations $2kx + 5y = 7, 6x - 5y = 11$ has a unique solution, if
    a) $k \neq -3$
    b) $k \neq \frac{2}{3}$
    c) $k \neq 5$
    d) $k \neq \frac{2}{9}$

11. Which of the following value of k should be selected so that the pair of equations $x + 2y = 5$ and $3x + ky + 15 = 0$ has a unique solution?
    a) $k \neq 5$
    b) $k \neq 6$
    c) $k = 5$
    d) $k = 6$

12. If the equations $kx - 2y = 3 \text{ and } 3x + y = 5$ represent two intersecting lines at unique point then the value of k is
    a) $k = -6$
    b) $k \neq -6$
    c) $k = 4$
    d) $k \neq 4$

13. The value of k for which the pair of equations $kx - y = 2 \text{ and } 6x - 2y = 3$ has unique solution
    a) $k = 3$
    b) $k \neq 3$
    c) $k \neq 0$
    d) $k = 0$

14. For what value of p does the pair of linear equations given below has unique solution $4x + py + 8 = 0 \text{ and } 2x + 2y + 2 = 0$
    a) $p = 1$
    b) $p = 2$
    c) $p \neq 4$
    d) $p \neq 2$

15. The condition for the system of linear equations $ax + by = c \ \& \ lx + my = n$ to have a unique solution is **[BOARD 2023]**
    a) $am \neq bl$
    b) $al \neq bm$
    c) $al = bm$
    d) $am = bl$

16. For what value of k, the equations $3x - y + 8 = 0, 6x - ky = -16$ represent coincident lines **[BOARD 2023]**
    a) $1/2$
    b) $-1/2$
    c) 2
    d) -2

17. The value of k for which the pair of equations $kx = y + 2 \ \& \ 6x = 2y + 3$ has infinitely many solutions, is **[BOARD 2023]**
    a) $k = 3$
    b) $k = -3$
    c) $k = 4$
    d) doesn't exist

18. For what value of k, the equations $kx + y = k^2 \text{ and } x + ky = 1$ have infinitely many solutions. **[BOARD 2024]**
    a) 1
    b) 2
    c) 3
    d) 4

19. The value of k for which the lines $5x + 7y = 3 \text{ and } 15x + 21y = k$ coincide is
    a) 9
    b) 5
    c) 7
    d) 18

20. The value of k for which the lines represented by the following pair of linear equations are coincident is $2x + 3y + 7 = 0 \text{ and } 8x + 12y + k = 0$
    a) All real values except 14
    b) 28
    c) 8
    d) 14

21. For what value of k, the pair of linear equations $kx - 4y = 3, 6x - 12y = 9$ has an infinite number of solutions?
    a) $k = 2$
    b) $k \neq 2$
    c) $k \neq 3$
    d) $k = 4$

22. One equation of a pair of dependent linear equation $-5x + 7y = 2$. The second equation can be
    a) $10x + 14y + 4 = 0$
    b) $-10x + 14y + 4 = 0$
    c) $-10x - 14y + 4 = 0$
    d) $10x - 14y + 4 = 0$

23. Two lines are given to be parallel. The equation of one of the lines is $4x + 3y = 14$ then the equation of the second line will be **[BOARD 2024]**
    a) $12x + 9y = 42$
    b) $12x + 8y = 15$
    c) $12x + 9y = 5$
    d) $12x + 8y = 42$

24. Given the linear equation $3x + 4y = 9$, select another linear equation in these two variables such that the geometrical representation of the pair so formed is intersecting lines
    a) $3x - 5y = 10$
    b) $8x + 12y = 18$
    c) $6x + 8y = 18$
    d) above all

25. If $3x + 4y : x + 2y = 9 : 4$ then $3x + 5y : 3x - y$ is
    a) $4 : 1$
    b) $1 : 4$
    c) $7 : 1$
    d) $1 : 7$

26. If $x = a$ and $y = b$ is the solution of the equation $x - y = 2$ and $x + y = 4$ then the values of a and b are, respectively
    a) 3 and 5
    b) 5 and 3
    c) 3 and 1
    d) -1 and -3

27. What are the values of x and y for the following pair of linear equations?
    $3x + 2y - 7 = 0$ and $4x + y - 6 = 0$
    a) 1 and 2
    b) 2 and 2
    c) 1 and 1
    d) -1 and -1

28. What are the values of x and y for the following pair of linear equations?
    $2x - y = 2$ and $x + 3y = 15$
    a) 4 and 5
    b) 3 and 4
    c) 5 and 4
    d) 4 and 4

29. The solution of the following pair of linear equations:
    $x - 3y = 2$ and $3x - y = 14$
    a) $x = 5, y = 1$
    b) $x = 2, y = 3$
    c) $x = 1, y = 2$
    d) $x = 1, y = 4$

30. The solutions of the pair of equations $x + y = a + b$ & $ax - by = a^2 - b^2$ is
    [BOARD 2023]
    a) $x = b,\ y = a$
    b) $x = -a, y = b$
    c) $x = a, y = b$
    d) $x = a, y = -b$

31. If $ax + by = a^2 - b^2$ and $bx + ay = 0$ then the value of $x + y$ is   **[BOARD 2024]**
    a) $a^2 - b^2$
    b) $a + b$
    c) $a - b$
    d) $a^2 + b^2$

32. What are the values of x and y for the following pair of linear equations?
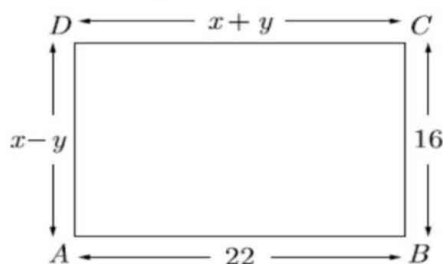 $99x + 101y = 499$ and $101x + 99y = 501$
    a) 3 and 6
    b) 3 and 2
    c) 2 and 3
    d) 6 and 3

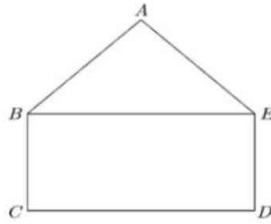33. If $2x + y = 23$ and $4x - y = 19$ the value of $(5y - 2x)$ and $\left(\frac{y}{x} - 2\right)$ will be
    a) $-\frac{5}{7}, 31$
    b) $31, -\frac{5}{7}$
    c) $37, \frac{2}{7}$
    d) $\frac{2}{7}, 37$

34. In the given figure, ABCD is a rectangle. The values of x and y will be

    a) 3 and 19
    b) 19 and 3
    c) 4 and 18
    d) 18 and 4

35. In the figure, ABCDE is a pentagon with $BE \parallel CD$ and $BC \parallel DE$. BC is perpendicular to CD. $AB = 5\,cm, AE = 5\,cm, BE = 7\,cm, BC = x - y$ and $CD = x + y$. If the perimeter of ABCDE is 27 cm. The value of x and y will be


   a) 3 and 2   b) 2 and 3   c) 1 and 6   d) 6 and 1

36. The pair of equations $x = a$ and $y = b$ graphically represents lines which are

   a) Parallel
   b) coincident
   c) intersecting at (a, b)
   d) intersecting at (b, a)

37. If a pair of linear equations is consistent then the lines will be
   a) Parallel
   b) Intersecting or coincident
   c) always coincident
   d) always intersecting

38. What do you say about the lines represented by $2x + y = 3$ and $4x + 2y = 6$?

   a) Parallel
   b) Intersecting
   c) coincident
   d) none of these

39. What do you say about the lines represented by $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$
   a) Parallel
   b) Intersecting
   c) coincident
   d) none of these

40. If $ad \neq bc$ then what do you say about the solution of the pair of linear equations $ax + by = p$ and $cx + dy = q$?
   a) Unique solution
   b) Infinitely many solution
   c) two solution
   d) no solution

41. If $am = bl$ then what do you say about the solution of the pair of linear equations $ax + by = c$ and $lx + my = n$?
   a) Unique solution
   b) Infinitely many solution
   c) two solution
   d) no solution

42. What do you say about the solution of the pair of linear equations $y = 0$ and $y = -5$
   a) Unique solution
   b) Infinitely many solution
   c) two solution
   d) no solution

43. The pair of equations $y = 0$ and $y = 7$ has
   a) Unique solution
   b) Infinitely many solution
   c) two solution
   d) no solution

44. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has
   a) Unique solution
   b) Infinitely many solutions
   c) exactly two solutions
   d) no solution

45. The pair of equations $3^{x+y} = 81$, $81^{x-y} = 3$ has
    a) No solution
    b) infinitely many solutions
    c) unique solution
    d) $x = 2\frac{1}{8}$, $y = 1\frac{7}{8}$

46. The pair of linear equations $2x + 3y = 5$ and $4x + 6y = 10$ is
    a) Inconsistent
    b) Consistent
    c) dependent consistent
    d) none of these

47. The two digit number which becomes $\frac{5^{th}}{6}$ of itself when its digits are reversed. The difference in the digits of the number being 1, then the two digit number is
    a) 45   b) 54   c) 36   d) 63

48. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed then the number is
    a) 36   b) 63   c) 48   d) 84

49. x and y are 2 different digits. If the sum of the two digit numbers formed by using both the digits is a perfect square, then the value of $x + y$ is
    a) 10   b) 11   c) 12   d) 13

50. A fraction becomes 4 when 1 is added to both the numerator and denominator and it becomes 7 when 1 is subtracted from both the numerator and denominator. The numerator of the given fraction is
    a) 2   b) 3   c) 5   d) 15

51. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. The fraction will be
    a) $\frac{7}{15}$ b) $\frac{8}{15}$ c) $\frac{6}{15}$ d) $\frac{9}{15}$

52. The father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. The present ages (in year) of the son and the father are, respectively
    a) 4 and 24   b) 5 and 30   c) 6 and 36   d) 3 and 24

53. Aruna has only Re 1 and Rs 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is Rs 75, then the number of Re 1 and Rs 2 coins are, respectively
    a) 35 and 15   b) 35 and 20   c) 15 and 35   d) 25 and 25

54. Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. The dimensions of garden will be
    a) 20 m by 16 m   b) 36 m by 10 m   c) 16 m by 30 m   d) 20 m by 16 m

55. 3 chairs and 1 table cost Rs 900, whereas 5 chairs and 3 tables cost Rs 2100. If the cost of 1 chair is Rs x and the cost of 1 table is Rs y then the situation can be represented algebraically as **[BOARD 2023]**
    a) $3x + y = 900, 3x + 5y = 2100$
    b) $3x + y = 900, 5x + 3y = 2100$
    c) $x + 3y = 900, 3x + 5y = 2100$
    d) $x + 3y = 900, 5x + 3y = 2100$

56. In the given figure, graphs of two linear equations are shown. The pair of these linear equations is **[BOARD 2024]**
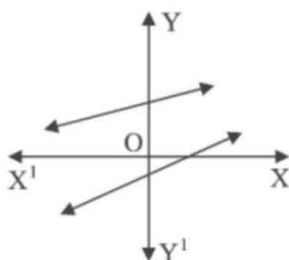
a) Consistent with unique solution

b) Consistent with infinitely many solutions

c) Inconsistent

d) Inconsistent but can be made consistent by extending these lines.

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

a) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

b) Assertion (A) is true but reason (R) is false

c) Assertion (A) is false but reason (R) is true

57. **Assertion (A):** $x + y - 4 = 0$ and $2x + ky - 3 = 0$ has no solution if $k = 2$.

Reason (R): $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are consistent if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.

58. **Assertion (A):** Pair of linear equations $9x + 3y + 12 = 0$ and $8x + 6y + 24 = 0$ have infinitely many solution.

Reason (R): Pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinitely many solutions if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

2 marks:

1. For what values of k will the following pair of linear equations have infinitely many solutions? $kx + 3y - (k - 3) = 0$ and $12x + ky - k = 0$.

2. For what value of k for which the following pair of linear equations have infinitely many solutions? $2x + 3y = 7$, $(k - 1)x + (k + 2)y = 3k$.

3. For what value of k for which the following pair of linear equations have infinitely many solutions? $2x - 3y = 7, (k + 2)x - (2k + 1)y = 3(2k - 1)$.

4. For what value of k will the following pair of linear equations have no solution? $3x + y = 1, (2k - 1)x + (k - 1)y = 2k + 1$.

5. Find the value of m for which the pair of linear equations. $2x + 3y - 7 = 0$ and $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions.

6. For what value of p will the following pair of linear equations have infinitely many solutions? $(p-3)x + 3y = p$ and $px + py = 12$.
7. Determine the values of a and b for which the following system of linear equations has infinite number of solutions: $2x - (a-4)y = 2b + 1$ and $4x - (a-1)y = 5b - 1$.
8. If the system of equations $2x + 3y = 7$ and $(a+b)x + (2a-b)y = 21$ has infinitely many solutions, then find a and b.
9. If $49x + 51y = 499, 51x + 49y = 501$ then find the values of x and y.
10. If $217x + 131y = 913, 131x + 217y = 827$ then find the values of x and y.

[BOARD 2023]

11. In figure, ABCD is a rectangle. Find the values of x and y.
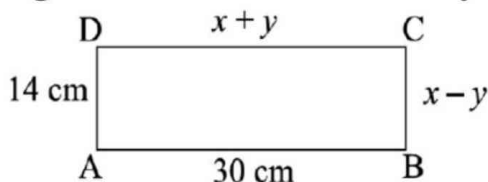
12. Sumit is 3 times as old as his son. Five years later, he shall be two and a half time as old as his son. How old is Sumit at present?
13. Solve the pair of equations $x = 3$ & $y = -4$ graphically. **[BOARD 2023]**
14. Using graphical method, find whether following system of linear equations is consistent or not $x = 0$ & $y = -7$. **[BOARD 2023]**
15. Solve $7x - 2y = 5$ & $8x + 7y = 15$ and verify your answer. **[BOARD 2024]**
16. Sum of two numbers is 105 and their difference is 45. Find the numbers.

[BOARD 2024]

3 marks:

1. Solve for x and y: $\frac{x}{2} + \frac{2y}{3} = -1$ and $x - \frac{y}{3} = 3$.
2. Solve the pair of linear equations: $8x + 5y = 9$ and $3x + 2y = 4$.
3. Solve for x and y: $\frac{x+1}{2} + \frac{y-1}{3} = 9$ and $\frac{x-1}{3} + \frac{y+1}{2} = 8$.
4. Solve for x and y: $ax + by = \frac{a+b}{2}$ and $3x + 5y = 4$.
5. Solve graphically: $2x - 3y + 13 = 0$ and $3x - 2y + 12 = 0$.
6. Solve graphically: $2x + 3y = 2$ and $x - 2y = 8$.
7. Find whether the following pair of linear equations has a unique solution. If yes, find the solution: $7x - 4y = 49$ and $5x - 6y = 57$.
8. Solve: $152x - 378y = -74$ and $-378x + 152y = -604$.
9. Given the linear equation $2x + 3y - 8 = 0$, write another linear equation in two variables such that the geometrical representation of the pair so formed is:
   a) Intersecting lines
   b) Parallel lines
   c) Coincident lines
10. Represent the following pair of linear equations graphically and hence comment on the condition of consistency of this pair. $x - 5y = 6$ and $2x - 10y = 12$.
11. Determine the values of m and n so that the following system of linear equation have infinite number of solutions: $(2m - 1)x + 3y - 5 = 0$ and $3x + (n-1)y - 2 = 0$.

12. For what value of p will the following system of equations have no solution?
$$(2p - 1)x + (p - 1)y = 2p + 1 \text{ and } y + 3x - 1 = 0$$

13. If the system of equations $2x + 3y = 7$ and $2ax + (a + b)y = 28$ has infinitely many solutions, then find a and b. **[BOARD 2023]**

14. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction. **[BOARD 2023]**

15. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers. **[BOARD 2023]**

16. The sum of the digits of a two digit number is 9. Also 9 times this number is twice the number obtained by reversing the order of the digits. Find the number.

17. A number consists of two digits. Where the number is divided by the sum of its digits, the quotient is 7. If 27 is subtracted from the number, the digits interchange their places, find the number.

18. A 2-digit number is seven times the sum of its digits. The number formed by reversing the digits is 18 less than the given number. Find the given number. **[BOARD 2023]**

19. The sum of the digits of a 2-digit number is 14. The number obtained by interchanging its digits exceeds the given number by 18. Find the number. **[BOARD 2024]**

20. Two numbers are in the ratio of 1: 3. If 5 is added to both the numbers, the ratio becomes 1: 2. Find the numbers.

21. Students of a class are made to stand in rows. If 4 students are extra in a row, there would be two rows less. If 4 students are less in a row, there would be four more rows. Find the number of students in the class.

22. A part of monthly hostel charges in a college is fixed and the remaining depends on the number of days one has taken food in the mess. When a student 'A' takes food for 22 days, he has to pay Rs.1380 as hostel charges. Whereas a student 'B' who takes food for 28 days, pays Rs. 1680 as hostel charges. Find the fixed charges and the cost of food per day. **[BOARD 2024]**

23. The ratio of income 2 persons is 9:7 and the ratio of their expenditure is 4:3, if each of them manage to save Rs.2000/ month. Find their monthly incomes.

24. A shop keeper gives books on rent for reading. She takes a fixed charge for first two days and an additional charge for each day thereafter. Latika paid Rs 22 for a book kept for six days, while Anand paid Rs 16 for the book kept for four days. Find the fixed charge and the charge for each extra day.

25. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars? **[BOARD 2023]**

26. A train covered a certain distance at a uniform speed. If the train would have been 6 km/hr faster, it would have taken 4 hours less than the scheduled time. And if the train were slower by 6 km/hr, it would have taken 6 hours more than the scheduled time. Find the length of the journey.

27. Anuj had some chocolates and he divided them into two lots A and B. He sold the first lot at the rate of Rs 2 for 3 chocolates and the second lot at the rate of Re 1 per chocolate and got a total of Rs 400. If he had sold the first lot at the rate of Re 1 per chocolate and the second lot at the rate of Rs 4 for 5 chocolates, his total collection would have been Rs 460. Find the total number of chocolates he had.

28. Meena went to a bank to withdraw Rs.2000. She asked the cashier to give her Rs.50 and Rs. 100 notes only. Meena got 25 notes in all. How many notes of Rs. 50 and Rs.100 she received? **[BOARD 2024]**

29. A man wished to give Rs.12 to each person and found that he fell short of Rs. 6 when he wanted to give to all the persons present. He therefore, distributed Rs.9 to each person and found that Rs.9 were left over. How much money did he have and how many persons were there?

30. A father's age is three times the sum of the ages of his children. After 5 years, his age will be two times the sum of their ages. Find the present age of the father. **[BOARD 2023]**

31. Three years ago, Rashmi was thrice as old as Namza. Ten years later, Rashmi will be twice as old as Namza. How old are Rashmi and Namza now? **[BOARD 2024]**

32. In a chemistry lab, there is some quantity of 50% acid solution and some quantity of 25% acid solution. How much of each should be mixed to make 10 liters of 40% acid solution? **[BOARD 2024]**

5 marks:

1. For what value of k, which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7$ and $(k + 1)x + (2k - 1)y = 4k + 1$.

2. Find c if the system of equations $cx + 3y + (3 - c) = 0, 12x + cy - c = 0$ has infinitely many solutions.

3. For what value of a and b does the following pair of linear equations have infinitely many solutions: $2x + 3y = 7, a(x + y) - b(x - y) = 3a + b - 2$.

4. Find the value of p and q for which the system of equations represent coincident lines $2x + 3y = 7$ and $(p + q + 1)x + (p + 2q + 2)y = 4(p + q) + 1$.

5. Solve for x and y: $2x - y + 3 = 0$ and $3x - 5y + 1 = 0$.

6. Solve graphically: $x - y = 1$ and $2x + y = 8$.

7. Solve graphically: $2x - y = 1$ and $x + 2y = 13$.

8. Solve graphically: $3x - 4y + 3 = 0$ and $3x + 4y - 21 = 0$. **[BOARD 2024]**

9. Solve graphically: $2x + 3y = 12$ and $x - y - 1 = 0$.

10. Determine graphically whether the following pair of linear equations:
$3x - y = 7$ and $2x + 5y + 1 = 0$ has
a) Unique solution
b) Infinitely many solutions or
c) No solution.

11. Draw the graph 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 X-axis and shade the triangular region.

12. Solve the pair of linear equations graphically:

$x + 3y = 12, 2x - 3y = 12$

Also shade the region bounded by the line $2x - 3y = 2$ and both the coordinate axes

13. Solve the pair of linear equations graphically:

$x - y = 1, 2x + y = 8$

Also find the coordinates of the points where the lines represented by the above equation intersect y-axis.

14. Aftab tells his daughter, '7 years ago, I was seven times as old as you were then. Also, 3 years from now, I shall be three times as old as you will be'. Represent this situation algebraically and graphically.

15. The cost of 2 kg apples and 1 kg of grapes on a day was found to be Rs 160. After a month, the cost of 4 kg of apples and 2 kg of grapes is Rs 300. Represent the situations algebraically and geometrically.

16. For Uttarakhand flood victims two sections A and B of class contributed Rs 1500. If the contribution of X-A was Rs 100 less than that of X-B, find graphically the amounts contributed by both the sections.

17. The area of rectangle gets reduced by 80 square units, if its length is reduced by 5 units and breadth is increased by 2 units. If we increase the length by 10 units and decrease the breadth by 5 units, the area increases by 50 square units. Find the dimensions of the rectangle. **[BOARD 2024]**

18. Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?

[BOARD 2023 & BOARD 2024]

19. If three times the greater of two numbers is divided by the smaller one, we get 4 as the quotient and 3 as the remainder. Also, if seven times the smaller number is divided by greater one, we get 5 as the quotient and 1 as the remainder. Find the numbers. **[BOARD 2024]**

Case based questions:

1. Two schools 'P' and 'Q' decided to award prizes to their students for two games of Hockey Rs x per student and Cricket Rs y per student. School 'P' decided to award a total of Rs 9,500 for the two games to 5 and 4 students respectively; while school 'Q' decided to award Rs 7,370 for the two games to 4 and 3 students respectively.

[BOARD 2023]

Based on the above information, answer the following questions:

(i) Represent the following information algebraically (in terms of x and y). **1**

(ii) (a) What is the prize amount for hockey? **2**

OR

(b) Prize amount on which game is more and by how much? **2**

(iii) What will be the total prize amount if there are 2 students each from two games? **1**

2. A coaching institute of Mathematics conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, there are 20 poor and 5 rich children, whereas in batch II, there are 5 poor and 25 rich children. The total monthly collection of fees from batch I is Rs 9000 and from batch II is Rs 26000. Assume that each poor child pays Rs x per month and each rich child pays Rs y per month. Based on the above information answer the following questions:

[BOARD 2023]

(i)   Represent the situation in terms of x and y. **1**

(ii)   Find the monthly fee paid by a poor child. **2**

OR

Find the difference in the monthly fee paid by a poor child and a rich child. **2**

(iii)   If there are 10 poor and 20 rich children in batch II, what is the total monthly collection of fees from batch II? **1**

3. MASK: Masks are an additional step to help prevent people from getting and spreading COVID-19. They provide a barrier that keeps respiratory droplets from spreading. Wear a mask and take every day preventive actions in public settings. Due to ongoing Corona virus outbreak, Wellness Medical store has started selling masks of decent quality. The store is selling two types of masks currently type A and type B.


₹ 15   ₹ 20

The cost of type *A* mask is Rs. 15 and of type *B* mask is Rs. 20. In the month of April, 2020, the store sold 100 masks for total sales of Rs. 1650.

(i) How many masks of each type were sold in the month of April? If the store had sold 50 masks of each type, what would be its sales in the month of April? **1**

(ii) Due to great demand and short supply, the store has increased the price of each type by Rs. 5 from May 1, 2020. In the month of May, 2020, the store sold 310 masks for total sales of Rs. 6875. How many masks of each type were sold in the month of May? **1**

(iii) What percent of masks of each type sale was increased in the month of May, compared with the sale of month April? **2**

OR

What extra profit did store earn by increasing price in May month. **2**

4. Varsha is a licensed architect and design very innovative house. She has made a house layout for her client which is given below. In the layout, the design and measurements has been made such that area of two bedrooms and kitchen together is 95 sq. m.
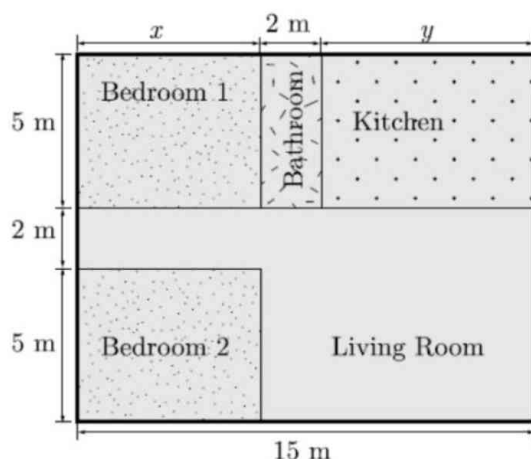
(i) Which pair of linear equations does describe this situation? **1**
(ii) What is the length of the outer boundary of the layout. **1**
(iii) What is the area of bedroom 1? What is the area of living room in the layout? **2**

OR

What is the cost of laying tiles in Kitchen at the rate of Rs. 50 per sq. m? **2**

5. Mr. RK Agrawal is owner of a famous amusement park in Delhi. The ticket charge for the park is Rs 150 for children and Rs 400 for adult. Generally he does not go to park and it is managed by team of staff. One day Mr Agrawal decided to random check the park and went there. When he checked the cash counter, he found that 480 tickets were sold and Rs 134500 was collected. **[BOARD 2024]**

(i) Let the number of children visited be x and the number of adults visited be y. Which of the following is the correct system of equations that model the problem? **1**

(ii) How many children visited the park? How many adults visited the park? **1**

(iii) How much amount collected if 300 children and 350 adults visited the park? **2**

OR

One day total visited children and adults together are 750 and the total amount collected is Rs 212500. What are the number of children and adults visited the park? **2**

6. Dipesh bought 3 notebooks and 2 pens for Rs. 80. His friend Ramesh said that price of each notebook could be Rs. 25. Then three notebooks would cost Rs.75, the two pens would cost Rs. 5 and each pen could be for Rs. 2.50. Another friend Amar felt that Rs. 2.50 for one pen was too little. It should be at least Rs. 16. Then the price of each notebook would also be Rs.16.
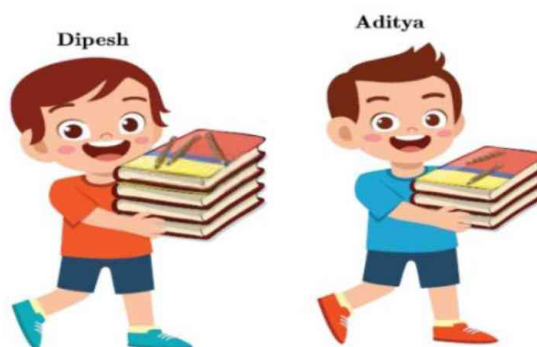
Aditya also bought the same types of notebooks and pens as Dipesh. He paid 110 for 4 notebooks and 3 pens.

(i) Whether the estimation of Ramesh and Amar is applicable for Aditya? **1**

(ii) Let the cost of one notebook be x and that of pen be y. Which of the following set describe the given problem? **1**

(iii) What is the exact cost of the notebook? **2**

OR

What is the exact cost of the pen? What is the total cost if they purchase the same type of 15 notebooks and 12 pens. **2**

13