Delhi Public School Guwahati

"Under the aegis of the Delhi Public School Society, Delhi"

CLASS X (MATHEMATICS)

CHAPTER 1: REAL NUMBERS

1. The HCF of 60 and 108 is 12. Write their LCM.
2. Express 102 as a product of its primes.
3. Can two numbers have 16 as their HCF and 380 as their LCM? Give reason.
4. State the Fundamental Theorem of Arithmetic.
5. Write a rational number between $\sqrt{5}$ *and* 3.
6. Write whether $\frac{2\sqrt{45}+3\sqrt{20}}{2\sqrt{5}}$ on simplification gives a rational or an irrational number.
7. If 3 is the least prime factor of number *a* and 7 is the least prime factor of number *b* then find the least prime factor of *(a+ b).*
8. What is the HCF of the smallest composite number and the smallest prime number?
9. All the rational and irrational numbers together form _____ numbers.
10. For what least value of 'n' a natural number, 24^n is divisible by 8?
    (a) 0 (b) -1 (c) 1 (d) No value of 'n' is possible
11. Prove that $(2+\sqrt{3})$ is an irrational number.
12. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$; where x, y are prime numbers, then find the HCF (a, b).
13. Prove that $\sqrt{5}$ is irrational.
14. Find the smallest number which when increased by 17 is exactly divisible by both 520 and 468.
15. What is the smallest number that, when divided by 35, 56 and 91 leaves a remainder 7 in each case?
16. On a morning walk, three persons step off together; their steps measure 75cm, 82cm and 90cm respectively. What is the minimum distance each should walk so that all can cover the same distance in complete steps?
17. Find the greatest number of 6 digits exactly divisible by 24, 15 and 36.
18. Two tankers contain 850 litres and 680 litres of petrol respectively. Find the maximum capacity of a container which can measure the petrol of either tanker in exact number of times.
19. Three sets of Science, English and Mathematics books have to be stacked in such a way that all the books are stored topic wise and height of each stack is the same. The number of science books is 84, the number of English books is 210 and the number of Mathematics books is 350. Assuming that the books are of same thickness, determine the number of stacks of Science, English and Mathematics books.
20. Show that 12^n cannot end with the digit 0 or 5 for any natural number *n*.

21. Prove that $\left(\sqrt{3}+\sqrt{5}\right)$ is irrational.
22. Find the least number of square tiles required to pave the ceiling of a room 15m17cm long 9m2cm broad.
23. In a school, there are two sections, namely A and B of class X. There are 30 students in section A and 28 students in section B. Find the minimum number of books required for their class library so that they can be distributed equally among students of section A or section B.

ANSWERS

1. 540
2. 2×3×17
3. No
6. Rational number
7. 2
8. 2
9. Real number
10. 1
12. xy^2

14. 4663

15. 3647

16.184 m 50 cm

17. 999720

18. 170 *l*

19. 6, 15, 25

22. 814 tiles

23. 420 books

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CHAPTER 2: POLYNOMIALS

1. Is the following statement True or False? Justify your answer.
   If the zeroes of a quadratic polynomial $ax^2 + bx + c$ are both negative, then a, b and c all have the same sign.
2. In each of the following, determine whether the given values of x are the zeroes of the polynomial or not:
   i. $2x^2 - 5x - 3;\ x = 3, x = -\frac{1}{2}$
   ii. $x^2 - 4\sqrt{2}x + 6;\ x = 3\sqrt{2}, x = -\sqrt{2}$
3. If the sum of zeroes of the quadratic polynomial $3x^2 - kx + 6$ is 3, then find the value of k.
4. If α and β are the zeroes of the polynomial $ax^2 + bx + c$, find the value of $\alpha^2 + \beta^2$.
6. If the sum of the zeroes of the polynomial $p(x) = (k^2 - 14)x^2 - 2x - 12$ is 1, then find the value of *k*.
7. If α and β are the zeroes of a polynomial such that $\alpha + \beta = -6$ and $\alpha\beta = 5$, then find the polynomial.
8. Find the condition that zeroes of polynomial $p(x) = ax^2 + bx + c$ are reciprocal of each other.
9. Find a quadratic polynomial, whose zeroes are -4 and -5.
10. Form a quadratic polynomial whose zeroes are $3 + \sqrt{2}$ and $3 - \sqrt{2}$.
11. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{3}$ and $\frac{1}{\sqrt{3}}$ resp.
12. Find the zeroes of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$.
13. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of $2x^2 - 5x - 3$, find the value of *p* and *q*.
14. Find the quadratic polynomial whose zeroes are -2 and -5. Verify the relationship between zeroes and coefficients of the polynomial.
15. Find the value of "p" from the polynomial $x^2 + 3x + p$, if one of the zeroes of the polynomial is 2.
16. Find the value of "x" in the polynomial $2a^2 + 2xa + 5a + 10$ if (a + x) is one of its factors.
17. How many zeros does the polynomial $(x - 3)^2 - 4$ can have? Also, find its zeroes.
18. If α and β are zeroes of the quadratic polynomial $x^2 - 6x + y$. Find the value of *'y'* if $3\alpha + 2\beta = 20$.
19. If α and β are the zeroes of the polynomial $6y^2 - 7y + 2$, find a quadratic polynomial whose zeroes are 1/α and 1/β.
20. If α and β are the zeroes of the polynomial $p(x) = 2x^2 + 5x + k$, satisfying the relation, $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$ then find the value of k.

21. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial $f(x) = x^2 - p(x+1) - c$, show that $(\alpha + 1)(\beta + 1) = 1 - c$.

ANSWERS

1. True
2. i) yes
   ii) yes
3. k = 9
4. $\frac{b^2-2ca}{a^2}$
5. $k = \pm 4$
6. $x^2 + 6x + 5$
7. $a = c$
8. $x^2 + 9x + 20$
9. $x^2 - 6x + 7$
10. $\sqrt{3}x^2 - 3x + 1$
11. $2\sqrt{3}, \frac{2}{\sqrt{3}}$
12. $p = -5, q = -6$
13. $x^2 + 7x + 10$
14. $p = -10$
15. 2
16. 2 zeroes 1,5
17. -16
18. $2y^2 - 7y + 6$
19. k = 2

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CHAPTER 3: PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1. Find the number of solutions of the following pair of linear equations:
   $x + 2y - 8 = 0$ and $2x + 4y = 16$.
2. If $14x + 15y = 63$ and $15x + 14y = 53$, then find the value of $x + y$.
3. If $2x - 3y = 7$ is a linear equation in two variables, write another linear equation in two variables such that the pair represents parallel lines.
4. Obtain the condition for the following system of linear equations to have a unique solution:
   $$ax + by = c$$
   $$lx + my = n$$
5. Find the value of p for which the following system of equations have exactly one solution:
   $$7x - 5y - 4 = 0$$
   $$14x + py + 4 = 0$$
6. 2 pens and 1 pencil costs Rs 110 and 5 pens and 2 pencils costs Rs 270. Form a pair of linear equations to represent the situation.
7. On comparing the ratios of the coefficients, find out whether the following pair of equations is consistent or inconsistent:
   $$x - 2y = 0$$
   $$3x + 4y - 20 = 0$$
8. For what value of k, $3x + y = 3$ and $6x + ky = 8$ doesn't have a solution.
9. What kind of lines are represented by the pair of equations $0.4x + 0.3y = 1.7$ and $0.7x - 0.2y = 0.8$?
10. Check whether $x = 3$ and $y = 1$ is the solution for the pair of equations $x - y = 2$ and $x + y = 4$.
11. For which values of p and q, will the following pair of linear equations have infinitely many solutions?
    $$4x + 5y = 2$$
    $$(2p + 7q)\, x + (p + 8q)\, y = 2q - p + 1.$$
12. If $x + 1$ is a factor of $2x^3 + ax^2 + 2bx + 1$, then find the values of a and b given that $2a - 3b = 4$.
13. Two numbers are in the ratio 5: 6. If 8 is subtracted from each of the numbers, the ratio becomes 4 : 5. Find the numbers.

14. Solve for x and y:
    $217x + 131y = 913$
    $131x + 217y = 827$

15. Solve the following pair of linear equations graphically:
    $$4x - 5y - 20 = 0$$

$3x + 5y - 15 = 0$

Determine the vertices of the triangle formed by the lines representing the above equation and *y*-axis.

16. Find the solution of the following pair of equations $\frac{x}{10} + \frac{y}{5} - 1 = 0$ *and* $\frac{x}{8} + \frac{y}{6} = 15$ by elimination method. Hence, find λ if $y = \lambda x + 5$.
17. Determine the value of *k* so that the following pair of linear equations have no solution:
    $(3k + 1)x + 3y - 2 = 0$
    $(k^2+1)\,x + (k - 2)\,y - 5 = 0$
18. There are some students in the two examination halls A and B. To make the number of students equal in each hall, 10 students are sent from A to B. But if 20 students are sent from B to A, the number of students in A becomes double the number of students in B. Find the number of students in the two halls.
19. Write an equation of a line passing through the point representing solution of the pair of linear equations $x+y = 2$ and $2x-y = 1$. How many such lines can we find?
20. Solve for *x* and *y:*
    $a\,(x+y) + b(x-y) = a^2 - ab + b^2$
    $a\,(x+y) - b(x-y) = a^2 + ab + b^2$
21. Determine, algebraically, the vertices of the triangle formed by the lines $5x - y = 5$, $x + 2y = 1$ and
    $6x + y = 17$.
22. On selling a T.V. at 5% gain and a fridge at 10% gain, a shopkeeper gains Rs 2000.But if he sells the T.V. at 10% gain and the fridge at 5% loss, he gains Rs 1500 on the transaction. Find the actual prices of T.V. and fridge.
23. The sum of a two digit number and the number formed by interchanging the digits is 132. If 12 is added to the number, the new number becomes 5 times the sum of the digits. Find the number.
24. Vijay had some bananas, and he divided them into two lots A and B. He sold the first lot at the rate of
    ₹ 2 for 3 bananas and the second lot at the rate of ₹ 1 per banana, and got a total of ₹ 400. If he had sold the first lot at the rate of ₹ 1 per banana, and the second lot at the rate of ₹ 4 for 5 bananas, his total collection would have been ₹ 460. Find the total number of bananas he had.
25. The ratio of incomes of two persons is 9:7and the ratio of their expenditures is 4:3. If each of them manages to save ₹ 2000 per month, find their monthly incomes.
26. A sum of money was distributed equally in a class of boys. Had there been 10 boys more, each would have received a rupee less and had there been 15 fewer, each would have ₹3 more. Find the number of boys in the class.
27. 7 audio cassettes and 3 video cassettes cost ₹ 1110 whereas 5 audio cassettes and 4 video cassettes cost ₹1350. Find the cost of an audio cassette and a video cassette.
28. The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.
29. Susan invested certain amount of money in two schemes A and B, which offer interest at the rate of 8% per annum and 9% per annum, respectively. She received ₹ 1860 as annual interest. However, had she interchanged the amount of investments in the two schemes, she would have received ₹ 20 more as annual interest. How much money did she invest in each scheme?

30. In a bag containing only white and black balls, half the number of white balls is equal to one-third the number of black balls. Also, two times the total number of balls exceeds three times the number of black balls by 4. Find the number of balls of each type in the bag.

ANSWERS

1. Infinitely many solutions
2. 4
3. Any equation satisfying the condition $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$with the given equation.
4. $am \neq bl$
5. $p \neq -10$
6. $2x + y = 110$ and $5x + 2y = 270$ where x represents the cost of each pen and y represents the cost of each pencil.
7. consistent
8. $k = 2$
9. Intersecting lines
10. Yes, it is a solution.
11. $p = -1$ and $q = 2$
12. $a = 5$ and $b = 2$
13. 40 and 48
14. $x = 3$ and $y = 2$
15. $x = 5$ and $y = 0$; (5,0), (0,3) and (0, – 4)
16. $x = 340$ and $y = -165$; $\lambda = -\frac{1}{2}$
17. $k = -1$
18. 100 students in hall A and 80 students in hall B
19. $x = y$; infinitely many such lines
20. $x = \frac{b^2}{2a}$ *and* $y = \frac{2a^2+b^2}{2a}$
21. (1,0), (2,–1), (3,5)
22. ₹ 20,000 and ₹ 10,000
23. 48
24. 500
25. ₹18000 and ₹14000
26. 40
27. ₹30 and ₹300
28. 40 years
29. Scheme A ₹12,000 and Scheme B ₹ 10,000
30. 8 white and 12 black

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CHAPTER 15: PROBABILITY

1. A die is thrown once. Find the probability of getting a number less than 3.
2. A single letter is selected at random from the word 'PROBABILITY'. Find the probability that it is a vowel.
3. From a well shuffled pack of cards, a card is drawn at random. Find the probability of getting a black queen.
4. Two coins are tossed simultaneously. Find the probability of getting exactly one head.
5. Two friends were born in the year 2000. What is the probability that they have the same birthday?
6. If the probability of winning a game is 0.3, what is the probability of losing it?
7. A pair of dice is thrown once. Find the probability of getting the same number on each dice.
8. In a single throw of a die, find the probability of getting a multiple of 3.
9. What is the probability of certain event?
10. A month is selected at random in a year. Find the probability that it is March or April.
11. The king, queen and jack of clubs are removed from a deck of 52 playing cards and the remaining cards are shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of (i) heart (ii) queen (iii) clubs.
12. Two dice are thrown simultaneously. What is the probability that
    i. 5 will not come up on either of them?
    ii. 5 will come up on at least once?
    iii. 5 will come up at both dice?
13. A bag contains 3 red balls, 5 black balls and 4 white balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is(i) white (ii) red (iii) black?
14. Two coins are tossed simultaneously. Find the probability of getting (i) two heads (ii) at least one head (iii) no head.
15. What is the probability that a leap year has 53 Sundays?
16. A black die and a white die are thrown at the same time. Write all the possible outcomes.
17. A number is selected at random from first 50 natural numbers. Find the probability that it is a multiple of 3 and 4.
18. What is the probability that a leap year has 53 Thursdays and 53 Fridays?
19. Two unbiased dice are thrown. Find the probability that the total score is more than 5.
20. A number is chosen at random from the numbers -3, -2, -1, 0, 1, 2, 3. What will be the probability that the square of this number is less than or equal to 1?
21. A bag contains 6 red balls, 5 black balls and 4 white balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) white (ii) red (iii) not black (iv) red or white.
22. A card is drawn at random from a well shuffled deck of playing cards. Find the probability that the card drawn is (i) a king or a jack (ii) a non-ace (iii) a red card (iv) neither a king nor a queen.
23. A box contains 19 balls bearing numbers 1, 2, 3, ...,19. A ball is drawn at random from the box. What is the probability that the number of the ball is (i) a prime number (ii) divisible by 3 or 5 (iii) neither divisible by 5 nor by 10 (iv) an even number?
24. Cards marked with the numbers 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from this box. Find the probability that the number on the card is:

i. an even number
ii. a number less than 14
iii. a number which is a perfect square
iv. a prime number less than 20.

25. A bag contains 12 balls out of which x are white.
i. If one ball is drawn at random, what is the probability that it will be a white ball?
ii. If 6 more white ball are put in the bag, the probability of drawing a white ball will be double than that given in first case. Find x.
26. Two customers are visiting a particular shop in the same week (Monday to Saturday). Each is equally likely to visit the shop on any one day as on another. What is the probability that both will visit the shop on (i) the same day (ii) different days (iii) consecutive days?
27. The probability of selecting a green marble at random from the jar that contains only green, white and yellow marbles is $\frac{1}{4}$. The probability of selecting a white marble at random from the same jar is $\frac{1}{3}$. If this contains 10 yellow marbles. What is the total number of marbles in the jar?
28. In a bag there are 44 identical cards with figure of circle or square on them. There are 24 circles, of which 9 are blue and rest are green and 20 squares of which 11 are blue and rest are green. One card is drawn from the bag at random. Find the probability that is has the figure of (i) square (ii) green colour (iii) blue circle and (iv) green square.
29. A bag contains cards which are numbered from 2 to 90. A card is drawn at random from the bag. Find the probability that it bears (i) a two digit number (ii) a number which is a perfect square.
30. The faces of a red cube and a yellow cube are numbered from 1 to 6. Both cubes are rolled. What is the probability that the top face of each cube will have the different number?

ANSWERS

1. $\frac{2}{6}$
2. $\frac{4}{11}$
3. $\frac{2}{52}$
4. $\frac{2}{4}$
5. $\frac{1}{366}$
6. 0.7
7. $\frac{6}{36}$
8. $\frac{2}{6}$
9. 1
10. $\frac{2}{12}$

11(i) $\frac{13}{49}$ (ii) $\frac{3}{49}$ (iii) $\frac{10}{49}$

12 (i) $\frac{25}{36}$ (ii) $\frac{11}{36}$ (iii) $\frac{1}{36}$

13.(i) $\frac{4}{12}$ (ii) $\frac{3}{12}$ (iii) $\frac{5}{12}$

14.(i) $\frac{1}{4}$ (ii) $\frac{3}{4}$ (iii) $\frac{1}{4}$

15. $\frac{2}{7}$

17. $\frac{4}{50}$

18. $\frac{1}{7}$

19. $\frac{26}{36}$

20. $\frac{3}{7}$

21.(i) $\frac{4}{15}$ (ii) $\frac{6}{15}$ (iii) $\frac{10}{15}$ (iv) $\frac{10}{15}$

22. (i) $\frac{8}{52}$ (ii) $\frac{48}{52}$ (iii) $\frac{26}{52}$ (iv) $\frac{44}{52}$

23. (i) $\frac{8}{19}$ (ii) $\frac{8}{19}$ (iii) $\frac{16}{19}$ (iv) $\frac{9}{19}$

24. (i) $\frac{50}{100}$ (ii) $\frac{12}{100}$ (iii) $\frac{9}{100}$ (iv) $\frac{9}{100}$

25. (i) $\frac{x}{12}$ (ii) 3

26. (i) $\frac{6}{36}$ (ii) $\frac{30}{36}$ (iii) $\frac{10}{36}$

27. 24

28. (i) $\frac{20}{44}$ (ii) $\frac{24}{44}$ (iii) $\frac{9}{44}$ (iv) $\frac{9}{44}$

29.(i) $\frac{81}{99}$ (ii) $\frac{8}{89}$

30. $\frac{30}{36}$

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