Lesson 11

Algebra

I. Multiple choice questions

1. If each match box contains 50 matchsticks, the number of matchsticks required to fill in such boxes is:

    a. $50 + n$ b. $50\, n$ c. $50 \div n$ d. $50 - n$

2. Amulya is x years of age now. 5 years ago her age was :

    a. $(5 - x)$ years   b. $(5 + x)$ years   c. $(x - 5)$ years   d. $(5 \div x)$ years

3. Which of the following represent 6 x.

    a. $6x$ b. $\frac{x}{6}$ c. $6 + x$ d. $6 - x$

4. Which of the following is an equation?

    a. $x + 1$ b. $x - 1$ c. $x - 1 = 0$ d. $x + 1 > 0$

5. If x takes the value 2. Then the value of $x + 10$ is:

    a. 20   b. 5   c. 12   d. 8

6. If the perimeter of a regular hexagon is x metres, then the length of each of its sides is:

    a. $(x + 6)$ metres   b. $(x \div 6)$ metres   c. $(x - 6)$ metres   d. $(6 \div x)$ metres

7. Which of the following equations has $x = 2$ as a solution?

    a. $x + 2 = 5$ b. $x - 2 = 0$ c. $2x + 1 = 0$ d. $x + 3 = 6$

8. For any two integers x and y. Which of the following suggests that operation of addition is commutative?

    a. $x + y = y + x$ b. $x + y > x$ c. $x - y = y - x$ d. $xy = yx$

9. Which of the following equations does not have a solution in integers?

    a. $x + 1 = 1$ b. $x - 1 = 3$ c. $2x + 1 = 6$ d. $1 - x = 5$

10. In algebra, a, b means ab, but in arithmetic 3 5 is:

    a. 35   b. 53   c. 15   d. 8

11. In a algebra, letters may stand for:

    a. Known quantities   b. unknown quantities

    c. fixed numbers   d. none of these

12. "Variable" means that it:

    a. Can take different values   b. has a fixed value

   c. can take only 2 value   d. can take only three values

13. $10 - x$ means:

    a. 10 is subtracted x times   b. x is subtracted 10 times

    c. x is subtracted from 10   d. 10 is subtracted from x

14. Savitri has a sum of Rs x. She spent Rs. 1000 on grocery, Rs. 500 on clothes and Rs. 400 on education, and received Rs. 200 as a gift. How much money (in Rs). Is left with her?

    a. $x - 1700$ b. $x - 1900$ c. $x + 2000$ d. $x - 2100$

15. The perimeter of the triangle shown in Fig. is:
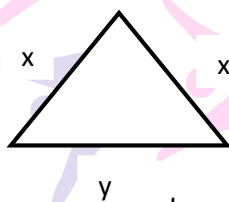
    a. $2x + y$ b. $x + 2y$ c. $x + y$ d. $2x - y$

16. The area of a square having each side x is:

    a. $x \times x$ b. $4x$ c. $x + x$ d. $4 + x$

17. The expression obtained when x is multiplied by 2 and then subtracted from 3 is:

    a. $2x - 3$ b. $2x + 3$ c. $3 - 2x$ d. $3x - 2$

18. $\frac{q}{2} = 3$ has a solution:

    a. 6   b. 8   c. 3   d. 2

19. $x - 4 = -2$ has a solution:

    a. 6   b. 2   c. -6   d. -2

20. $\frac{4}{2} = 2$ denotes a:

    a. Numerical equation   b. algebraic expression

    c. equation with a variable   d. false statement

21. Kanta has p pencil in her box. She puts q more pencils in the box. The total number of pencils with her are:

   a. $p + q$ b. pq c. $p - q$ d. $\frac{p}{q}$

22. The equation $4x = 16$ is satisfied by the following value of x:

   a. 4   b. 2   c. 12   d. -12

23. I think of a number and on adding 13 to it, I get 27. The equation for this is:

   a. $x - 27 = 13$ b. $x - 13 = 27$ c. $x + 27 = 13$ d. $x + 13 = 27$

24. If Sarita's present age is 'x' years, what will be her age 5 years from now?

   a. $(x - 5)$ yrs   b. $(x + 5)$ yrs   c. $5x$ yrs   d. $5/x$ yrs

25. Ram's   bank balance is   500 more than 3 time his friend's bank balance. If his friend's bank balance is 'y', what is Ram's bank balance.

   a. $y + 500$ b. $3y + 500$ c. $3y$ d. $3y$ 500

26. The length of a rectangular hall is 4 metres less than 3 times the breadth of the hall. What is the length, if the breadth is 'b' metres?

   a. $b + 4$ b. $b - 4$ c. $3b - 4$ d. $3b + 4$

27. If $2x + 3 = 5$, which of the following is the value of 'x'?

   a. 1   b. 4   c. 4   d. -1

28. Find which of the following is the solution of the equation $3y - 5 = 7$?

   a. 1   b. -4 c. 4   d. -1

29. The quotient of x by y added to the product of x and y is written as:

   a. $\frac{x}{y} + xy$ b. $\frac{y}{x} + xy$ c. $\frac{xy+x}{y} + 4$ d. $\frac{xy+y}{y} - 1$

30. 9 taken away from the sum of x and y is:

   a. $\frac{x+y}{9}$ b. $9 - (x - y)$ c. $x + y - 9$ d. $\frac{9}{x+y}$

31. The algebraic expression for the quotient of x and 3 multiplied by y is written as:

   a. $\frac{x}{3y}$ b. $\frac{3x}{y}$ c. $\frac{3y}{x}$ d. $\frac{xy}{3}$

32. $5x$ is equal to:

   a. $5 \times x$ b. $5 \div x$ c. $5 + x$ d. $x - 5$

33. Three times a number is written as:

    $a.\ 3 - m$ b. $3 + m$ c. $\frac{m}{3}$ d. $3m$

1.(b)	2. (c)	3. (a)	4. (c)	5. (c)	6. (b)	7. (b)	8. (a)	9. (c)	10. (c)	11. (b)
12. (a)	13. (c)	14. (a)	15. (a)	16. (a)	17. (c)	18. (a)	19. (b)	20. (a)	21. (a)	22. (a)
23. (d)	24. (b)	25. (b)	26. (c)	27. (a)	28. (c)	29. (a)	30. (c)	31. (d)	32. (a)	33. (d)

II. Multiple choice questions

1. In algebra, letters may stand for

    a. Known quantities   b. unknown quantities
    c. fixed numbers   d. none of these

2. $10 - x$ means

    a. 10 is subtracted x times   b. x is subtracted
    c. x is subtracted from 10   d. 10 is subtracted from x

3. Which of the following is an equation?

    a. $x + 1$ b. $x - 1$ c. $x - 1 = 0$ d. $x + 1 > 0$

4. If x takes the value 2, then the value of $x + 10$ is

    a. 20   b. 12   c. 5   d. 8

5. Which of the following equations has x = 2 as a solution?

    a. $x + 2 = 5$ b. $x - 2 = 0$ c. $2x + 1 = 0$ d. $x + 3 = 6$

6. The equation $4x$ = 16 is satisfied by the following value of x.

    a. 4   b. 2   c. 12   d. – 12

7. $x - 4 = -2$ has a solution

    a. 6   b. 2   c. – 6   d. – 2

8. Kanta has p pencils in her box. She puts q more pencils in the box. The total number of pencils with here are

    a. $p + q$ b. pq c. $p - q$ d. $\frac{p}{q}$

9. The expression obtained when x is multipled by 2 and then subtracted from 3 is

    a. $2x - 3$ b. $2x + 3$ c. $3 - 2x$ d. $3x - 2$

10. In algebra $x \times y$ means xy, but in arithmetic 2 x 4 means

    a. 24   b. 42   c. 6   d. 8

11. If the perimeter of a regular hexagon is x metres, then the length of each of its sides is

    a. $(x + 6)$ metres   b. $(x \div 6)$ metres   c. $(x - 6)$ metres   d. $(6 \div x)$ metres

12. Which of the following equations does not have a solution in integers?

    a. $x - 2 = 0$ b. $x + 1 = 0$ c. $x - 3 = 2$ d. $2x - 1 = 0$

13. For any two integers x and y, which of the following suggests that operation of addition is commutative?

    a. $x + y = y + x$ b. $x + y > x$ c. $x - y = y - x$ d. $x \times y = y \times x$

14. The perimeter of a triangle with one side x units and two sides units each is

    a. $2x + y$ b. $2x - y$ c. $x + 2y$ d. $x - 2y$

15. I think of a number and on adding 13 to it, I get 27. The equation for this is

    a. $x - 27 = 13$ b. $x - 13 = 27$ c. $x + 27 = 13$ d. $x + 13 = 27$

1. (b)	2. (c)	3. (c)	4. (b)	5. (b)	6. (a)	7. (b)	8. (a)
9. (c)	10. (d)	11. (b)	12. (d)	13. (a)	14. (c)	15. (d)	

III. Multiple choice questions

1. Given, expression for P divided by 15 is

    a. P – 15   b. P + 15   c. P ÷   d. P × 15

2. Which out of the following are expression with numbers only?

    a. 2x + 5   b. 3x – 5   c. 3(11 – 5) + 5 × 2   d. 3y + 5

3. Take Meena's present age to be y yr, what is his father's age if he is double of her age?

    a. y + 2   b. $y - 2$ c. $y/2$ d. $2y$

4. If each matchbox contains 50 matchsticks, the number of matchsticks required to fill n such boxes is

    a. $50 + n$ b. $50\,n$ c. $50 \div n$ d. $50 - n$

5. Amulya present age is xyr. 5 yr ago her age was

    a. (5 – x) yr   b. (5 + x) yr   c. (x – 5) yr   d. (5 ÷ x) yr

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6. Which of the following represents $6 \times x$?

    a. $6x$ b. $\frac{x}{6}$ c. $6 + x$ d. $6 - x$

7. State which of the following are equations (with a variable)

    a. $3x + 2 = 11$ b. $2y - 4 > 5$ c. $a + 4 < 6$ d. $m + 3 < 7$

8. If x takes the value 3, then x + 12 is

    a. 16   b. 10   c. 14   d. 15

9. If the perimeter of a regular hexagon is x m, then the length of each of its side is

    a. $(x + 6)$ m   b. $(x \div 6)$ m   c. $(x - 6)$ m   d. $(6 \div x)$ m

10. Which of the following equations has x = 2 as a solution?

    a. x + 2 = 5   b. x – 2 = 0   c. 2x + 1 = 0   d. x + 3 = 6

11. Savitri has a sum of ₹x. She spent ₹1000 on grocery, ₹500 on clothes and ₹400 on education and received ₹200 as a gift. How much money (in ₹) is left with her?

    a. X – 1700   b. x -1900   c. x + 200   d. x – 2100

1. (c)	2. (c)	3. (d)	4. (b)	5. (c)	6. (a)
7. (a)	8. (d)	9. (b)	10. (b)	11. (a)	

IV. Multiple choice questions

1. The rule, which gives the number of matchsticks required to make the matchstick pattern L, is

    a. $2\,n$ b. $3\,n$ c. $4\,n$ d. $5\,n$

2. The rule, which gives the number of matchsticks required to make the matchstick pattern C, is

    a. $2\,n$ b. $3\,n$ c. $4\,n$ d. $5\,n$

3. The rule, which gives the number of matchsticks required to make the matchstick pattern F, is

    a. $2\,n$ b. $3\,n$ c. $4\,n$ d. $5\,n$

4. The rule, which gives the number of matchsticks required to make the matchstick pattern U, is

    a. $2\,n$ b. $3\,n$ c. $4\,n$ d. $5\,n$

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5. The rule, which gives the number of matchsticks required to make the matchstick pattern V, is

   a. $2n$ b. $3n$ c. $4n$ d. $5n$

6. The rule, which gives the number of matchsticks required to make the matchstick pattern Δ, is

   a. $2n$ b. $3n$ c. $4n$ d. $5n$

7. The rule, which gives the number of matchsticks required to make the matchstick pattern □ , is

   a. $2n$ b. $3n$ c. $4n$ d. $5n$

8. The rule, which gives the number of matchsticks required to make the matchstick pattern T, is

   a. $2n$ b. $3n$ c. $4n$ d. $5n$

9. The rule, which gives the number of matchsticks required to make the matchstick pattern E, is

   a. $2n$ b. $3n$ c. $4n$ d. $5n$

10. The rule, which gives the number of matchsticks required to make the matchstick pattern A, is

    a. $3n$ b. $4n$ c. $5n$ d. $6n$

11. The rule, which gives the number of matchsticks required to make the matchstick pattern Z, is

    a. $3n$ b. $4n$ c. $5n$ d. $6n$

12. The rule, which gives the number of matchsticks required to make the matchstick pattern S, is

    a. $3n$ b. $4n$ c. $5n$ d. $6n$

13. The side of a square is l. Its perimeter is

    a. $3l$ b. $2l$ c. $4l$ d. $6l$

14. The side of an equilateral triangle is l. Its perimeter is

    a. l b. $2l$ c. $3l$ d. $6l$

15. The side of a regular pentagon is l. Its perimeter is

    a. $3l$ b. $6l$ c. $4l$ d. $5l$

16. The side of a regular hexagon, is l. Its perimeter is

   a. l b. $2l$ c. $3l$ d. $6l$

17. The length of an edge of a cube is l. The total length of its edges is

   a. $3l$ b. $4l$ c. $6l$ d. $12l$

18. The radius of a circle is r. Its diameter is

   a. $2r$ b. $4r$ c. $3r$ d. $6r$

19. Which of the following is an expression with numbers only?

   a. $x + 1$ b. $2x$ c. $1 - x$ d. 3

20. Which of the following is an expression with numbers only?

   a. $2(4 - 3) + 5 \times 6$ b. $2 \times 3 - 4x$

   c. $4 \times 5 - 10 \times 2 - 25 + x$ d. $\frac{x}{8}$.

21. Which of the following is not an expression with numbers only?

   a. $2 \times (3 + 4)$ b. $(2 + 3) \times 4$ c. $2 \times 3 + 4 \times 5$ d. $2x + 1$

22. The expression for ' 1 added to p' is

   $a. p + 1$ b. $p - 1$ c. $1 - p$ d. $- 1 - p$

23. The expression for ' 1 subtracted from p' is

   a. $p - 1$ b. $p + 1$ c. $1 - p$ d. $-1 - p$

24. The expression for 'p multiplied by 2' is

   a. $p + 2$ b. $p - 2$ c. $\frac{p}{2}$ d. $2p$

25. The expression for 'p divided by 2' is

   $a. \frac{p}{2}$ b. $2p$ c. $p + 2$ d. $p - 2$

26. The expression for ' 1 subtracted from $-p'$ is

   $a. -p - 1$ b. $p - 1$ c. $1 - p$ d. $1 + p$

27. The expression for '1 added to $-p'$ is

   $a. -p + 1$ b. $-p - 1$ c. $p + 1$ d. $p - 1$

28. The expression for '$-p$ multiplied by $-2'$ is

   $a. -2p$ b. $-\frac{p}{2}$ c. $p - 2$ d. $-p - 2$

29. The expression for '$-p$ multiplied by 2' is

   a. $-2p$ b. $-\frac{p}{2}$ c. $p - 2$ d. $-p - 2$

30. The expression for '$-p$ divided by 2' is

   a. $-\frac{p}{2}$ b. $-2p$ c. $-p + 2$ d. $-p - 2$

31. The expression for '1 added to $2p$' is

   a. $2p + 1$ b. $2p - 1$ c. $1 - 2p$ d. $-1 - 2p$

32. The expression for '1 subtracted from $2p$' is

   a. $2p - 1$ b. $2p + 1$ c. $1 - 2p$ d. $-2p - 1$

33. The expression for '2 times x to which 1 is added' 2

   a. $2x + 1$ b. $x + 2$ c. $1 - 2x$ d. 2x-1

34. The expression for '2 times x from which 1 is subtracted' is

   a. $2x - 1$ b. $2x + 1$ c. $x - 2$ d. $x + 2$

35. The expression for 'x is divided by 2 and the result is added to 1' is

   a. $1 + \frac{x}{2}$ b. $1 - \frac{x}{2}$ c. $2 + x$ d. $2 - x$

36. The expression for 'x is divided by – 2 and the result is added to 1' is

   a. $1 - \frac{x}{2}$ b. $1 + \frac{x}{2}$ c. $\frac{x}{2} - 1$ d. $2 - x$

37. If Apala's present age is x years, what will be her age in year's after 20 years from now?

   a. $x + 20$ b. $x - 20$ c. $\frac{x}{20}$ d. $2x$

38. If Meenu's present age is x years, what was her age in years, 10 years back?

   a. $x - 10$ b. $10 - x$ c. $-x - 10$ d. $x - 2$

39. If the age of Hari Kishan is two times age of Manish (which is x years), then the age of Hari Kishan, in years, is

   a. $\frac{x}{2}$ b. $2x$ c. $x + 2$ d. $x - 2$

40. The salary of Hari Kishan is two times the salary of Manish (which ₹x), then the salary of Hari Kishan, in rupees, is

   a. $2x$ b. $\frac{x}{2}$ c. $x + 2$ d. $x - 2$

41. Which of the following is an equation in a variable?

     a. $\frac{10}{2} = 5$ b. 2 x 3 + 2 x 1 = 8   c. 2 x 4 = 8   d. 3p = 12

42. Which of the following is an equation in a variable?

     a. 2 < 10   b. 3 > 12   c. $x - 1 = 0$ d. 2 + 3 = 3 + 2

43. Solve: $p + 1 = 2$

     a. 1   b. 2   c. − 1   d. − 2

44. Solve: $m - 2 = 3$

     a. 2   b. 3   c. 5   d. 1

45. Solve: $\frac{y}{3} = 5$

     a. 3   b. 5   c. 2   d. 15

46. Solve : $3z = 9$

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

47. Solve: $\frac{l}{2} + 5 = 7$

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

48. Solve: $7u = 21$

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

49. Solve: $k - 3 = 3$

     a. 3   b. − 3   c. 0   d. 6

50. Solve: $r + 5 = 5$

     a. 0   b. 1   c. 5   d. − 5

1.(a)	2. (b)	3. (c)	4. (b)	5. (a)	6. (b)	7. (c)	8. (a)	9. (d)	10. (c)
11. (a)	12. (c)	13. (c)	14. (c)	15. (d)	16. (d)	17. (d)	18. (a)	19. (d)	20. (a)
21. (d)	22. (a)	23. (a)	24. (d)	25. (a)	26. (a)	27. (a)	28. (a)	29.(a)	30. (a)
31. (a)	32. (a)	33. (a)	34. (a)	35. (a)	36. (a)	37. (a)	38. (a)	39. (b)	40. (a)
41. (d)	42. (c)	43. (a)	44. (c)	45. (d)	46. (c)	47. (d)	48. (c)	49. (d)	50. (a)

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I. Fill in the blanks

1. The distance (in km) travelled in h hours at a constant speed of 40 km per hour is _____.

2. p kg of potatoes are bought for ₹70. Cost of 1 kg of potatoes (in ₹) is _____.

3. An auto rickshaw charges ₹10 for the first kilometre then ₹8 for each such subsequent kilometre. The total charge (in ₹) for d kilometres is _____.

4. If $x + 4 = 25$, then the value of x is _____.

5. The solution of the equation $3x + 7 = -20$ is _____.

6. 'x exceeds y by 7' can be expressed as _____.

7. '8 more than three times the number x' can be written as _____.

8. Number of pencils bought for ₹x at the rate of ₹2 per pencil is _____.

9. The number of days in weeks is _____.

10. Annual salary at x rupees per month along with a festival bonus of Rs. 2000 is _____.

11. The two digit number whose ten's digit is 't' and units' digit is 'u' is _____.

12. The variable used in the equation $2p + 8 = 18$ is _____.

13. x metres = _____ centimetres.

14. p litres = _____ millilitres.

15. r rupees = _____ paise.

16. If the present age of Ramandeep is n years, then her age after 7 years will be _____.

17. If I speed f rupees from 100 rupees, the money left with me is _____ rupees.

18. $3x > 5$ is an example of _____.

19. $3x + 4 = 9$ is an example of _____.

20. The letters which are used to represent numbers are called _____.

21. Literal numbers are also know as _____ for the numerals.

22. A constant has a _____ numbers.

23. _____ is often called the arithmetic of literal number.

1. $40h$	2. $\frac{70}{p}$	3. $8d + 10$	4. 21
5. -9	6. $x = y + 7$	7. $3x + 8$	8. $2x$

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9. $7w$	10. $12x + 2000$	11. $10t + u$	12. p
13. $100x$	14. $1000p$	15. $100r$	16. $n + 7$
17. $100 - f$	18. inequality	19. Simple equation	20. Literal numbers
21. Place holder	22. fixed	23. Algebra	

III. Fill in the blanks

1. The variable can take _____ values.

2. The value of the variable in an equation which satisfies the equation is called a _____ to the equation.

3. An _____ has two sides, LHS and RHS, between them is the equal (=) sign.

4. The LHS of an _____ is equal to its RHS only for a definite value of the variable in the equation.

5. The distance (in km) travelled in h hours at a constant speed of 40 km per hour is _____.

6. p kg of potatoes are bought for ₹70. Cost of 1 kg of potatoes (in ₹) is _____.

7. An auto rickshaw charges ₹10 for the first kilometre, then ₹8 for each such subsequent kilometre. The total charge (in ₹) for d kilometres is _____.

8. If 7x + 6 = 48, then the value of x is _____.

9. The solution of the equation 5x – 4 = - 24 is _____.

10. m exceeds n by 10 can be expressed as _____.

11. The two digit number whose ten's digit is 't' and unit's digit is 'u', is _____.

1. different	2. solution	3. equation	4. equation	5. 40 h km	6. ₹70 ÷ p
7. ₹(8d + 2)	8. x = 6	9. x = -4	10. $m = n + 10$	11. 10t + u	

I. True or False

1. 0 is a solution of the equation $x + 1 = 0$.
2. The equations $x + 1 = 0$ and $2x + 2 = 0$ have the same solution.
3. If m is a whole number, then $2m$ denotes a multiple of 2.

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4. The additive inverse of an integer x is $2x$.
5. If x is a negative integer, $-x$ is a positive integer.
6. $2x - 5 > 11$ is an equation.
7. In the equation, the LHS is equal to the RHS.
8. In the equation $7k - 7 = 7$, the variable is 7.
9. $a = 4$ is a solution of the equation $2a - 1 = 5$.
10. The distance between New Delhi and Bhopal is not a variable.
11. t minutes are equal to $60t$ seconds.
12. $x = 5$ is the solution of the equation $3x + 2 = 20$.
13. 'One third of a number added to itself gives 8', can be expressed as $\frac{x}{3} + 8 = x$.
14. The different between the ages of two sisters Leela and Yamini is a variable.
15. The number of lines that can be drawn through a point is a variable.
16. $-3\, x\, y^2\, z$ is a monomial.
17. $2x + 3 = 5$ is a linear equation.
18. The coefficient of x in $5xy$ is 5.

1. False	2. True	3. True	4. False	5. True	6. False	7. True	8. False	9. True
10.True	11.True	12.False	13.False	14.False	15.False	16.True	17.True	18.False

II. True or False

1. The total distance travelled by a car in x h at a constant speed of y km/h, is xy km.
2. The perimeter of a square if each of its side is x units, is 4x units.
3. 2 is the solution of the equation x + 4 = 5
4. The equation 2x + 4 = 6 and 3x + 9 = 12 have the same solution.
5. In the equation 7k – 7 = 7, the variable is 7.
6. a = 3 is a solution of the equation 2a - 1 = 5.
7. The distance between New Delhi and Bhopal is not a variable.
8. t minutes are equal to 60 t seconds.
9. X = 5 is the solution of the equation 3x + 2 = 20
10. 3x – 6 > 15 is an equation.

1.True	2.True	3.False	4.True	5.false	6.True	7.True	8.True	9.False	10.False

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I Match the following

Column A		Column B	
a.	x increased by 12	i.	$7y + 5x$
b.	x decreased by 12	ii.	$y^3 - x^3$
c.	5 times x added to 7 times y	iii.	$x - 12$
d.	x cube less than y cube	iv.	$2x + y$
e.	Twice x increased by y	v.	$x + 12$

a. (v)	b. (iii)	c. (i)	d. (ii)	e. (iv)

II Match the following

Column A		Column B
a.	The number of corners of a quadrilateral	=
b.	The variable in the equation $2p + 3 = 5$	Constant
c.	The solution of the equation $x + 3 = 5$	+ 1
d.	Solution of the equation $2p + 3 = 5$	- 1
e.	A sign used in an equation	P

a. (ii)	b. (v)	c. (iv)	d. (iii)	e. (i)

I Very short answer

1. **One more than twice the number. Give corresponding expression.**

   Let the number be x.

   Twice of the number = $2x$.

   After that, $2x$ is added by 1 to get another number, which is more than that number.

   Then, expression = $2x + 1$.

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2. **20°C less than the present temperature. Give the corresponding expression.**

   Let the present temperature be $f°C$

   ∴ Required expression = Present temperature - $20°C = (f - 20)°C$.

3. **The successor of an integer. Give the corresponding expression.**

   Let the integer be n.

   Successor of $n = n + 1$

   ∴ Required expression = $n + 1$

4. **The perimeter of an equilateral triangle, if side of the triangle is m. Give the corresponding expression.**

   Given side of triangle is m.

   In equilateral triangle, all sides are equal.

   ∴ Perimeter of an equilateral triangle = Sum of all three sides = $m + m + m = 3$

   Hence, the perimeter of an equilateral triangle is $3m$.

5. **Area of the rectangle with length k units and breadth n units. Give corresponding expressions.**

   Given, the length of rectangle = k units

   And breadth of the rectangle = n unoits

   ∴ Area of the rectangle = Length x Breadth = $k \times n = kn$.

   Hence, the expression is kn.

6. **Amar helps his mother 1 hour more than his sister does. Give the corresponding expression.**

   Let sister's helping hours = x hours

   Then, Amar's helping hour = sister's helping hour + 1 = $(x + 1)$ hours

   ∴ Required expression = $(x + 1)$ hours.

7. **Two consecutive odd integers. Give the corresponding expression**

   Any odd integer can be written as $2n + 1$, when n is an integer so, next odd integer will be $(2n + 1)$ + 2, $i.e., 2n + 3$.

   Note : A sequence of consecutive even or odd integer is a list of two of more integer which increase by 2 from one integer to the next consecutive integer. They have a difference of 2 between every two integer.

8. **Two consecutive even integers. Give the corresponding expression.**

   Any even integer can be consecutive as $2n$, where n is an integer, so, next even integer will $2n + 2$. Hence, two consecutive even integer are $2n$ and $2n + 2$.

9. **Multiple of 5. Give the corresponding expression.**

   The multiple of a whole number are found by taking product of any counting number and that whole number. Multiples of 5 are multiply 5 by 1 = 5 x 1 = 5 multiple by 2 = 5 x 2 and so on.

   Hence, multiple of 5 = $5n$, where n is any whole number.

10. **The denominator of a fraction is 1 more than its numerator. Give the corresponding expression.**

    Let the numerator be x.

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Then, denominator = $x + 1$

Now, fraction = $\frac{Numerator}{Denominator} = \frac{x}{x+1}$

Hence, the required expression is $\frac{x}{x+1}$

11. **The height of Mount Everest is 20 times the height of Empire State building. Give the corresponding expression.**

Let height of empire state be h metre.

Then height of Mount Everest = $20 \times h = 20h$ metre

Hence, the required expression is $20\,h$.

12. **If a note book costs ₹ p and a pencil costs ₹ 3, then the total cost (in ₹) of two note books and one pencil. Give the corresponding expression.**

Given,

Cost of one notebook = ₹p cost of 2 notebooks = $2 \times p$

= ₹$2\,p$ similarly, cost of one pencil

= Rs. 3 now, total cost

= cost of 2 notebooks + cost of one pencil

$$= ₹(2p + 3)$$

Hence, the required expression is $2p + 3$.

13. **Z is multiplied by -3 and the result is subtracted from 13. Given the corresponding expression.**

According to the question,

z is multiplied by – 3 = (-3) × z

Now, result is subtracted from 13 = 13 – (-3) z = 13 + 3z

Hence, the required expression is 13 + 13z

14. **P is divided by 11 and the result is added to 10. Give the corresponding expression.**

According to the questions, p is divided by 11 = $\frac{p}{11}$

Now, result is added to 10.

$i.e., 10 + \frac{p}{11}$

Hence, the required expression is $10 + \frac{p}{11}$.

15. **X is times of 3 is added to the smallest natural number. Given the corresponding expression.**

According to the question

x times of 3 = $3x$ and smallest natural number = 1.

Now according to question, Resulting expression = $3x + 1$.

Hence, the required expression is $3x + 1$.

16. **6 times q is subtracted from the smallest two digit number. Give the corresponding expression.**

6 times of $q = 6q$

and smallest two digit number = 10

Then according to question, resulting expression = $10 - q$

Hence, the required expression = $10 - 6q$.

17. **A pencil costs ₹ p and a Pen costs ₹ $5p$.**

    The cost of a pen is 5 times the cost of a pencil.

18. **Leela contributed ₹ y towards the Prime Minister's Relief Fund. Leela is now left with ₹ $(y + 10000)$.**

    Amount left with Leela is Rs. 10000 more than the amount she contributed towards Prime minister's Relief fund.

19. **Kartik is n years old. His father is $7n$ years old.**

    Age of Kartik's father is seven times the age of Kartik.

20. **The maximum temperature on a day in Delhi was $p°C$ The minimum temperature was (p-10)° C.**

    The difference between maximum and minimum temperature on a day in Delhi was $10°C$.

21. **John planted t plants last years. His friend Jay planted $2t + 10$ plants that year.**

    Last year, Jay planted 10 more plants than twice the number of plants planted by John.

22. **Shared used to take p cups tea a day. After having some health problem, he takes $p - 5$ cups of tea day.**

    Shared reduced the consumption of tea per day by 5 cups after having some health problem.

23. **The number of students dropping out of school last year was m. Number of students dropping out of school this year is $m - 30$.**

    The number of students dropping out of school this year is 30 less than the number of student dropped last year.

24. **Price of petrol was ₹p per litre last month. Price of petrol now is ₹ $(p - 5)$ per litre.**

    The price of petrol per litre is decreased this month by Rs. 5 than its price last month.

25. **Khader's monthly salary was ₹ p in the year 2005. His salary in 2006 was ₹ $(p + 1000)$.**

    Khader's monthly salary is increased by Rs. 1000 in the year 2006 than in 2005.

26. **The number of girls enrolled in a school last year was g. The number of girls enrolled this year in the school is $3g - 10$.**

    The number of girls enrolled this year was 10 less than girls enrolled last year.

27. **Perimeter of a rectangle is found by using the formula $P = 2(l + w)$. Where l and w are respectively the length and breadth of the rectangle. Write the rule that is expressed by this formula in words.**

    Perimeter of a rectangle = 2 (length of a rectangle + Breadth of the rectangle).

    ∴ The perimeter of a rectangle is twice the sum of its length and breadth.

28. **Perimeter of a triangle is found by using the formula $P = a + b + c$ where a, b and c are the sides of the triangle. Write the rule that is expressed by this formula in words.**

    In this question, given formula for getting perimeter of triangle is

    $P = a + b + c$

    Here a, b and c are sides of the triangle.

    Hence, the perimeter of the triangle is given by the sum of sides of triangle.

1. **How will 8 more than three times the number x can be represented?**

   $3x + 8$.

2. **Amulya is x years of age now. Write expression for her age 5 years ago?**

   Amulya age 5 years ago = $(x - 5)$ years.

3. **If each match box contains 50 matchsticks. What will be number of matchsticks required to fill n such boxes?**

   Number of matchsticks required = $50 \times n = 50\,n$

4. **Write expression for successor of an integer.**

   Let integer be x.

   Successor of integer = $x + 1$.

5. **How can quotient of x by 2 is added to 5 be written?**

   $\frac{x}{2} + 5$.

6. **Write the perimeter of an equilateral triangle, if side of the triangle 3 m.**

   9 m.

1. **The sum of the number 5 and x.**

   The sum of numbers 5 and x = 5 + x

2. **4 less than number x.**

   It can be written as (x – 4)

3. **5 more than the number y.**

   It can be written as (y + 5).

4. **Two fifth of a number z.**

   It can be written as $\frac{2}{5}z$.

5. **One-third of the sum of the numbers x and y.**

   Sum of numbers x and y = x + y. it can be written as $\frac{1}{3}$ (x + y).

6. **The number 5 times the product of x and y.**

   Product of numbers x and y = x x y.

   So, number = 5xy

7. **The number, 5 more than $\frac{1}{3}$ rd of the number x.**

   The required number is $\frac{X}{3}$ + 5.

8. **Quotient of x by y added to the product of x and y.**

   It can be written as $\frac{x}{y}$ + xy.

9. **If x = 72, then find the value of $\frac{1}{4}$ x.**

   Given, x = 72, then $\frac{1}{4} \times 72 = \frac{72}{4}$ = 18

10. **Sohan bought 1 dozen eggs for ₹ 60 y. then, find the price of 2 eggs.**

    Given, price of 1 dozen eggs is ₹ 60 y.

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Price of 1 egg will be = $\frac{60y}{12}$ [∵ 1 dozen eggs = 12 eggs]

= ₹5 y

So, price of 2 eggs will be = ₹2 × 5 y = ₹10 y.

11. **Add 25, 26, 27 in two different ways by using associative property.**

(25 + 26) + 27 = 51 + 27 = 78

And 25 + (26 + 27) = 25 + 53 = 78

12. **Verify the addition by using distributive property for numbers 13, 25, 30.**

Let numbers be a = 13, b = 25 and c = 30

$a \times (b + c) = a \times b + a \times c$

Now, $a \times (b + c)$ = 13 × (25 + 30) = 13 × 55 = 715

and $13 \times 25 + 13 \times 30$ = 325 + 390 = 715

I Short answer

1. **Write an equation for which have solution 0 is a solution.**

Let the one number be x which have solution 0 in equation. Now for getting equation, the number x is multiplied by 2, then the number is $2x$. After that, it will be added to 3 which result into 3.

Hence, $2x + 3 = 3$

On solving $2x = 3 - 3 = 0$ [transporting + 3 to RHS]

$\Rightarrow \frac{2x}{2} = \frac{0}{2}$ [Dividing both sides by 2]

$\Rightarrow x = 0$

Hence, required equation is $2x + 3 = 3$.

2. **Write an equation whose solution is not a whole number.**

We know that, whole number are 0, 1, 2, 3, _____.

Now, let the one number be x whose solution is not a whole number.

For getting equation, the number x will be added to 1

Which results into 0. Then, $x + 1 = 0$ [transporting + 1 to RHS]

One solution $x = -1$

Which is not a whole number.

Hence, required equation is $x + 1 = 0$.

3. **A class with p students has planned a picnic. ₹ 50 per students is collected, out of which ₹ 1800 is paid in advance for transport. How much money is left with them to spend on other items?**

According to the questions,

Total students in the class = p

Collected money from per students = ₹50

Then, total money collected = ₹50 p

Advance paid for transport = ₹1800

∴ Left money for spend on other items = [Total money collected – Advance paid money]

= ₹$(50\, p - 1800)$.

4. **Sunita is half the age of her mother Geeta. Find their ages?**
     i.   After 4 years?
     ii. Before 3 years?

Let the age of Sunita's mother = $2x$ years

Then, according to the question

Geeta's age = $\frac{2x}{2} = x$ [half of her mother's age]

   i. Since, in the after years, present age is added in given years.

     ∴   Sunita's age = $(x + 4)$ years

Her mother's age = $(2x + 4)$ years

   ii. Since, in the before years, given year is subtracted from present age.

     ∴   Sunita's age = $(x - 3)$ years and her mother's age = $(2x - 3)$ years.

II Short answer

1. **If m is a whole number less than 5, complete the table and by inspection of the table, find the solution of the equation $2m - 5 = -1$.**

m				
$2m - 5$				

Given, m is a whole number which is less than 5, then solution of the equation is given by putting value of m in the table.

When $m = 0, 2m - 5 = 2(0) - 5 = -5$

⇒ $m = -5$

When $m = 1, 2m - 5 = 2(1) - 5 = 2 - 5 = -3$

⇒ $m = -3$

When $m = 2, 2m - 5 = 2(2) - 5 = 4 - 5 = -1$

⇒ $m = -1$

When $m = 3, 2m - 5 = 2 \times (3) - 5 = 6 - 5 = 1$

⇒ $m = 1$

When $m = 4, 2m - 5 = 2 \times 4 - 5 = 8 - 5 = 3$

⇒ $m = 3$

m	0	1	2	3	4
$2x - 5$	-5	-3	-1	1	3

Hence, solution of the equation is given by $m = 2$.

1. **Cadets are marching in a parade. There are 5 cadets in a row. What is the rule which gives the number of cadets, given the number of rows?(Use n for the number of rows.)**

   No. of rows = n

   Cadets in a row = 5

   Thus, the rule would be:

   Number of cadets = 5 x No. of rows = $5n$

2. **If there are 50 mangoes in a box, how will you write the total number of mangoes in terms of the number of boxes? (Use b for the number of boxes)**

   No. of boxes = b

   Mangoes in a box = 5

   ∴ Total number of Mangoes = 50 x No. of boxes = $50b$.

3. **Leela is Radha's younger sister. Leela is 4 year younger than Radha. Can you write leela's age in terms of Radha's age? Take Radha's age to be x years.**

   Radha's age is x years

   Leela is 4 years younger than Radha

   So, Leela's age – 4 = $(x - 4)$.

4. **Mother has made *laddus*. She gives some *laddus* to guests and fami.y members: still 5 *laddus* remain. If the number of *laddus* mother gave away is l, how many *laddus* did she make?**

   Number of *laddus* mother gave away = l

   Number of *laddus* remaining = 5

   So, *laddus* she made

   = Number of *laddus* she gave away + Number of *laddus* remaining

   = $(l + 5)$

   ∴ She made $(l + 5)$ *laddus*.

5. **If the weight of a mango is 95 grams and that of a banana is 40 grams, what will be the weight of x mangoes and y bananas?**

   Weight of a mango = 95 grams

   Weight of x mangoes = 95 x g

   Now, weight of a banana = 40 g

   Weight of y bananas = 40 y g

   Total weight = $(95x + 40y)$ g

6. **The number of rooms on the ground floor of a building is 12 less than twice of the number of rooms on first floor. If the first has x rooms, how many rooms does the ground floor has?**

   Rooms on first floor = x

   Twice of no. of rooms on first floor = $2x$

   Now, Rooms on ground floor = Twice of no. of rooms on first floor – 12

   ∴ Rooms on ground floor = $2x - 12$.

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7. Oranges are to be transferred from larger boxes into smaller boxes. When a large box is emptied, the oranges from it fill two smaller boxes and still 10 oranges remain outside. If the number of oranges in a small box are taken to be x, what is the number of oranges in the larger box?

   Here, No. of small boxes used = 2

   Oranges remaining outside = 10

   No. of oranges in small box = x

   So, total no. of oranges in small boxes = $2x$

   ∴ No. of oranges in large box

   = Oranges in small boxes + Oranges remaining outside

   = $(2x + 10)$

   So, oranges in large box are $(2x + 10)$.

8. A class with P students has planned a picnic. ₹ 50 per student is collected, out of which ₹1800 is paid in advance for transport. How much money is left with them to spend on other items?

   No. of students in a class = P

   Money taken from each student = ₹50

   So, total money collected = ₹ 50 P

   Money paid for transport = ₹1800

   ∴ Money left = Total money – Money paid for transport

   = (50 P – 1800).

9. Binny spends ₹ a daily and saves ₹ b per week. What is her income for two weeks?

   Money spend daily = ₹ a

   Money spend in two weeks = ₹14a

   Now, Money saved per week = ₹ b

   Money saved in two weeks = $2b$

   ∴ Income of two weeks

   = Money spend in two weeks + Money saved in two weeks

   = ₹ $(14a + 2b)$

10. In a village, there are 8 water tanks to collect rain water. On a particular day, x litres of rain water is collected per tank. If 100 litres of water was already there in one of the tanks, what is the total amount of water in the tanks on that day?

    Rain water collected on particular day per tank = x litres

    No. of tanks to collect water = 8

    Total water in all tank = $(8x)\, l$

    Water in one of the tanks = 100 l

    ∴ Total amount of water = Total water in all tanks + Water in one of the tanks

    = $(8x + 100)\, l$.

11. **Fill in the blanks**:

    i.   If $7x + 4 = 25$, then the value of x is _____.

    ii.   The two digit number whose ten's digit is 't' and unit's digit is 'u' is _____.

    iii.   'x exceeds y by 7' can be expressed as _____.

    iv. p litres = _____ millilitres.

    v.   If I spend x rupees from 100 rupees, the money left with me is _____ rupees.

    vi.   Annual salary at x rupees per month along with a festival bonus of ₹2000 is

          _____.

1. 3	2. $100t + u$	3. $x = y + 7$	4. $1000p$	5. 100 - x	6. $12x + 2,000$

IV Short answer

1. **Write the following statements, using numbers, literals and signs of basic operations, 8 times a number x is y less than a number z.**

    It can be written as 8x – y = z.

2. **Write the following statements using numbers, literal numbers and arithmetic operations. State what each represents?**

    a. The selling price of an item is equal to the sum of the cost price of the item and the profit earned.

    b. The profit on an item is the difference between selling price and cost price.

    a. Let selling price of an item be ₹ x.

    Cost price of an item be ₹y.

    Profit be ₹z.

    ∵   x = y + z

    b. z = x - y

3. **If 2x = 12 for 3x + 2y = 23, then find the value of y.**

    Given, 2x = 12   ⇒ x = $\frac{12}{2}$ = 6

    For 3x + 2y = 23,

    If x = 6 then,

    3 × 6 + 2y = 23   ⇒ 18 + 2y = 23

    2y = 23 – 18   ⇒   y = $\frac{5}{2}$

4. **Amit bought socks for a total of ₹ 180 v. how many pairs of socks did he buy? If the price of each pair is ₹ 15.**

    Total amount = ₹180 v

    Price of each pair = ₹15

    Number of pair of socks he can bought = $\frac{180\,v}{15}$ = 12 v

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5. **A class with p students has planned a price. ₹ 50 per student is collected, out of which ₹ 1800 is paid in advance for transport. How much money is left with them to spend on other items?**

   Total number of students = p

   Money collect = ₹50 per student

   Total money collect = ₹50 p

   Advance money paid for transport = ₹1800

   Money left with them = ₹(50 p – 1800)

6. **Convert expressions into statements in ordinary language.**

   a. **A pencil costs ₹ p and a pen costs ₹ 5p.**

   b. **Leela contributed ₹ y towards the Prime Minister's Relief Fund. Leela is now left with ₹ (y + 10000).**

   c. **Kartik is n yr old. His father is $7n$ yr old.**

   a. The cost of pen is 5 times the cost of a pencil.

   b. Amount left with Leela is ₹ 10000 more than the amount she contributed towards Prime Minister's Relief Fund.

   c. Age of Kartik's father is seven times the age of Kartik.

7. **Write in algebraic language:**

   a. **The sum of three consecutive integers, of which x is the middle integer.**

   b. **The total cost of x stamps is 50 xp and stamps is 25 yp. [p denotes paisa]**

   a. The required sum is

   $$x - 1 + x + x + 1$$

   b. Cost of x stamps = 50 × paise

   Cost of y stamps = 25 y paise
   Total cost = (50x + 25y) paise

8. **Perimeter of a triangle is found by using the formula P = a + b + c, where a, b and c are the sides of the triangle. Write the rule that is expressed by this formula in words.**

   Perimeter of triangle = Sum of its all sides.

9. **On my last birthday, I weighed 40 kg. if increase m kg of weight in one year, what is my present weight?**

   Present weight = 40 kg + m kg = (40 + m) kg

10. **Perimeter of a rectangle is found by using the formula P = 2($l + w$), where l and w are respectively the length and breadth of the rectangle. Write the rule that is expressed by this formula in words.**

    Perimeter of a rectangle = 2 (Length of the rectangle + Breadth of the rectangle)

11. Nisha scored one-half of the total marks scored by Sita and Geeta in Maths. If Seeta and Geeta scored x and 3 y marks respectively, express by an algebraic expression the marks scored by Nisha.

    Seeta's marks = x

    Geeta's marks = 3y

    Total marks scored by Seeta and Geeta = x + 3 y

    ∴ Nisha's mark = $\frac{1}{2}$ (x + 3y)

I Long answer

1. **Translate each of the following statements into an equation.**

   a. **The perimeter (p) of an equilateral triangle is three times of its side (a).**

   b. **The diameter (d) of a circle is twice its radius (r).**

   a. a. **The selling price (s) of an item and the profit (p).**

   b. b. **Amount (a) is equal to the sum of principal (p) and interest (i).**

   a. Given,

   Perimeter of an equilateral triangle = p

   Side of an equilateral triangle = a then, three times of side (a) = $3a$ then, according to the question, $p = 3a$.

   b. Given,

       Diameter of a circle = d

       Radius of a circle = r

       Twice of radius, $r = 2r$

   Then, according to the question,

       $d = 2r$

   a. Given, selling price of an item = ₹ S cost price of an item = ₹ c

               Profit = ₹p

   Then, according to question, $s = c + p$

   b. Given, amount = ₹ a principal = ₹ p interest = ₹ Then, according to the question, $a = p + i$.

2. **Let Kanika's present age be x years., Complete the following table. Showing ages of her relative.**

Situation (described in ordinary language)	Expressions
i. Her brother is 2 years younger.	……………. ……………..

ii. Her father's age exceeds her age by 35 years.	………………..
iii. Mother's age is 3 years less than that of her father.	………………..
iv. Her grand father's age is 8 times of her gae.	

Given, Kanika's present age = x years

i.   Her brother's age = $x - 2$ years   [∵ her brother is 2 years younger]

ii.   Kanika's present age $= x$ years

Father's age = Kanika's present age + 35 = $x + 35$ years

iii.   Kanika's present age $= x$ years

Father's age = $(x + 35)$ years [from part (ii)]

and Mother's age = father's age – 3 = $x + 35 - 3 = (x + 32)$ years.

iv.   Kanika's present age $= x$ years

Now, grand father's age = 8 times of Kanika's age = $8x = 8x$ years.

3. Write two equations for which 2 is the solution. Give corresponding expressions.

Let the two numbers be x and y, which has solution 2 in equation.

(i)   For getting   first equation, the number x is multiplied by 2, then the number is $2x$. After that it, 3 is subtracted from it which result into 1.

     Hence, we have $2x - 3 = 1$

       On solving $2x - 3 = 1$

    ⇒ $2x - 3 ⇒ x = 2$.

(ii)   For getting second equation, the number y is multipled by 3, then the number is 3y. After that it will be added by 4 and equal to 10.

     Hence, we have, $3y + 4 = 10$

     On solving, $3y = 10 - 4 ⇒ 3y = 6 ⇒ y = 2$

     Hence, both equations are $2x - 3 = 1$ and $3y + 4 = 10$.

4. Length and breadth of a bulletin are r cm ant t cm, respectively

(i)   What will be the length (in cm) of the aluminium strip required to frame the board? If 10 cm extra strip is required to fix it properly.

(ii)   If x nails are used to repair on board, how many nails will be required to repair 15 such boards.

(iii)   If 500 sq cm extra cloth per board is required to cover the edges, what will be the total area of the cloth required to cover 8 such boards?

(iv)   What will be the expenditure for making 23 boards, if the carpenter charges ₹x per boards?

     Given length of bulletin board = r cm and breadth of bulletin board = t cm then, perimeter of bulletin board = rt cm

   (i)   Required length of aluminium strip = $[2 (r + t) + 10]$ cm

   (ii)   To repair one board, number of nails required = $15 x$

   (iii)   Area of one board = rt sq cm

         Area of eight board = 8 × Area of one board = $8 rt$ sq cm

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Extract cloth for one board = 500 sq. cm [given]

Extract cloth for 8 board = 500 x 8 = 4000 sq cm

Required area of the cloth to cover 8 boards = $(8\,rt + 4000$ sq cm$)$

(iv)   Charges for one board = ₹x. Charges of 23 boards = ₹$23\,x$

Hence, expenditure for making 23 boards is $23x$.

II Long answer

1. Find the rule which gives the number of matchsticks required to make the following matchstick patterns. Use a variable to write the rule.

i.   **A pattern of letter** T **as**

ii.   **A pattern of letter** Z **as**   **iii.** **A pattern of letter** U **as**

iv.   **A pattern of letter** E **as**   **iv.** **A pattern of letter** S **as**

vi.   **A pattern of letter** R **as**

    i.   Matchsticks used to make letter T = 2

    Thus, the rule is,

    No. of matchsticks required = 2 x no. of T's

                = $2n$ (n = 1, 2, 3…..)

    ii.   Matchsticks used to make letter Z = 3

    Thus, the rule is,

    No. of matchsticks required = 3 x no. of Z's

                = $3n$ (n = 1, 2, 3 …….)

    iii. Matchsticks used to make letter U = 3

    Thus, the rule is,

    No. of matchsticks required = 3 x no. of U's

                = $3n$ (n = 1, 2, 3 …….)

    iv. Matchsticks used to make letter E = 5

    Thus, the rule is,

    No. of matchsticks required = 5 x no. of E's

                = $5n$ (n = 1, 2, 3 ………)

    v.   Matchsticks used to make letter S = 5

    Thus, the rule is,

    No. of matchsticks required = 5 x no. of S's

                = $5n$ (n = 1, 2, 3 ……..)

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    vi.   Matchsticks used to make letter A = 6

Thus, the rule is,

No. of matchsticks required = 6 x no. of A's

$$= 6n \ (n = 1, 2, 3 \ ....)$$

2. **Translate each of the following statements into an equation, using x as the variable:**
   i. **13 subtracted from twice a number gives 3.**
   ii. **One fifth of a number is 5 less than that number.**
   iii. **Two-third of number is 12.**
   iv. **9 added to twice a number gives 13.**
   v. **1 subtracted from one-third of a number gives 1.**

   i.   Let the number be x.

   Twice of number is $2x$

   13 subtracted from it gives 3, thus expression is $2x - 13$ = 3

   ii.   Let the number be x

   One-fifth of number is $\frac{x}{5}$

   One-fifth of number is 5 less than number, thus expression $\frac{x}{5}$ = $x - 5$.

   iii.   Let the number be x

   Two-third of number is $\frac{2}{3}x$

   Two-third of number is equal to 12, thus expression $\frac{2}{3}x$ = 12.

   iv.   Let the number be x

   Twice the number is $2x$

   9 added to it gives 13, thus expression is $2x + 9$ = 13

   v.   Let the number be x

   One-third of number is $\frac{x}{3}$

   1 subtracted from it gives 1, thus expression is $\frac{x}{3} - 1$ = 1 .

3. **Translate each of the following statements into an equation:**
   i. **The perimeter (p) of an equilateral triangle is three times of its side (a).**
   ii. **The diameter (d) of a circle is twice its radius (r).**
   iii. **The selling price (s) of an item is equal to the cost price (c) of an item and the profit (p) earned.**
   iv. **Amount (a) is equal to the sum of principal (p) and interest (i).**

   i.   Side of triangle is a.

   Perimeter of triangle is p

   Perimeter = 3 x side $\therefore p$ = $3a$

   ii.   Diameter of circle s a.

   Radius of circle is r

   Diameter of circle is twice it's radius $\therefore d = 2r$

   iii. Selling price of item is s

   Cost price of item is c

   Profit earned is p

   Selling price is equal to sum of cost price and profit

$\therefore s = c + p.$

iv. Amount is given as a

Principal is given as p

Interest is given as i

Amount is equal to sum of principal and interest, thus $a = p + 1$.

4. Length and breadth of a bulletin board are r cm and t cm, respectively.

   i. **What will be the length (in cm) of the aluminium strip required to frame the board, if 10 cm extra strip is required to fix it properly?**

   ii. **If x nails are used to repair one board, how many nails will be required to repair 15 such boards?**

   iii. **If 500 sq cm extract cloth per board is required to cover the edges, what will be the total area of the cloth required to cover 8 such boards?**

   iv. **What will be the expenditure for making 23 boards, if the carpenter charges ₹x per board?**

   i. Length of board is r cm

   Breadth of board is t cm

   Here, Length of aluminium strip required = Perimeter of board

   Length of strip required = 2 (length + breadth) = $2(r + t)$

   Also, 10 cm extra strip is required

   So, length of strip required = $2(r + t) + 10$

   (ii) Nails required to repair one board = x

   No. of boards to be repaired = 15

   So, No. of nails required = nails required for one board × No. of boards

   $$= x \times 15 = 15x$$

   (iii) Area of cloth required for one board = length ×breadth

   $$= r \times t = rt \ sq \ cm$$

   No. of boards = 8

   Area of cloth for all boards = Area of one board × No. of boards

   $$= 8 \times rt = 8rt$$

   Extra cloth required = 500 $sq \ cm$

   Total area of cloth required

   = Area of cloth for all boards + Extra cloth required

   = $(8rt + 500) sq \ cm$.

(iv)   Carpenter charges per board$=₹\,x$

No. of boards to be made = 23

Total cost = No. of boards $\times$ carpenter charges = $23\,x$

5. **Sunita is half the age of her mother Geeta. Find their ages**
   (i) After 4 years ?
   (ii) Before 3 years ?

Let Sunita's present age be x

We are given, Sunita is half the age of her mother Geeta, therefore, Geeta's present age is $2x$

(i) Ages after 4 years

Sunita's age after 4 years $= x + 4$

Geeta's age after 3 years $= 2x + 4$

(ii) Ages before 3 years

Sunita's age before 3 years $= x - 3$

Geeta's age before 3 years$= 2x - 3$

6. **Take Sarita's present age to be y years.**
   i. **What will be her age 5 years from now?**
   ii. **What was her age 3 years back?**
   iii. **Sarita's grandfather is 6 times her age. What is the age of her grandfather?**
   iv. **Grandmother is 2 years younger than grandfather. What is grandfather's age?**
   v. **Sarita's father's age is 5 year more than 3 times Sarita's age. What is her father's age?**

   i. Sarita's present age is y years

   Sarita's age 5 years from now would be $(y + 5)$ years.

   ii. Sarita's present age is y years

   Sarita's age 3 years back would be $(y - 3)$ years

   iii. Sarita's present age is y years

   Sarita's grandfather is 6 times her age, therefore Sarita's grandfather's age = $6y$ years.

   iv. Sarita's present age is y years

   Sarita's grandmother's age = $(6y - 2)$ years.

   v. Sarita's present age is y years

   3 times of her age is $3y$ years

   Sarita's father's age is 5 more than 3 times of her age, therefore, Sarita's father's age = $(3y + 5)$ years.

7. **Give expressions in the following cases.**

   i. **11 added to $2\,m$**
   ii. **5 times y from which 3 is subtracted**
   iii. **y is multiplied by -8**

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iv. y is multiplied by – 8 and then 5 is added to the result.

v. y is multiplied by – 5 and the result is added to 16. '

i. $2m + 11$ ii. $5y - 3$ iii. $-8y$ iv. $-8y + 5$ v. $-5y + 16$

8. **Answer the following:**

i. The length of a rectangular hall is 4 metres less than 3 times the breadth of the hall. What is the length, if the breadth is b metres?

ii. A rectangular box has height h cm. its length is 5 times the height and breadth is 10 cm less than the length. Express the length and the breadth and the breadth of the box in terms of the height.

iii. Meena, Beena and Leena are climbing the steps to the hill top. Meena is at step s, Beena is 8 steps ahead and Leena 7 steps behind. Where are Beena and Leena? The total number of steps to the hill top is 10 less than 4 times what Meena has reached. Express the total number of steps using s.

i. Breadth of hall = b metres

3 times of breadth is $3b$ metres

Length of hall is 4 metres less than 3 times of breadth, therefore

Length of hall = $(3b - 4)$ metres

ii. Height of box is h cm

Here, length of box = 5 x height of box = $5h$ cm

Breadth of box = length – 10 = $(5h - 10)$ cm

iii. Meena is at step s

Beena is 8 steps ahead of Meena, i.e. $s + 8$

Leena is 7 steps behind of Meena, i.e. $s - 7$

Now, total step = 4 x step of Meena – 10 = $(4s - 10)$

III Long answer

1. Anil is x years old. Express the following in algebraic form.

    a. Anil's age after a period of 15 yr.

    b. 5 times Anil's age, 5 yr ago.

    c. What is his father's age, if he is 15 yr more than double of Anil's age?

    d. The present age of Anil's cousin, if his cousin is three years less than one-third Anil's age five years ago.

    e. Find the age of Anil's grandfather, if his age is double his son's age and the age of Anil's father is 20 yr more than Anil's age.

    a. Given, Anil's present age = x yr

    Anil's age after 15 yr = (x + 15) yr

    b. 5 yr ago Anil's age = (x -5) yr

5 times Anil's age, 5 yr ago = 5(x -5) yr

c. Given, Anil's age = x yr

Father's age = (2x + 15) yr

d. 5 yr ago Anil's age = (x – 5)yr

Now, cousin's age = $\left[\frac{1}{3}(1-5)-3\right]$ yr

e. Given, Anil's age = x yr

Anil's father age = (x + 20) yr

Anil's grandfather age = 2(x + 20) yr

2. **Form an equation for the given statements.**

   a. When 14 is added to a number, the result is 70.

   b. The difference of a number with 3 is 10.

   c.   Five times a number is 25.

   d. A number divided by 3 gives 15.

   e. Three is added to two times of a number given 13.

   a. Let the number be x.

   Then, the required equation is x + 14 = 70

   b. Let the number be x.

   Then, the required equation is x – 3 = 10

   c. Let the number be x.

   Given, five times of x = 5x

   ∴ Required equation is 5x = 25

   d. Let the number be x.

   One-third of x = $\frac{x}{3}$

   Then, the equation is $\frac{x}{3}$ = 15

   e. Let the number be x.

   Two times of this number = 2x

   ∴ The equation is 2x + 3 = 13

3. **Translate each of the following statements into an equation, using x as the variable.**

   a. 13 subtracted from twice a number gives 3.

   b. One-fifth of a number is 5 less than that number.

   c. Two-third of a number is 12.

   d. 9 added to twice a number gives 13.

   e. 1 subtracted from one-third of a number gives 1.

   a. Let number be x.

   Twice the number = 2x

   Then, 2x – 13 = 3

   b. Let the number be x.

   One-fifth of this number = $\frac{x}{5}$

   Then, $\frac{x}{5}$ = x - 5

   c. Let the number be x.

   Two-third of this number = $\frac{2}{3}$ x

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∴ $\frac{2x}{3} = 12$

    d. Let the number be x.

Twice of this number = 2x

Then, 2x + 9 = 13

    e. Let the number be x.

One-third of this number = $\frac{x}{3}$

Then, = $\frac{x}{3}$ - 1 = 1

4. **Length and breadth of a bulletin board are r cm and t cm, respectively.**

  a. **What will be the length (in cm) of the aluminium strip required to frame the board, if 10 cm extract strip is required to fix it properly?**

  b. **If x nails are used to repair one board, how many nails will be required to repair 15 such boards?**

  c. **If 500 sq cm extra cloth board is required to cover the edges, what will be the total area of the cloth required to cover 8 such boards?**

  d. **What will be the expenditure for making 23 boards, if the carpenter charges ₹ x per board.**

  Given, length of bulletin board = r cm

  and breadth of bulletin board = t cm

  Then, perimeter of this board = $2(r + t)$ cm

  And area of this board = rt cm^2

  a. Required length of aluminium strip = $[2(r + t) + 10]$ cm

  b. To repair one board number of nails required = x

  For 15 boards, numbers of nails = 15x

  c. Area of one board = rt sq cm

  Area of eight boards = 8 rt sq cm

  Extract cloth for one board = 500 sq cm

  Extract cloth for eight boards = 4000 sq cm

  Required area of the cloth = (8rt + 4000) sq cm

  d.   Charges for one board = ₹x

  Charges for 23 board = ₹23 x

5. **Write two equations for which 2 is the solution. Give corresponding expressions.**

  Let the two numbers be x and y, which has solution 2 in equation.

  (i)   For getting first equation, the number x is multiplied by 2, then the number is 2x. After that, 3 is subtracted from it which results into 1.

        Hence, we have 2x – 3 = 1

        On solving, 2x = 3 + 1 ⇒ 2x = 4 ⇒ x = 2

  (ii)   For getting second equation, the number y is multiplied by 3, then, the number is 3y. after that, it will be added to 4 and equal to 10.

        Hence, we have,   3y + 4 = 10

        On solving,   3y = 10 – 4 ⇒   3y = 6 ⇒ y = 2

        Hence, two equations are

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$2x - 3 = 1$ an $3y + 4 = 10$

6. **Cost of 3 dozen bananas is ₹ 54. Rehman has ₹ 18 with him. He wants to give bananas to the poor people on the street.**

   a. **How many bananas he can buy?**

   b. **Mention the value depict from Rehman?**

   (a) Let the cost of 1 dozen be ₹ x.

   Then, cost of 3 dozen = ₹ $3x$

   According to the question,

   $$3x = 54 \qquad \Rightarrow x = \frac{54}{3} = 18$$

   ∴ The cost of one dozen = ₹ 18

   Hence, Rehman can buy 1 dozen of bananas.

   (b) Humanity, helpfulness, caring for others.

7. **In a village, there are 9 water tanks to collect rain water. On a particular day, xL of rain water is collected per tank. If 200 L of water is the total amount of water in the tanks on that day?**

   According to the question,

   Tanks to collect rain water = 9

   Rain water is collected per tank (in L) = x

   Then, total rain water in tanks (in L) = Number of tanks × Per tank collected rain water

   $$= 9 \times x = 9x$$

   But in the one tank, already 200 L of water exits, then total amount of water is given by

   = 200 + [Total rain water in L]

   $$= 200 + 9x \text{ or } (9x + 200) \text{ L}.$$

8. **Sunita is half the age of her mother Geeta. Find their ages.**

   i. **After 4 yr?**   ii. **Before 3 yr?**

   Let the age of Sunita's mother = $2x$ yr

   Then, according to the question,

   Sunita's age = $\frac{2x}{2} = x$ [half of her mother's age]

   i.   After 4 yr, present age is added in given years.

           Sunita's age = $(x + 4)$ yr

           ∴ Her mother's age = $(2x + 4)$ yr

   ii.   Before 3 yr, given year is subtracted from present age.

           ∴   Sunita's age = $(x - 3)$ yr

           and her mother's age = $(2x - 3)$ yr

9. Perimeter of a triangle is found by using the formula P = 2a + 2b + 2c, where 2a, 2b and 2c are the length sides of the triangle. Write the rule that is expressed by this formula in words.

In this questions, given formula for getting perimeter of triangle is P = 2a + 2b + 2c

Here, 2a, 2b and 2c are the length of sides of the triangle.

Hence, the perimeter of the triangle is given by the sum of sides of the triangle.

I Value based questions

1. Shahid stars from Gujarat Delhi. If this car is running at the speed of x km/hr and at 3 pm he observes that he is 22 km away from Delhi. Find the distance between Gujarat and Delhi.

We have,

Total time from 10 am to 3 pm = 5 hours

Shahid's car is running at the rate of x km/h

∴   Distance travelled by it in 5 hours = (5 times x) km

= 5 x km (Distance = Speed x Times)

At 3 pm, distance that Shahid has to travel = 22 km

∴ Distance between Gujarat and Delhi = (22 km more than 5 x) km

= 5 x + 22 km

2. Write each of the following phrases by using numbers, literals and signs of basic operations:

i. Quotient of x by 6 is multiplied z.

ii. Quotient of x by y added to the product of x and y.

iii. Taken away from the quotient of x by $3y$.

iv. Eight times a number p is x less than a number y.

i. We have, Quotient of x by 6 = $\frac{x}{6}$

∴   Quotient of x by 6 is multiplied by z means, $\frac{x}{6} \times z = \frac{2x}{6}$.

ii. We have, Quotient of x by $y = \frac{x}{y}$, and Product x and $y = xy$

∴   Quotient of x by y added to the product of x and $y = \frac{x}{y} + xy$.

iii. We have, Quotient of x by $3y = \frac{x}{3y}$

∴   5 taken away from the quotient of x by $3y = \frac{x}{3y} - 5$.

iv. We have, 8 times a number $p = 8p$

x less than a number $y = y - x$

∴ Eight times a number p is x less than a number y means

$8p = y - x$.

1. (i) **What must be subtracted from $a^3 - 4a^2 + 5a - 6$ to obtain $a^2 - 2a + 1$?**

    (ii). **If $a = 2$ and $b = 1$ then verify that:**
    $$a^2 - b^2 = (a + b)(a - b).$$

    (i) Let the number = A
         According to problem then

         $a^3 - 4a^2 + 5a - 6 - A = a^2 - 2a + 1$

         Or $-A = a^2 - 2a + 1 - a^3 + 4a^2 - 5a + 6$

         Or $-A = 5a^2 - 7a - a^3 + 1 + 6$

         Or $-A = -a^3 + 5a^2 - 7a + 7$

         Or $A = a^3 - 5a^2 + 7a = 7$

         Hence, required value = $a^3 - 5a^2 + 7a = 7$

    (ii) Putting $a = 2$ and $b = 1$, then
         $$\text{L.H.S.} = a^2 - b^2 = 2^2 - 1^2$$
         $$= 4 - 1 = 3$$
         and $\text{R.H.S.} = (a + b)(a - b)$
         $$= (2 + 1)(2 - 1)$$
         $$= 3 \times 1 = 3$$
         Hence,   L.H.S = R.H.S = 3.

2. Simplify
    (i) $2a - [3b - \{a - (2c - 3b) + 4c - 3(a - b - 2c)\}]$
    (ii) If $p = -2, q = -1$ and $r = 3$, find the value of $p^2 + q^2 - r^2$

    (i) $2a - [3b - \{a - (2c - 3b) + 4c - 3(a - b - 2c)\}]$
          $= 2a - [3b - \{a - 2c + 3b + 4c - 3a + 3b + 6c)\}]$
          $= 2a - [3b - \{-2a + 6b + 8c\}]$
          $= 2a - [3b + 2a - 6b - 8c]$
          $= 2a - 2a + 3b + 8c$
          $= +3b + 8c.$

    (ii) Putting $p = -2, q = -1$ and $r = 3$ then
          $$p^2 + q^2 - r^2 = (-2)^2 + (-1)^2 - 3^2$$
          $$= 4 + 1 - 9 =$$
          $$= 5 - 9 = -4$$

3. (i) $-2(x^2 - y^2 + xy) - 3(x^2 + y^2 - xy).$
    (ii). If $a = 3$ and $b = 2$ then verify that:
    (i) $-2(x^2 - y^2 + xy) - 3(x^2 + y^2 - xy).$
          $= 2x^2 + 2y^2 - 2xy - 3x^2 - 3y^2 + 3xy$

$$= -5x^2 - y^2 + xy.$$

(ii)   Putting $a = 3$ and $b = 2$ then

L.H.S = $(a + b)^2$

$= (3 + 2)^2 = 5^2 = 25$

and   R.S.H = $x = a^2 + b^2 + 2ab$

$= 3^2 + 2^2 + 2 \times 3 \times 2$

$= 9 + 4 + 12 = 25$

Hence,   L.H.S = R.H.S = 25.

I. Higher Order Thinking Skills

1. In a village, there are 8 water to collect rain water… on a particular day, x L of rain water is collected per tank. If 100 L of water was already there in one of the tanks. What is the total amount of water in the tanks on that day?

According to the question

Tanks to collect rain water = 8

Rain water is collected per tank (in L) = x

Then, total rain water in tanks (in L)

= Number of tanks x Per tank collected rain water = 8 x x = $8x$.

But in the one tank, already 100 L of water exist, then

Total amount of water is given by = 100 + [total rain water in L]

= 100 + $8x$ or $8x + 100$ L.

II. Higher Order Thinking Skills

1. Shahid stars from Gujarat Delhi. If this car is running at the speed of x km/hr and at 3 pm he observes that he is 22 km away from Delhi. Find the distance between Gujarat and Delhi.

We have,

Total time from 10 am to 3 pm = 5 hours

Shahid's car is running at the rate of x km/h

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∴   Distance travelled by it in 5 hours = (5 times x) km

= 5 x km (Distance = Speed × Times)

At 3 pm, distance that Shahid has to travel = 22 km

∴ Distance between Gujarat and Delhi = (22 km more than 5 x) km

= 5 x + 22 km

3. **Write each of the following phrases by using numbers, literals and signs of basic operations:**

     v.   **Quotient of x by 6 is multiplied z.**

     vi.   **Quotient of x by y added to the product of x and y.**

     vii.   **Taken away from the quotient of x by $3y$.**

     viii.   **Eight times a number p is x less than a number y.**

v. We have, Quotient of x by 6 = $\frac{x}{6}$

∴   Quotient of x by 6 is multiplied by z means, $\frac{x}{6} \times z = \frac{2x}{6}$.

vi. We have, Quotient of x by $y = \frac{x}{y}$, and Product x and $y = xy$

∴   Quotient of x by y added to the product of x and $y = \frac{x}{y} + xy$.

vii.   We have, Quotient of x by $3y = \frac{x}{3y}$

∴   5 taken away from the quotient of x by $3y = \frac{x}{3y} - 5$.

viii.   We have, 8 times a number $p = 8p$

x less than a number $y = y - x$

∴ Eight times a number p is x less than a number y means

     $8p = y - x$.