Practice Exercise
for sure **Success...**

1. Define lemma.
2. What is Euclid's division lemma?
3. What is fundamental theorem of arithmetic?
4. Express 5050 as a product of its prime factors. Is it unique? **[CBSE 2015]**
5. Examine whether $\dfrac{35}{2^3 \times 5^2 \times 7}$ is a terminating or not.
6. After how many decimal places will the rational number $\dfrac{1251}{1250}$ terminate? **[CBSE 2016]**
7. What are the possible values of remainder r, when a positive integer a is divided by 5?
8. What is the HCF of $7^2 \times 5^3$ and $7^3 \times 5$?
9. A rational number in its decimal expansion is 327.7081. What can you say about the prime factors of q when this number is expressed in the form of $\dfrac{p}{q}$? **[CBSE 2012]**
10. If two positive integers x and y are written as $x = a^4 b^3$ and $y = ab^5$ where a and b are prime numbers, then find HCF (x, y).
11. If p is a prime number, then what is the HCF of p^3, p^5 and p^7?
12. The HCF of two numbers is 4 and their product is 576. Find their LCM.
13. The LCM of two numbers is 2079 and their product is 56133. Find their HCF.
14. Identify $\sqrt{\dfrac{25}{196}}$ as rational or irrational.
15. Write two irrational number between 1 and 2.

16. Write down the decimal expansions of the following numbers:
    (i) $\dfrac{18}{20}$ (ii) $\dfrac{19}{1600}$
17. Explain why $17 \times 5 \times 11 \times 3 \times 2 + 2 \times 11$ is a composite number. **[CBSE 2016]**
18. Find the LCM and HCF of 48 and 60 and verify that LCM × HCF = Product of numbers.
19. Express $0.\overline{24}$ as a fraction in the simplest form.
20. Express $0.2\overline{54}$ as a fraction in the simplest form.
21. How many irrational numbers lie between $\sqrt{3}$ and $\sqrt{5}$? Write any two of them. **[HOTS]**
22. Write a rational number between $\sqrt{2}$ and $\sqrt{5}$.

23. Find (HCF × LCM) for the numbers 100 and 190. *[CBSE 2009]*

24. Check whether 15^n can end with digit zero for any natural number n. *[HOTS; CBSE 2011, 12, 15]*

25. Check whether $(20)^n$ can end with digit zero for any natural number n. *[HOTS]*

26. Find the HCF of 180, 252 and 324 using Euclid's division lemma. *[CBSE 2011]*

Short Answer Type-II Questions (3 Marks)

27. Show that every positive even integer is of the form $2q$ and every odd positive integer is of the form $2q+1$ where q is any integer. *[CBSE 2016]*

28. Show that the square of an odd positive integer is of the form $8m+1$, for some whole number m. *[HOTS; CBSE 2009, 15]*

29. Using Euclid's division algorithm, find the HCF of:
    (i) 216 and 297   (ii) 2825 and 70625

30. Find the greatest number which divides 70 and 125, leaving remainders 5 and 8 respectively.

31. Find the greatest number of 6 digits exactly divisible by 24, 36, 50 and 70. *[HOTS]*

32. If the HCF (210, 55) is expressible in the form $1050 - 55m$, find m.

33. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm respectively. What is the minimum distance each should walk, so that each can cover the same distance in complete steps? *[HOTS; NCERT Exemplar]*

34. A merchant has 120 litres of oil of one kind, 180 litres of second kind and 240 litres of third kind. He wants to sells the oil by filling the three kinds of oil in tins of equal capacity. What should be the greatest capacity of such a tin? *[CBSE 2010]*

35. An army contingent of 1000 members is to march behind an army band of 56 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march? *[CBSE 2011]*

36. The length, breadth and height of a room are 8 m 25 cm, 6 m 75 cm and 4 m 50 cm respectively. Determine the length of the longest rod which can measure the three dimensions of the room exactly. *[HOTS; CBSE 2012]*

37. For any positive integer n, prove that $n^3 - n$ is divisible by 6. *[HOTS]*

38. Show that p^2 will leave a remainder 1 when divided by 8, if p is an odd positive integer. *[HOTS]*

39. Give an example of each if two irrational numbers, whose: *[HOTS]*
    (i) sum is an irrational number.
    (ii) difference is a rational number.
    (iii) product is an irrational number.
    (iv) product is a rational number.
    (v) quotient is an irrational number.

40. On GT road, three consecutive traffic lights change after 36, 42 and 72 s. If the lights are first switched on at 9:00 am, then at what time will they change simultaneously again? *[HOTS; CBSE 2012]*

Long Answer Type Questions (4 Marks)

41. Prove that $\dfrac{3\sqrt{2}}{4}$ is an irrational number. *[CBSE 2016]*

42. Prove that $5 - \sqrt{3}$ is an irrational number. *[CBSE 2015]*

43. Prove that $7 - 2\sqrt{3}$ is an irrational number.

44. Prove that $\sqrt{2} + \sqrt{5}$ is an irrational number.

45. What is the HCF and LCM of two prime numbers a and b? Three alarm clocks ring at intervals of 6, 9 and 15 minutes respectively. If they start ringing together, after what time will they next ring together? *[CBSE 2015]*

46. Show that the square of any positive integer cannot be of the form $5q+2$ or $5q+3$ for any integer q. *[CBSE 2010, 11; NCERT Exemplar]*

Value Based Questions (VBQs)

47. Radha has 230 *ladoos* and 140 *burfis*. She wants to pack them in boxes in such a way that each box has the same number of pieces. What is the maximum number of pieces that can be placed in each box?

How many such boxes can be packed? She donates these boxes to an old age home. Mention the value depicted by Radha in this question.

48. An NGO decided to donate clothes in winter season in different orphanages. There are 72 children in one orphanage and 64 children in other orphanage. How many minimum number of clothes are required so that each child gets equal number of clothes? How many clothes will each child get? Mention the value depicted by NGO.

ANSWERS

4. $2 \times 5^2 \times 101$, Yes   5. Yes, terminating   6. four places of decimal   7. 0, 1, 2, 3 or 4   8. $7^2 \times 5$

9. Prime factors of q are 2 and 5.   10. ab^3 11. p^3 12. 144   13. 27   14. Rational   15. $\sqrt{2}$ and $\sqrt{3}$

16. (i) 0.9 (ii) 0.011875   17. Because, it has more than two factors.   18. 240, 12   19. $\frac{8}{33}$ 20. $\frac{14}{55}$

21. Infinite, 1.74204200...., 1.7520200....   22. $\frac{9}{5}$ 23. 19000   24. No   25. Yes   26. 36   29. (i) 27 (ii) 2825

30. 13   31. 995400   32. 19   33. 25.20 m   34. 60 litres   35. 8   36. 75 cm

39. (i) $4 + \sqrt{3}, -4 + 3\sqrt{3}$ (ii) $5 + \sqrt{3}, 8 + \sqrt{3}$ (iii) $\sqrt{2}, \sqrt{5}$ (iv) $5 + \sqrt{7}, 5 - \sqrt{7}$ (v) $\sqrt{10} - \sqrt{5}, \sqrt{2} - 1$

40. 9:08:24 a.m.   45. 1, ab, after 1 hour 30 minutes.

47. 10 pieces in each box, 37 total boxes; Sympathy, Sense of sharing, Kindness and Love.

48. 576 clothes, each child will get 8 clothes; Empathy, Helpfulness, Kindness and Cooperation.

Hints of Selected Questions

33. LCM of 40, 42, 45

34. HCF of 120, 180, 240

35. HCF of 1000 and 56

36. HCF of 8 m 25 cm, 6 m 75 cm and 4 m 50 m

38. Let $p = 2n + 1$, where $n = 0, 1, 2, 3, 4,...$

Now, $p^2 = (2n + 1)^2$ (Squaring both sides)

$$= 4n^2 + 4n + 1$$
$$= 4(n^2 + n) + 1$$
$$= 4n(n + 1) + 1$$

But $n(n + 1)$ is even because if n is odd then $n + 1$ is even otherwise n is even.

$\therefore 4n(n + 1) + 1 = 8m + 1$, where m is an integer.

39. (v) $\frac{\sqrt{10} - \sqrt{5}}{\sqrt{2} - 1} = \frac{\sqrt{5}(\sqrt{2} - 1)}{\sqrt{2} - 1} = \sqrt{5}$
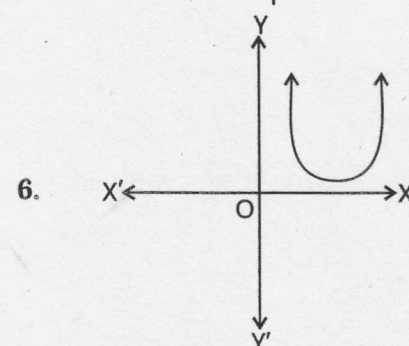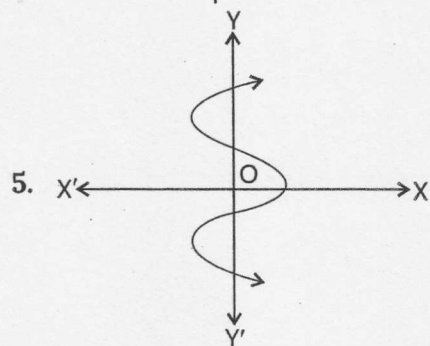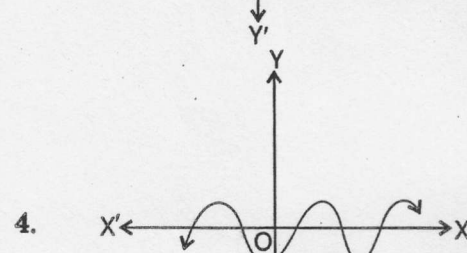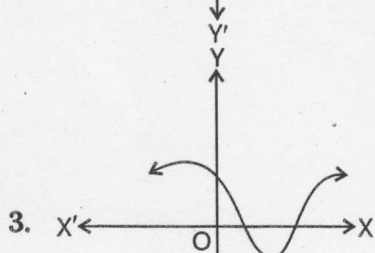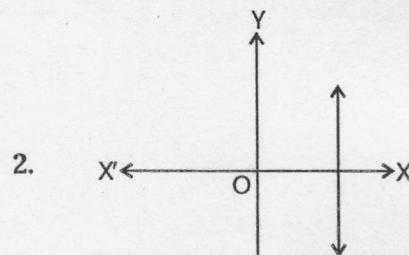
40. LCM of 36, 42, 72

Chapter - 2

Practice Exercise
for sure Success...

Very Short Answer Type Questions (1 Mark)

Direction (Q.Nos. 1-6): The graph of $y = p(x)$ for some polynomials are given below. Find the number of zeroes in each question.

1.

2.

3.

4.

5.

6.
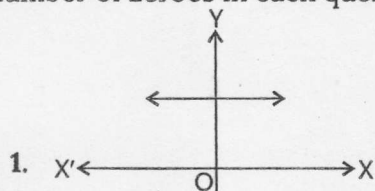
7. Form a quadratic polynomial, whose one zero is 8 and the product of zeroes is −56. **[CBSE 2012]**

8. If $p(x) = x^2 - 2x - 3$, find p(3).

9. Form a quadratic polynomial whose zeroes are 3 and 4.

10. If one zero of the polynomial is $3 - \sqrt{5}$ and product of zeroes is 4. Form the quadratic polynomial.

11. Find the quadratic polynomial whose zeroes are:
    (i) $3 + \sqrt{2}$ and $3 - \sqrt{2}$ **[CBSE 2012]**   (ii) $\sqrt{3} + \sqrt{5}$ and $\sqrt{5} - \sqrt{3}$ **[CBSE 2014]**

12. Find the zeroes of $100x^2 - 81$. *[CBSE 2010]*

13. Find the zeroes of $5y^2 + 10y$.

14. If α, β are the zeroes of $p(x) = px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$, then find the value of p.

15. If m and n are the zeroes of the polynomial $3x^2 + 11x - 4$, find the value of $\dfrac{m}{n} + \dfrac{n}{m}$. *[CBSE 2012]*

16. If p, q are the zeroes of the polynomial $f(x) = 2x^2 - 7x + 3$, find the value of $p^2 + q^2$. *[CBSE 2012]*

17. If α, β are the zeroes of the polynomial $5x^2 - 7x + 2$, then find the sum of their reciprocals.

18. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 + 7x + 6$, then find the value of $\alpha^2 + \beta^2$.

19. If $x + a$ is a factor of the polynomial $2x^2 + 2ax + 5x + 10$, find the value of a. *[CBSE 2009]*

20. Verify whether 2 is a zero of the polynomial $x^3 + 4x^2 - 3x - 18$ or not? *[CBSE 2012]*

Short Answer Type-I Questions (2 Marks)

21. Find the zeroes of the quadratic polynomial $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$. Also verify the relationship between its zeroes and coefficients. *[CBSE 2011]*

22. If α and β are zeroes of the polynomial $x^2 - p(x + 1) + c$ such that $(\alpha + 1)(\beta + 1) = 0$, then find the value of c. *[HOTS; CBSE 2015]*

23. If α and β are zeroes of a quadratic polynomial $x^2 - 5$, then form a quadratic polynomial whose zeroes are $1 + \alpha$ and $1 + \beta$. *[HOTS; CBSE 2016]*

24. If the product of the zeroes of the polynomial $(ax^2 - 6x - 6)$ is 4, find the value of a. *[CBSE 2008, 09]*

25. Divide $2x^2 - x + 3$ by $(2 - x)$.

26. Find the quadratic polynomial whose zeroes are 2 and -6 respectively. Verify the relation between the coefficients and zeroes of the polynomial. *[CBSE 2010]*

27. If the zeroes of the polynomial $x^2 + px + q$ are double in values to the zeroes of $2x^2 - 5x - 3$, find the values of p and q. *[HOTS; CBSE 2012]*

28. If 2 and -3 are the zeroes of the quadratic polynomial $x^2 + (a + 1) x + b$, then find the value of a and b. *[CBSE 2011]*

29. α and $\dfrac{1}{\alpha}$ are the zeroes of polynomial $4x^2 - 2x + (k - 4)$. Find the value of k.

30. If α and β are the zeroes of the polynomial $2y^2 + 7y + 5$, then find the value of $\alpha + \beta + \alpha\beta$. *[CBSE 2010]*

Short Answer Type-II Questions (3 Marks)

31. Verify that $3, -1, \dfrac{-1}{3}$ are the zeroes of the cubic polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$, and then verify the relationship between the zeroes and the coefficients.

32. If $x^3 - 6x^2 + 6x + k$ is completely divisible by $x - 3$, then find the value of k. *[CBSE 2016]*

33. Find a quadratic polynomial, the sum and product of whose zeroes are -10 and 25 respectively. Hence find the zeroes. *[CBSE 2016]*

34. What should be added in the polynomial $x^3 - 2x^2 - 3x - 4$ so that it is completely divisible by $x^2 - x$. *[HOTS; CBSE 2016]*

35. If $p(x) = x^2 + 5x + 2$, what is the value of $p(3) + p(2)$? *[CBSE 2016]*

36. If one zero of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the zeroes and the value of k. *[CBSE 2010, 12]*

37. If α, β are zeroes of quadratic polynomial $2x^2 + 5x + k$, find the value of k such that $(\alpha + \beta)^2 - \alpha\beta = 15$.

38. If α, β are zeroes of the polynomial $x^2 - 6x + a$. Find the value of a, if $3\alpha + 2\beta = 20$. *[HOTS]*

39. If one zero of the quadratic polynomial $2x^2 - 3x - p$ is 3, find its other zero. Also, find the value of p. *[CBSE 2012]*

40. Divide the polynomial $p(x) = 2x^3 - 11x^2 + 16x - 4$ by the polynomial $g(x) = x^2 - 2x + 1$ and verify division algorithm. *[CBSE 2012]*

41. If one zero of a polynomial $2x^3 + x^2 - 7x - 6$ is 2, then find all the zeroes. *[CBSE 2016]*

42. It is given that 1 is one of the zeroes of the polynomial $7x - x^3 - 6$. Find its other zeroes. *[CBSE 2011]*

43. Given that $x^2 + 2x - 3$ is a factor of $f(x) = x^4 + 6x^3 + 2ax^2 + bx - 3a$. Find the values of a and b. *[CBSE 2012]*

44. Find all other zeroes of the polynomial $3x^4 - 12x^3 + 10x^2 + 8x - 8$, if two of its zeroes are $\sqrt{\dfrac{2}{3}}$ and $-\sqrt{\dfrac{2}{3}}$. *[HOTS; CBSE 2016]*

45. For which values of a and b, the zeroes of $q(x) = x^3 + 2x^2 + a$ are also the zeroes of the polynomial $p(x) = x^5 - x^4 - 4x^3 + 3x^2 + 3x + b$? Which zeroes of $p(x)$ are not the zeroes of $q(x)$? *[HOTS; NCERT Exemplar]*

46. Find other zeroes of the polynomial $2x^4 - 3x^3 - 5x^2 + 9x - 3$, if it is given that two of its zeroes are $-\sqrt{3}$ and $\sqrt{3}$, respectively. *[HOTS; CBSE 2011]*

47. Find all the zeroes of $2x^4 - 9x^3 + 5x^2 + 3x - 1$, if two of its zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$. *[HOTS; CBSE 2008]*

48. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1$, then what will be the quotient and remainder? *[HOTS; CBSE 2011]*

49. If the polynomial $6x^4 + 8x^3 - 5x^2 + ax + b$ is exactly divisible by the polynomial $2x^2 - 5$, then find the values of a and b. *[HOTS; CBSE 2009]*

Long Answer Type Questions (4 Marks)

50. Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$. *[CBSE 2010, 16]*

51. What must be subtracted or added to $p(x) = 8x^4 + 14x^3 - 2x^2 + 8x - 12$ so that $4x^2 - 3x - 2$ is a factor of $p(x)$? *[CBSE 2012]*

52. On dividing the polynomial $p(x) = 2x^3 + 4x^2 + 5x + 7$ by a polynomial $g(x)$, the quotient and the remainder were $2x$ and $7 - 5x$ respectively. Find $g(x)$. *[CBSE 2012]*

53. α, β, γ are zeroes of cubic polynomial $x^3 - 12x^2 + 44x + c$. If α, β, γ are in AP, find the value of c.

54. Obtain all the zeroes of the polynomial $x^4 - 17x^2 - 36x - 20$, if two of its zeroes are 5 and -2.

Value Based Questions (VBQs)

55. There are 25 honest students and 12 dishonest students in a class. Write a quadratic polynomial whose zeroes are equal to number of honest students and number of dishonest students. Which value is depicted in this question?

56. Maneesh donated some money, clothes for earthquake victims from his salary. Money and clothes can be represented by the zeroes (α, β) of the polynomial $p(x) = x^2 + px + q$. His friend Dinesh was also inspired by him and donated some money and clothes in the form of polynomial whose zeroes are $\left(\dfrac{\alpha}{\beta} + 2\right)$ and $\left(\dfrac{\beta}{\alpha} + 2\right)$. Find the polynomial represented by Dinesh's donation. Depict the value of both in this question.

57. Government of Delhi allotted Relief Fund to help the families whose houses and shops were burned in a fire accident. The fund is represented by $6x^3 - 11x^2 + 15x - 24$.

The fund is equally divided between each of the families of that accident. Each family receives an amount of ₹ $3x - 7$. After distribution, ₹ $7x + 11$ amount is left. The District Magistrate decided to use this amount to develop the infrastructure of the area. Find the number of families which received relief fund from Government. What value has been depicted here? *[CBSE 2015]*

ANSWERS

1. 0 **2.** 1 **3.** 2 **4.** 5 **5.** 1 **6.** 0 **7.** $x^2 - x - 56$ **8.** 0 **9.** $x^2 - 7x + 12$ **10.** $x^2 - 6x + 4$

11. (i) $x^2 - 6x + 7$; (ii) $x^2 - 2\sqrt{5}x + 2$ **12.** $\dfrac{9}{10}, -\dfrac{9}{10}$ **13.** 0. -2 **14.** $\dfrac{2}{3}$ **15.** $-\dfrac{145}{2}$ **16.** $\dfrac{37}{4}$ **17.** $\dfrac{7}{2}$ **18.** 37

19. 2 **20.** Yes **21.** $\dfrac{-2}{\sqrt{3}}, \dfrac{\sqrt{3}}{4}$ **22.** -1 **23.** $x^2 - 2x - 4$ **24.** $\dfrac{-3}{2}$ **25.** $Q = -2x - 3, R = 9$ **26.** $x^2 + 4x - 12$

27. $p = -5, q = -6$ **28.** $a = 0, b = -6$ **29.** 8 **30.** -1 **32.** 9 **33.** $x^2 + 10x + 25, -5, -5$ **34.** $4x + 4$ **35.** 42

36. $\dfrac{7}{3}, \dfrac{1}{3}; \dfrac{2}{3}$ **37.** $\dfrac{-35}{2}$ **38.** -16 **39.** $\dfrac{-3}{2}, 9$ **41.** $-1, \dfrac{-3}{2}$ **42.** $-3, 2$ **43.** $a = 5, b = -2$ **44.** 2, 2

45. $a = -1$ and $b = -2$, 1 and 2 are the zeroes of $p(x)$ and not of $q(x)$. **46.** 1, 1/2 **47.** 1, $-1/2$ **48.** $2x^2 + 5, x + 2$

49. $a = -20, b = -25$ **50.** $\sqrt{2}, -\sqrt{2}, \dfrac{1}{2}, 1$ **51.** $\left(\dfrac{123x}{4} - \dfrac{7}{2}\right)$ Should be subtracted **52.** $x^2 + 2x + 5$ **53.** $c = -48$

54. $-2, -2, -1, 5$ **55.** $x^2 - 37x + 300$; Honesty **56.** $x^2 - \left(\dfrac{p^2 + 2q}{q}\right)x + \left(\dfrac{2p^2 + q}{q}\right)$; Kindness, Sympathy towards victims, Motivation

57. $2x^2 + x + 5$; Empathy, Social responsibility, Sensitivity towards victims.

Hints of Selected Questions

23. $\alpha + \beta = 0, \alpha\beta = -5$
∴ Required quadratic polynomial:
$x^2 - [(1 + \alpha) + (1 + \beta)]x + (1 + \alpha)(1 + \beta)$
$= x^2 - (2 + \alpha + \beta)x + (1 + \alpha + \beta + \alpha\beta)$

27. (α, β) and (α', β') are the zeroes of $x^2 + px + q$ and $2x^2 - 5x - 3$ polynomial respectively
∵ $\alpha = 2\alpha', \beta = 2\beta'$
∴ $\alpha + \beta = -p \Rightarrow \alpha' + \beta' = -\dfrac{p}{2}$
and $\alpha\beta = q \Rightarrow \alpha'\beta' = \dfrac{q}{4}$
$\Rightarrow \dfrac{5}{2} = -\dfrac{p}{2} \Rightarrow p = -5$
$\Rightarrow -\dfrac{3}{2} = \dfrac{q}{4} \Rightarrow q = -6$

34.
$$\begin{array}{r}
x - 1 \\
x^2 - x\ \overline{)\ x^3 - 2x^2 - 3x - 4} \\
x^3 - x^2 \\
-\quad + \\
\hline
-x^2 - 3x \\
-x^2 + x \\
+\quad - \\
\hline
-4x - 4 \\
\hline
\end{array}$$
∴ $4x + 4$ should be added.

38. $3\alpha + 2\beta = 20$ ....(1)
$\alpha + \beta = 6$
$2\alpha + 2\beta = 12$ ....(2)
Solve eqs. (1) and (2), we get
$\alpha = 8, \beta = -2$
∵ $\alpha\beta = a \Rightarrow a = -16$

39. $\beta\alpha = 3 \cdot \alpha = -\dfrac{p}{2} \Rightarrow \alpha = -\dfrac{p}{6}$
and $\alpha + \beta = -\dfrac{p}{6} + 3 = \dfrac{3}{2} \Rightarrow p = q$
and $\alpha = -\dfrac{9}{6} = -\dfrac{3}{2}$.

53. Given, $2\beta = \alpha + \gamma$ ...(1)
$\alpha + \beta + \gamma = 12$ ...(2)
On solving eqs. (1) and (2), we get
$\beta = 4$
∴ $\alpha + \gamma = 8$ ...(3)
∵ $\alpha\beta + \beta\gamma + \gamma\alpha = 44$
∴ $\beta(\alpha + \gamma) + \gamma\alpha = 44$
$\Rightarrow 32 - \dfrac{c}{4} = 44$ $\left[\because \alpha\beta\gamma = -c \Rightarrow \gamma = -\dfrac{c}{4\alpha}\right]$
$\Rightarrow c = -48$

Chapter - 3

Practice Exercise
for sure Success...

1. Show that the system of equations $2x + 5y = 17$ and $5x + 3y = 14$ has a unique solution.

2. Find the coordinate where the line $3x + 4y = 12$ will intersect x-axis.

3. Find the coordinate where the line $5x - 3y = 15$ will intersect y-axis.

4. Find out whether the following pair of linear equations are consistent or inconsistent: $x + 2y = 4$ and $3x + 6y = 12$. **[CBSE 2016]**

5. Find the value of k for which $kx + 3y = -7$ and $2x - 6y = 14$ have infinitely many solutions.

6. Find the value of k for which the system of equations $2x + y - 3 = 0$ and $5x + ky + 7 = 0$ has no solution.

7. For what values of m, the system of equations $x + 2y = 5$ and $3x + my = -15$ has no solution?

8. Find the value of k for which the system of equations $2x + 3y = 7$ and $8x + (k + 4)y - 28 = 0$ has infinitely many solution.

Short Answer Type-1 Questions (2 Marks)

9. Solve for x and y, using substitution method: $2x + y = 7$ and $4x - 3y + 1 = 0$.

10. Solve for x and y, using substitution method: $x + 2y - 3 = 0$ and $3x - 2y + 7 = 0$. **[CBSE 2016]**

11. Solve for x and y, using elimination method: $2x - 3y = 13$ and $7x - 2y = 20$.

12. Solve for x and y, using elimination method: $3x - 5y - 19 = 0$ and $-7x + 3y + 1 = 0$.

13. Solve for x and y, using elimination method:
$$0.4x + 0.3y = 1.7 \text{ and } 0.7x - 0.2y = 0.8.$$

14. Solve the following pair of linear equations using elimination method:
$$x - y + 1 = 0 \text{ and } 4x + 3y - 10 = 0. \quad \textbf{[CBSE 2016]}$$

15. Find the value of k for which the lines $(k + 1)x + 3ky + 15 = 0$ and $5x + ky + 5 = 0$ are coincident. **[HOTS]**

16. If the system of equations $4x + y = 3$ and $(2k - 1)x + (k - 1)y = 2k + 1$ is inconsistent, then find k.

17. Find the values of α and β for which the following pair of linear equations has infinite number of solutions:
$$2x + 3y = 7 \text{ and } 2\alpha x + (\alpha + \beta)\,y = 28. \quad \textbf{[HOTS; CBSE 2012, 14]}$$

18. Find the values of a and b for which the following pair of linear equations has infinitely many solutions:
$$2x + 3y = 7, (a + b)x + (2a - b)y = 21. \quad \textbf{[HOTS; CBSE 2010]}$$

Short Answer Type-II Questions (3 Marks)

19. Solve for x and y:
$$6x + 5y = 7x + 3y + 1 = 2(x + 6y - 1)$$

20. Solve for x and y:
$$\frac{5}{x} + 6y = 13 \quad \text{and} \quad \frac{3}{x} + 4y = 7$$

21. Solve for x and y:
$$\frac{2}{x} + \frac{3}{y} = 13 \quad \text{and} \quad \frac{5}{x} - \frac{4}{y} = -2$$
$$(x \neq 0, y \neq 0) \quad \text{[CBSE 2008]}$$

22. Solve for x and y:
$$\frac{1}{7x} + \frac{1}{6y} = 3 \quad \text{and} \quad \frac{1}{2x} - \frac{1}{3y} = 5$$
$$(x \neq 0, y \neq 0)$$

23. Solve for x and y:
$$6x + 3y = 7xy \quad \text{and} \quad 3x + 9y = 11xy$$
$$(x \neq 0, y \neq 0)$$

24. Solve for x and y:
$$7^x + 5^y = 74, \ 7^{x+1} - 5^{y+1} = 218 \quad \text{[HOTS]}$$

25. Solve for x and y:
$$\frac{15}{x-y} + \frac{22}{x+y} = 5 \quad \text{and} \quad \frac{40}{x-y} + \frac{55}{x+y} = 13$$
$$(x \neq y \text{ and } x \neq -y)$$

26. Solve for x and y:
$$\frac{1}{2(2x+3x)} + \frac{12}{7(3x-2y)} = \frac{1}{2}$$
$$\frac{7}{2x+3y} + \frac{4}{3x-2y} = 2$$
$$[(2x+3y) \neq 0, (3x-2y) \neq 0]$$

27. Solve for x and y:
$$2ax - by = 2a^2 - b^2,$$
$$ax + 2by = a^2 + 2b^2$$
[CBSE 2010; NCERT Exemplar]

28. Solve for x and y:
$$ax + by = 1; \ bx + ay = \frac{2ab}{a^2 + b^2}$$
[HOTS; CBSE 2010]

29. Solve for x and y:
$$37x + 43y = 123 \quad \text{and} \quad 43x + 37y = 117$$
[HOTS; CBSE 2008]

30. Solve for x and y:
$$\frac{x}{a} + \frac{y}{b} = a + b \quad \text{and} \quad \frac{x}{a^2} + \frac{y}{b^2} = 2 \quad [a, b \neq 0]$$
[CBSE 2010; NCERT Exemplar]

31. Solve the following equations, using cross-multiplication method:
$$2x + 3y = 17 \quad \text{and} \quad 3x - 2y = 6$$

32. Solve the following equations, using cross-multiplication method:
$$mx - ny = m^2 + n^2 \quad \text{and} \quad x + y = 2m$$

33. Solve the following equations, using cross-multiplication method:
$$\frac{a}{x} - \frac{b}{y} = 0 \quad \text{and} \quad \frac{ab^2}{x} + \frac{a^2b}{y} = a^2 + b^2$$
$$(x \neq 0, y \neq 0)$$

34. Find the values of a and b for which the following system of linear equations has infinite number of solutions.
$$(a + b)x - 2by = 5a + 2b + 1 \quad \text{and} \quad 3x - y = 14$$
[CBSE 2012]

35. Aditya is walking along the line joining points (1, 4) and (0, 6). Aditi is walking along the line joining points (3, 4) and (1, 0). Represent on graph and find the point where both of them cross each other. **[CBSE 2015, 16]**

36. The age of the father is 3 years more than 3 times the son's age. 3 years hence, the age of the father will be 10 years more than twice the age of the son. Find their present ages. **[CBSE 2010]**

37. The sum of the two-numbers is 18. The sum of their reciprocals is $\frac{1}{4}$. Find the numbers. **[CBSE 2010]**

38. Form a pair of linear equations in two variables using the following information and solve it graphically.
Five years ago Sagar was twice as old as Tiru. Ten years later, Sagar's age will be ten years more than Tiru's age. Find their present ages. **[CBSE 2015]**

39. 7 audio cassettes and 3 video cassettes cost ₹ 1110, while 5 audio cassettes and 4 video cassettes cost ₹ 1350. Find the cost of an audio cassette and a video cassette.

40. Taxi charges in a city consist of fixed charges and the remaining depending upon the distance travelled in kilometres. If a person travels 60 km, he pays ₹ 960 and for travelling 80 km, he pays ₹ 1260. Find the fixed charges and the rates per km.

41. A part of monthly hostel charges in a school 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 ₹ 4250 as hostel charges whereas a student B, who takes food for 28 days, pays ₹ 5150 as hostel charges. Find the fixed charges and the cost of food per day. **[CBSE 2010]**

42. If three times the larger 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 larger one, we get 5 as the quotient and 1 as the remainder. Find the numbers. **[HOTS]**

43. The difference of two numbers is 4 and the difference of their reciprocals is $\frac{4}{21}$. Find the numbers.

44. The sum of numerator and denominator of a fraction is 3 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{2}$. Find the fraction. **[CBSE 2010]**

45. A shopkeeper sells a saree at 8% profit and a sweater at 10% discount, thereby, getting a sum ₹ 1008. If she had sold the saree at 10% profit and the sweater at 8% discount, she would have got ₹ 1028, then find the cost of the saree and list price of the sweater. **[HOTS; NCERT Exemplar]**

46. 8 men and 12 boys can finish a piece of work in 5 days, while 6 men and 8 boys can finish it in 7 days. Find the time taken by 1 man alone and that by 1 boy alone to finish the work. **[HOTS]**

47. A train covered a certain distance at a uniform speed. If the train had 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. **[HOTS]**

48. A bird flying in the same direction as that of the wind, covers a distance of 45 km in 2 h 30 min. But it takes 4 h 30 min to cover the same distance when it flies against th direction of the wind. Ignoring conditio other than the wind conditions, find:
    (i) The speed of the bird in still air.
    (ii) The speed of the wind. **[HOTS; CBSE 201**

Long Answer Type Questions (4 Marks

49. If the length of a rectangle is reduced by 5 units and its breadth is increased by 2 units, then the area of the rectangle is reduced by 80 sq. units. However, if we increase its length by 10 units and decrease the breadth by 5 units, its area i increased by 50 sq. units. Find the length and breadth of the rectangle.

50. Places A and B are 150 km apart on highwa One car starts from A and another from : at the same time. If the cars travel in th same direction at different speeds, the meet in 15 hours. If they travel toward each other, they meet in 1 hour. What ar the speeds of the two cars? **[CBSE 2012**

51. Solve the following system of linear equations graphically:
    $$x + 2y = 3 \text{ and } 4x + 3y = 2$$

52. Solve the following system of linear equations graphically:
    $$4x - 5y - 20 = 0 \text{ and } 3x + 5y - 15 = 0$$
    Determine the vertices of the triangle formed by the lines representing the above equations and the Y-axis.

53. Solve the following system of linear equations graphically:
    $$3x + y - 11 = 0 \text{ and } x - y - 1 = 0$$
    Shade the region bounded by these lines and the Y-axis. Find the coordinates of the points where the graph lines cut the Y-axis.

54. A number consists of two digits. When it is divided by the sum of its digits, the quotient is 6 with no remainder. When the number is diminshed by 9, the digits are reversed. Find the number.

55. The monthly incomes of A and B are in the ratio of 5 : 4 and their monthly expenditures are in the ratio 7 : 5. If each saves ₹ 9000 per month, find the monthly income of each.

56. A boat goes 24 km upstream and 28 km downstream in 6 hours. It goes 30 km upstream and 21 km downstream in $6\frac{1}{2}$ hours. Find the speed of boat in still water and also speed of the stream. **[CBSE 2010]**

Value Based Questions (VBQs)

57. A lending library has a fixed charge for the first three days and additional charge for each day thereafter. Ram returned a book after one week and paid ₹40 while Shyam paid ₹60 as he returned it after eleven days. Find the fixed charge and the additional charge paid by them. Are you in favour of public libraries? **[CBSE 2016]**

58. The ratio of income of two persons A and B are in the ratio 3 : 4 and the ratio of their expenditures is 5 : 7. If their savings are ₹15000 annually, find their annual incomes. What value will be promoted if expenditure is under control? **[CBSE 2015]**

59. While teaching about the Indian flag, a teacher asked the students that how many spokes are there in blue colour wheel? One student replied that it is 8 times the number of colours in the flag. While other said that the sum of the number of colours in the flag and number of spokes in the wheel of the flag is 27. Convert the statements given by the students into linear equation of two variables. Find the number of spokes in the wheel. What does the wheel signifies in the flag?

60. A man donated a piece of land to an NGO to make a hospital. A piece of land is in the form of a quadrilateral enclosed by $x = 3$, $x = 5$, $2x - y - 4 = 0$ and the X-axis. Find the points of intersection of the lines graphically and the area of the land, if all measurements are in km. What value of the man is depicted in this question?

ANSWERS

2. (4, 0) 3. (0, −5) 4. Consistent 5. −1 6. $\frac{5}{2}$ 7. 6 8. 8 9. $x = 2$, $y = 3$ 10. $x = -1$, $y = 2$ 11. $x = 2$, $y = -3$

12. $x = -2$, $y = -5$ 13. $x = 2$, $y = 3$ 14. $x = 1$, $y = 2$ 15. 14 16. $\frac{3}{2}$ 17. $\alpha = 4$, $\beta = 8$ 18. $a = 5$, $b = 1$

19. $x = 3$, $y = 2$ 20. $x = \frac{1}{5}$, $y = -2$ 21. $x = \frac{1}{2}$, $y = \frac{1}{3}$ 22. $x = \frac{1}{14}$, $y = \frac{1}{6}$ 23. $x = 1$, $y = \frac{3}{2}$ 24. $x = 2$, $y = 2$

25. $x = 8$, $y = 3$ 26. $x = 2$, $y = 1$ 27. $x = a$, $y = b$ 28. $x = \frac{a}{a^2 + b^2}$, $y = \frac{b}{a^2 + b^2}$ 29. $x = 1$, $y = 2$ 30. $x = a^2$, $y = b^2$

31. $x = 4$, $y = 3$ 32. $x = m + n$, $y = m - n$ 33. $x = a$, $y = b$ 34. $a = 5$, $b = 1$ 35. (2, 2) 36. 33 years, 10 years 37. 12 and 6

38. 25 years, 15 years 39. ₹30 and ₹300 40. ₹60 and ₹15 per km 41. ₹950 and ₹150 per day

42. 25 and 18 43. 7 and 3 or −3 and −7 44. $\frac{4}{7}$ 45. ₹600, ₹400, 46. 70 days, 140 days 47. 720 km

48. 14 km/h, 4 km/h 49. 40 units, 30 units 50. 80 km/hr, 70 km/hr 51. $x = -1$, $y = 2$ 52. (0, −4), (0, 3), (5, 0)

53. (3, 2), (0, −1), (0, 11) 54. 54 55. ₹30,000; ₹24,000 56. 10 km/hr, 4 km/hr 57. ₹20 and ₹5 per day; Yes, they provide good books at reasonable charges.

58. ₹90,000, ₹1,20,000; Foresightedness, Carefulness 59. 24; Motion (progress); Truth and dharma 60. (3, 2), (5, 6), (5, 0), (3, 0); Area = 8 sq. km, Sympathy, Kindness

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Very Short Answer Type Questions (1 Mark)

1. Which of the following are quadratic equations?

   (i) $x + \dfrac{1}{x} = 1$ (ii) $x^2 + \dfrac{1}{x} = 1$ (iii) $x^2 + 2\sqrt{x} + 1 = 0$ (iv) $(x+1)^2 = (x+3)^2$

2. Solve for $x : (2x - 3)(x + 4) = 0$.
3. Solve for $x : 9x^2 - 3x - 2 = 0$.
4. Solve for $x : 4x^2 - 9x = 100$.
5. For what value of k, $x = 2$ satisfies $3x^2 - kx - 2 = 0$?
6. For what value of k, $x = -\dfrac{1}{2}$ satisfies $kx^2 - 3x - k = 0$?
7. Show that $x = 3$ is the solution of $x^2 - 5x + 6 = 0$.
8. Show that $\sqrt{3} - 1$ is the solution of $x^2 + 2x - 2 = 0$.
9. If $ax^2 + bx + c = 0$ has equal roots, find the value of c. *[CBSE 2012]*
10. Find the discriminant of the quadratic equation $3\sqrt{3}x^2 - 4x - \sqrt{3} = 0$.
11. If a number is added to twice its square, then the resultant is 21. Write the quadratic equation of this situation. *[CBSE 2014, 15]*
12. If the discriminant of $3x^2 + 2x + a = 0$ is double the discriminant of $x^2 - 4x + 2 = 0$, then find the value of a. *[CBSE 2011]*

Short Answer Type-I Questions (2 Marks)

13. Show that $\sqrt{2}$ and $-2\sqrt{2}$ are the roots of the equation $x^2 + \sqrt{2}x - 4 = 0$.
14. Solve for $x : \sqrt{2x + 9} + x = 13$. *[HOTS; CBSE 2013]*
15. Solve for $x : 4x^2 + 4bx - (a^2 - b^2) = 0$. *[HOTS; CBSE 2015]*
16. Find the numerical difference of the roots of equation $x^2 - 7x - 18 = 0$. *[HOTS; CBSE 2015]*
17. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, then find the value of k. *[HOTS; CBSE 2014, 16]*
18. Solve $2x^2 + ax - a^2 = 0$ for x by quadratic formula. *[CBSE 2014]*
19. Find the value of p for which the quadratic equation $x(x - 4) + p = 0$ has real roots. *[CBSE 2017]*
20. Find the value of k, so that the quadratic equation $(k+1)x^2 - 2(k-1)x + 1 = 0$ has equal roots.
21. Show that the equation $x^2 + ax - 4 = 0$ has real and distinct roots for all real values of a.
22. Show that the roots of equation $(p-q)x^2 + 5(p+q)x - 2(p-q) = 0$ are real and distinct if p, q and r are real.

Short Answer Type-II Questions (3 Marks)

23. Solve for x: $\dfrac{1}{a+b+x}=\dfrac{1}{a}+\dfrac{1}{b}+\dfrac{1}{x}$, where $a, b, x \neq 0$ and $a+b+x \neq 0$. **[HOTS]**

24. Solve for x: $\dfrac{x-2}{x-3}+\dfrac{x-4}{x-5}=3\dfrac{1}{3}$, $x \neq 3,5$.

    [CBSE 2014]

25. Solve for x: $abx^2 + (b^2 - ac)x - bc = 0$.

    [CBSE 2014]

26. Solve for x: $\dfrac{4}{x}-3=\dfrac{5}{2x+3}$, $x \neq 0, -\dfrac{3}{2}$.

    [CBSE 2014]

27. Solve for x: $\dfrac{1}{2a+b+2x}=\dfrac{1}{2a}+\dfrac{1}{b}+\dfrac{1}{2x}$.

    [CBSE 2013]

28. Solve for x: $6(a+b)^2 x^2 + 5(a+b)cx - 6c^2 = 0$.

29. Solve $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$ for x by quadratic formula. **[CBSE 2013]**

30. Solve for x: $2^{2x} - 3 \cdot 2^{x+2} + 32 = 0$. **[HOTS]**

31. By using the method of completing the square, show that the equation $4x^2 + 3x + 5 = 0$ has no real roots.

32. Find the non-zero value of k for which the quadratic equation $kx^2 + 1 - 2(k-1)x + x^2 = 0$ has equal roots. Hence, find the roots of the equation. **[CBSE 2015]**

33. Find the values of p for which the quadratic equation $(2p+1)x - (7p+2)x + (7p-3) = 0$ has real and equal roots. **[CBSE 2014]**

34. Determine the positive value of p for which the equations $x^2 + 2px + 64 = 0$ and $x^2 - 8x + 2p = 0$ will both have real roots. **[HOTS]**

35. If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, prove that $\dfrac{a}{b} = \dfrac{c}{d}$. **[HOTS; CBSE 2013]**

36. A shopkeeper buys a number of books for ₹1200. If he had bought 10 more books for the same amount, each book would have cost him ₹20 less. How many books did he buy? **[CBSE 2012]**

37. A train takes 2 h less for a journey of 300 km, if its speed is increased by 5 km/h from its usual speed. Find the usual speed of the train. **[CBSE 2012]**

38. The sum of the squares of two consecutive multiples of 7 is 637. Find the multiples. **[CBSE 2014]**

39. The difference of two natural numbers is 5 and the difference of their reciprocals is $\dfrac{1}{10}$. Find the numbers. **[CBSE 2014]**

40. The sum of the ages of a man and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Find their present ages.

41. One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels. **[HOTS]**

42. If a man walks 1 km/hr faster than his usual speed, then he covers a distance of 3 km in 15 minutes less time. Find his usual speed. **[HOTS]**

43. A pole has to be erected at a point on the boundary of a circular park of diameter 13 m in such a way that the difference of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 m. Is it possible to do so? If yes, at what distances from the two gates should the pole be erected. **[HOTS]**

Long Answer Type Questions (4 Marks)

44. Solve for x:
    $2\left(\dfrac{2x-1}{x+3}\right)-3\left(\dfrac{x+3}{2x-1}\right)=5$, $x \neq -3, \dfrac{1}{2}$.

    [CBSE 2014]

45. Solve for x:
    $3\left(\dfrac{7x+1}{5x-3}\right)-4\left(\dfrac{5x-3}{7x+1}\right)=11$, $x \neq \dfrac{3}{5}, -\dfrac{1}{7}$.

46. Solve $x^2 + 6x - (a^2 + 2a - 8) = 0$ by quadratic formula.

47. Solve $a^2 b^2 x^2 - (4b^4 - 3a^4)x - 12a^2 b^2 = 0$, $a \neq 0, b \neq 0$.

48. If the quadratic equation $(1+m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, prove that $c^2 = a^2(1+m^2)$. **[CBSE 2014]**

49. A two digit number is such that the product of digits is 20. When 9 is added to the number, then the digits interchange their places. Find the number.

50. ₹ 6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got ₹ 30 less. Find the original number of persons. **[CBSE 2012, 13]**

51. A bus travels at a certain average speed for a distance of 75 km and then travels a distance of 90 km at an average speed of 10 km/hr more than the first speed. If it takes 3 hours to complete the total journey, find its original speed. **[CBSE 2015]**

52. In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/hr and time of flight increased by 30 minutes. Find the original duration of the flight. **[CBSE 2012]**

53. A motor-boat whose speed in still water is 24 km/hr, takes 1 hour more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream. **[CBSE 2014, 16]**

54. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank separately, find the time in which each pipe would fill the tank separately. **[CBSE 2016]**

55. A motor-boat goes to 10 km upstream and returns back to the starting point in 55 minutes. If the speed of the motorboat in still water is 22 km/ hour, find the speed of the stream. **[CBSE 2017]**

Value Based Questions (VBQs)

56. A man bought a certain number of toys for ₹ 180. He gave one toy to a poor child and sold the rest for one rupee each more than he gave for them. Besides giving a toy to poor child for nothing, he made a profit of ₹ 10. Find the number of toys. Mention the value of man reflected in this question.

57. A person gave ₹ 56 to buy some rice. Shopkeeper gave him 1 kg more rice for ₹ 56 due to reduction of ₹ 1 per kg in the price of rice. Find the original price of rice per kg. Which value of shopkeeper is shown in this question?

ANSWERS

1. (i) Yes (ii) No (iii) No (iv) No 2. $x = \frac{3}{2}, -4$ 3. $x = \frac{2}{3}, -\frac{1}{3}$ 4. $x = \frac{25}{4}, -4$ 5. $k = 5$ 6. $k = 2$ 9. $c = \frac{b^2}{4a}$

10. 52 11. $2x^2 + x - 21 = 0$ 12. -1 14. 8 15. $x = -\frac{(a+b)}{2}, \frac{a-b}{2}$ 16. 11 17. $\frac{7}{4}$ 18. $\frac{a}{2}, -a$

19. $p \le \frac{1}{4}$ 20. 0 and 3 23. $-a, -b$ 24. $6, \frac{7}{2}$ 25. $-\frac{b}{a}, \frac{c}{b}$ 26. $-2, 1$ 27. $-a, -\frac{b}{2}$ 28. $\frac{2c}{3(a+b)}, \frac{-3c}{2(a+b)}$

29. $\frac{\sqrt{3}}{4}, -\frac{2}{\sqrt{3}}$ 30. 2 and 3 32. $k = 3, x = \frac{1}{2}, \frac{1}{2}$ 33. $4, -\frac{4}{7}$ 34. 8 36. 20 37. 25 km/h 38. 14, 21 39. 10, 5

40. 36 years, 9 years 41. 36 42. 3 km/hr

43. Yes, either 5 m from gate A and 12 m from gate B or 5 m from gate B and 12 m from gate A.

44. $-10 - \frac{1}{5}$ 45. 0, 1 46. $a - 2, -(a+4)$ 47. $\frac{4b^2}{a^2}, -\frac{3a^2}{b^2}$ 49. 45 50. 50 51. 50 km/hr 52. $3\frac{1}{2}$ hrs

53. 8 km/hr 54. 20 min and 25 min 55. 2 km/h 56. 20, kindness 57. ₹ 8 per kg, honesty

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Very Short Answer Type Questions (1 Mark)

1. If the probability of happening an event is 0.45, what is the probability of its not happening?
2. What is the probability of getting an even number in single throw of die?
   [CBSE 2017]
3. A die is thrown once. Find the probability of getting an even number less than 5?
   [CBSE 2013]
4. Find the probability that a number selected at random from the numbers 1, 2, 3, ..., 15 is a multiple of 4.
   [CBSE 2014]
5. Cards marked with number 3, 4, 5, ..., 50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number.
   [CBSE 2016]
6. What is the probability of an impossible event?
7. What is the probability of getting a number greater than 2 by throwing a die?
8. In a lottery, there are 8 prizes and 32 blanks. What is the probability of getting a prize?
9. One card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a face card?
10. A bag contains 3 white, 5 red and 7 green balls. One ball is drawn at random. What is the probability that the ball drawn is neither green nor white?

Short Answer Type-I Questions (2 Marks)

11. Two coins are tossed simultaneously. What is the probability of getting at least one head?
    [CBSE 2014]
12. A bag contains 6 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.
    [HOTS]
13. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?
    [HOTS]
14. Two dice are thrown at the same time. Determine the probability that the difference of the numbers on the two dice is 2.
    [NCERT Exemplar]
15. Two dice are thrown together. Find the probability the product of the numbers on the top of the dice is:
    (i) 6   (ii) 12   (iii) 7.
    [NCERT Exemplar; CBSE 2011]
16. A coin is tossed 3 times. Find the probability of getting:
    (i) all heads.   (ii) at least 2
    [CBSE 2014; NCERT Exemplar]
17. An integer is chosen between 0 and 100. What is the probability that it is:
    (i) divisible by 7?   (ii) not divisible by 7?
    [CBSE 2015; NCERT Exemplar]
18. Out of 150 bulbs in a box, 5 bulbs are defective. One bulb is taken out at random from the box. Find the probability that the drawn bulb is not defective.

19. In the word 'INDIA', if we take one alphabet randomly, what is the probability that it is 'I'?

20. Two dice are thrown at the same time and the product of numbers appearing on them is noted. Find the probability that the product is less than 9. **[HOTS]**

Short Answer Type-II Questions (3 Marks)
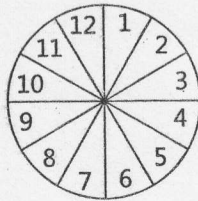
21. Three unbiased coins are tossed together. Find the probability of getting:
    (i) all tails.   (ii) two tails.
    (iii) one tails.   (iv) at least two tails.

22. A bag contains 5 black, 7 red and 3 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is:
    (i) not red.   (ii) red or white.
    (iii) white.

23. Three unbiased coins are tossed simultaneously. Find the probability of getting:
    (i) exactly 2 heads.
    (ii) at least 2 heads.
    (iii) at least two tails.   **[HOTS; CBSE 2016]**

24. Red queens and black jacks are removed from a pack of 52 playing cards. A card is drawn at random from the remaining cards, after reshuffling them. Find the probability that the drawn card is:
    (i) a king.   (ii) of red colour.
    (iii) a face card. (iv) a queen. **[CBSE 2014]**

25. A box contains 80 discs, which are numbered from 1 to 80. If one disc is drawn at random from the box, find the probability that it bears (i) a perfect square numbers. (ii) a number divisible by 2 and 3. **[CBSE 2011]**

26. Renu throws two dice once and computes the product of the numbers appearing on the dice. Peehu throws one die and squares the number that appears on it. Who has the better chance of getting the number 36? Why? **[HOTS]**

27. A die is rolled twice. Find the probability that:
    (i) 5 will not come up either time.
    (ii) 5 will come up exactly one time. **[HOTS]**

28. A jar contains 54 balls, some are blue, some are green and some are white. The probability of selecting a blue ball at random is $\frac{1}{3}$ and the probability of selecting a green ball at random is $\frac{4}{9}$. How many white balls does the jar contain? **[HOTS]**

29. Find the probability that a leap year selected at random will contain 53 Wednesday or Friday. **[HOTS]**

Long Answer Type Questions (4 Marks)

30. Cards numbered 11 to 60 are kept in a box. If a card is drawn at random from the box, find the probability that the number on the drawn card is:
    (i) an odd number.
    (ii) a perfect square number.
    (iii) divisible by 5.
    (iv) a prime number less than 20.
    [CBSE 2014]

31. Two different dice are rolled together. Find the probability of getting:
    (i) the sum of numbers on two dice to be 5,
    (ii) even number on both dice,
    (iii) a doublet.   **[CBSE 2014, 15]**

32. A piggy bank contains hundred 50-p coins, fifty ₹ 1 coins, twenty ₹ 2 coins and ten ₹ 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, find the probability the coin falling out will be:
    (i) a 50-p coin.
    (ii) of value more than ₹ 1.
    (iii) of value less than ₹ 5.
    (iv) a ₹ 1 or ₹ 2 coin. **[CBSE 2014]**

33. A card is drawn at random from a well-shuffled deck of 52 playing cards. Find the probability that the card drawn is:
    (i) a card of spades or an ace.
    (ii) a black king.
    (iii) neither a jack nor a king.
    (iv) either a king or a queen. **[CBSE 2015]**

34. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3, ...12 as shown in the figure. What is the probability that it will point to:

    (i) 6?
    (ii) an even number?
    (iii) a prime number?
    (iv) a number which is a multiple of 5?

35. Tickets numbered 2, 3, 4, 5, ... 101, are placed in a box and mixed thoroughly. One ticket is drawn at random from the box. Find the probability that the number on the ticket is:

    (i) an even number.
    (ii) a number less than 16.
    (iii) a number which is a perfect square.
    (iv) a prime number less then 40.

36. All the black face cards are removed from a deck of 52 playing cards. The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting a:

(i) face card.   (ii) red card.
(iii) black card.   (iv) king.   *[CBSE 2014]*

Value Based Questions (VBQs)

37. In a survey of 50 children, 18 children like to play outdoor games and remaining like to play indoor games. What is the probability that a child selected at random would like outdoor games? How can a child remain healthy for a long time?

38. A teacher wants to teach basics of Maths through a game. She says to students to write numbers from 11 to 50 on different cards. If a card is drawn at random from the box by a student, find the probability that the number on the drawn card is:

    (i) an even number.
    (ii) a perfect square number.
    (iii) divisible by 4.
    (iv) a prime number less than 40 and greater than 20.

Write the value possessed by the teacher in this question.

ANSWERS

1. 0.55 2. $\dfrac{1}{2}$ 3. $\dfrac{1}{3}$ 4. $\dfrac{1}{5}$ 5. $\dfrac{1}{8}$ 6. 0 7. $\dfrac{2}{3}$ 8. $\dfrac{1}{5}$ 9. $\dfrac{3}{13}$ 10. $\dfrac{1}{3}$ 11. $\dfrac{3}{4}$ 12. 18 13. 480 14. $\dfrac{2}{9}$

15. (i) $\dfrac{1}{9}$ (ii) $\dfrac{1}{9}$ (iii) 0 16. (i) $\dfrac{1}{8}$ (ii) $\dfrac{1}{2}$ 17. (i) $\dfrac{14}{99}$ (ii) $\dfrac{85}{99}$ 18. $\dfrac{29}{30}$ 19. $\dfrac{2}{5}$ 20. $\dfrac{4}{9}$ 21. (i) $\dfrac{1}{8}$ (ii) $\dfrac{3}{8}$ (iii) $\dfrac{3}{8}$ (iv) $\dfrac{1}{2}$

22. (i) $\dfrac{8}{15}$ (ii) $\dfrac{2}{3}$ (iii) $\dfrac{1}{5}$ 23. (i) $\dfrac{3}{8}$ (ii) $\dfrac{1}{2}$ (iii) $\dfrac{1}{2}$ 24. (i) $\dfrac{1}{12}$ (ii) $\dfrac{1}{2}$ (iii) $\dfrac{1}{6}$ (iv) $\dfrac{1}{24}$ 25. (i) $\dfrac{1}{10}$ (ii) $\dfrac{13}{80}$

26. Peehu has better chance because the chance of getting the number 36 of Renu and Peehu are 0.02 and 0.16 respectively. 27.(i) $\dfrac{25}{36}$ (ii) $\dfrac{5}{18}$ 28. 12 29. $\dfrac{4}{7}$ 30. (i) $\dfrac{1}{2}$ (ii) $\dfrac{2}{25}$ (iii) $\dfrac{1}{5}$ (iv) $\dfrac{2}{25}$ 31. (i) $\dfrac{1}{9}$ (ii) $\dfrac{1}{4}$ (iii) $\dfrac{1}{6}$

32. (i) $\dfrac{5}{9}$ (ii) $\dfrac{1}{6}$ (iii) $\dfrac{17}{18}$ (iv) $\dfrac{7}{18}$ 33. (i) $\dfrac{4}{13}$ (ii) $\dfrac{1}{26}$ (iii) $\dfrac{11}{13}$ (iv) $\dfrac{2}{13}$ 34. (i) $\dfrac{1}{12}$ (ii) $\dfrac{1}{2}$ (iii) $\dfrac{5}{12}$ (iv) $\dfrac{1}{6}$

35. (i) $\dfrac{1}{2}$ (ii) $\dfrac{7}{50}$ (iii) $\dfrac{9}{100}$ (iv) $\dfrac{3}{25}$ 36. (i) $\dfrac{3}{23}$ (ii) $\dfrac{13}{23}$ (iii) $\dfrac{10}{23}$ (iv) $\dfrac{1}{23}$

37. $\dfrac{9}{25}$; A child can remain healthy for a long time by frequent participation in sports and physical activities and by adopting a healthy lifestyle. 38. (i) $\dfrac{1}{2}$ (ii) $\dfrac{1}{10}$ (iii) $\dfrac{1}{4}$ (iv) $\dfrac{1}{10}$; The value possessed by the teacher is creative thinking, innovation, and a clear concept about the subject.