Name : _____

Grade : VIII

Subject : Mathematics

Chapter : 2. Linear Equations in One Variable

Objective Type Questions

(1 Marks)

I. Multiple choice questions

1. $\frac{-4}{3}\ y\ =\ -\frac{3}{4}\ ,\ then\ y\ =$ **[NCERT Exemplar]**

a. $-\left(\frac{3}{4}\right)^2$ b. $-\left(\frac{4}{3}\right)^2$ c. $\left(\frac{3}{4}\right)^2$ d. $\left(\frac{4}{3}\right)^2$

2. Linear equation in one variable has **[NCERT Exemplar]**

a. only one variable with any power b. only one term with a vairable

c. only one variable with power 1 d. only constant term

3. Which of the following is a linear expression: **[NCERT Exemplar]**

a. $x^2 + 1$ b. $y + y^2$ c. 4 d. $1 + z$

4. The shifting of a number from one side of an equation to other is called **[NCERT Exemplar]**

a. Transposition b. Distributivity c. Commutativity d. Associativity

5. If x% of 50 is 10, then the value of $'x'$ is:

a. 30 b. 15 c. 10 d. 20

6. Two numbers are in the ratio 3:5. If their sum is 64, then the numbers are:

a. 24 and 40 b. 15 and 24 c. 10 and 24 d. 20 and 24

7. Arpita's present age is thrice of Shilpa. If Shilpa's age three years ago was x. Then Arpita's present age is **[NCERT Exemplar]**

a. $3\,(x-3)$ b. $3x + 3$ c. $3x - 9$ d. $3\,(x + 3)$

8. The sum of three consecutive multiples of '5' is 45. Which is the smallest of the three multiples.

a. 10 b. 15 c. 20 d. 25

9. Sum of two numbers is 95. If one exceeds the other by 15, then the number are:

a. 25 and 40 b. 50 and 65 c. 30 and 45 d. 40 and 55

10. Solution of the equation $7y = 14$ is :

a. $y = \frac{3}{4}$ b. $y = \frac{7}{2}$ c. $y = \frac{4}{3}$ d. $y = 2$

11. What value of y will satisfy the given equation? $\frac{y}{2y-15} = \frac{7}{9}$

a. $y = 21$ b. $y = 23$ c. $y = 25$ d. $y = 27$

12. Solving $1.3 = \frac{y}{1.2}$, we get:

a. $y = 1.56$ b. $y = 1.66$ c. $y = 2.56$ d. $y = 2.66$

13. The digit in the tens place of a two digit number is more then the digit in the units place. Let the digit at units place be b. Then the number is **[NCERT Exemplar]**

a. $11b + 30$ b. $10b + 30$ c. $11b + 3$ d. $10b + 3$

14. If $8x - 3 = 25 + 17x$, then x is: **[NCERT Exemplar]**

a. a fraction b. an integer c. a rational number d. cannot be solved

15. If $\frac{5x}{3} - 4 = \frac{2x}{5}$, then the numerical value of $2x - 7$ is **[NCERT Exemplar]**

a. $\frac{19}{13}$ b. $-\frac{13}{19}$ c. 0 d. $\frac{13}{19}$

16. The sum of three consecutive multiples of 7 is 357. Find the smallest multiple. **[NCERT Exemplar]**

a. 112 b. 126 c. 119 d. 116

17. If $\frac{3}{x-4} < 0$, then what is range of x?

a. $x < 4$ b. $x < 5$ c. $x < 3$ d. $x < 2$

18. The value of x which satisfy the equation $\frac{2}{3x-2} = \frac{3}{x-6}$ is

a. $\frac{6}{7}$ b. $\frac{7}{6}$ c. $\frac{-7}{6}$ d. 0

1. c	2. c	3. d	4. a	5. d	6. a	7. d	8. a	9. d
10. d	11. a	12. a	13. a	14. c	15. b	16. a	17. a	18. c

II. Multiple choice questions

1. If x= a, then which of the following is not always true for an integer k

a) $kx = ak$ b) $\frac{x}{k} = \frac{a}{k}$ c) $x - k = a - k$ d) $x + h = a + k$

2.The value of x for which the expression 3x-4 and 2 x + 1 become equal is

a) −3 b) 0 c) 5 d) 1

3. If $\frac{5x}{3} - 4 = \frac{2x}{5}$ then the numerical value _____of 2x -7 is

a) $\frac{19}{13}$ b) - $\frac{13}{19}$ c) 0 d) $\frac{13}{19}$

4. 0.25 (4f-3) =0.05(10f −9), then f =

a) 0.5 b) 0.1 c) 0.3 d) 0.6

5. If $\frac{3y+4}{2-6y} = \frac{-2}{5}$, y, is equal to

a) 4 b) -8 c) 8 d) 2

1) b	2) c	3) b	4) d	5) b

III. Multiple choice questions

1. The solution of the Equation ax +b = 0 is

a) x=$\frac{a}{b}$ b)x=-b c) x=$\frac{-b}{a}$ d) x =$\frac{b}{a}$

2. If 8x-13 = 25 +16x, then x is

a) a fraction b) an Integer c) a rational number d) Cannot be solved

3. The value of x for which the expressions (3x-4) and (2x+1) become equal is

a) -3 b) 0 c) 5 d) 1

4. If a and be are positive integers, then solution of the equation ax=b has to be always

a) Positive b) negative c) One d) zero

5. Which of the following is a linear expression?

a) x^2 +2+y b) y+y^2 +3 c) 4 d) 1+z

6. A linear equation in one variable has

a) only one solution b) no solution

c) two solutions d) more than two solutions

1. c	2. c	3. c	4. a	5. d	6. a

I. Fill in the blanks

1. If $x = \frac{1}{2}$, then $\frac{5}{4} - \frac{x}{2}$ = _____.

2. $\left(\frac{1}{2}+\frac{1}{4}\right) \times \frac{1}{4}$ = _____.

3. 9 is subtracted from the product of p and 4, the result is 11. The value p is _____.

4. If $\frac{2}{5}x - 2 = 5 - \frac{3}{5}x$, then x = _____.

1. 1	2. $\frac{3}{16}$	3. 5	4. 7

II. Fill in the blanks

1. In a linear equation .....power of the variable appearing in the equation is one.
2. Any value of the variable, which makes both sides of an equation equal is known as a .....of the equation.
3. A term of an equation can be transposed to the other side by changing its.....
4. If one dividing a number by 18. The result is -144 then the number is .....
5. 19 is subtracted from the product of P and 14 the result is 21. The value of P is .....
6. After 18 yrs. Saurabh will be 4 times as old as he is now. His parents age is .....
7. The sum of two consecutive multiples of 10 is 210 the smaller multiple is .....
8. If $4t-3-(3t+1) = 5t-4$ then the root of t is .....

Answers

1. In a linear equation, highest power of the variable appearing in the equation is one

   e.g. In $3x+2$ the power of x is 1

2. Solution
3. Sign
4. $-2592 \because \frac{2592}{18} = -144$
5. $\because (P \times 14) - 19 = 21 = 14P - 19 = 21$

   $\Rightarrow 14P = 40 \Rightarrow p = \frac{40}{14} = \frac{20}{7} = 2\frac{6}{7}$
6. $\because x + 18 = 4x \Rightarrow 4x - x = 18$

   $\because 3x = 18 \Rightarrow x = 6$ year.
7. Let two consecutives multiples of 10 be x and (x+1)

   $\therefore 10 \times x + 10 \times (x+1) = 210 \Rightarrow$

   $10x + 10x + 10 = 210$

   $\Rightarrow 20x = 210 - 10 = 200 \Rightarrow x = 200 \div 20 = 10$

   So the smaller $4t-3-(3t+1) =$ multiple is 10

   8. $\because 4t-3-(3t+1) = 5t-4$

   $\Rightarrow 4t - 3 - 3t = 5t - 4 \Rightarrow t - 4 = 5t - 4$

   $\Rightarrow t - 5t = -4 + 4 \Rightarrow -4t = 0 \Rightarrow$

   $t = 0$

I. True or False

1. $(5 - 3x^2)$ is a binomial.

2. -8 is not a monomial.

3. When $x = 2$ and $y = 1$, the value of $-\frac{8}{7}x^3y^4$ is $\frac{-64}{7}$.

4. $\frac{x}{4} + \frac{x}{6} - \frac{x}{2} = \frac{3}{4} \Rightarrow x = 10$.

5. If x is an even numbe, then the next even number is $2(x + 1)$. **[NCERT Exemplar]**

1. True	2. False	3. True	4. False	5. False

II. True or False

1. In the equation 13x -4 =9. Transporting -4 to RHS, we get 13X = 5

2. In The equation 2x=4-x, transposing –x to LHS , we get 3x = 4.

3. If 16x = 80, then 18x =90

4. If x is an even number, then the next even number is 2(x+1)

5. Two numbers differ by 40, when each number is increased by 8 the bigger becomes thrice the lesser number. If one number is x, then the other number is (40-x)

6. In a two-digit number, the unit's place digit is x. If the sum of digits be 9, then the other number is (10x-9).

7. The number of boys and girls in a class in the ratio 5:4 If the number of boys is 9 more than the number of girls, then the number of boys is 9.

8. Two different equations can never have the same answer.

Ans.

1. False since: 13x-4 = 9 $\Rightarrow$ 13x=9+4 $\Rightarrow$ 13x = 13

2. True, since 2x = 4-x

   $\Rightarrow$ 2x + x = 4 $\Rightarrow 3x = 4$

3. True, since 16x =80 $\Rightarrow$ x=80 x $\frac{1}{16} = 5$

   18x =18 x 5 =90

4. False, If x is an even number then the next even number is (x+2)

5. False, since two numbers differ by 40 i.e. one number is x and the other is (40 + x)

6. False,. Since the unit's place digit is x. Then ten's place digit is (9-x)

   Number = $10 \times (9 - x) + x$

$= 90 - 10x + x$

$= 90 - 9x$

$= 9(10 - x)$

7. False, suppose the number of gifts is X

$\therefore$ Number of boys $= (x + 9)$

From the given condition $\frac{x+9}{5} = \frac{5}{4} \Rightarrow 4x + 36 = 5x$

$\Rightarrow 4x - 5x = -36 \Rightarrow x = 36 \times \frac{-1}{1} = 36$

$\therefore$ Number of boys $= 36 + 9 = 45$ and number of girls $= 36$

So, the given information is false

8. False, two different equations can have the same answer

i.e. $3x + 5 = 23$ and $4x + 6 = 30$

Both have the same answer as $x = 6$.

I. Match the following

I. Column A	Column B
a) 7	$\frac{x}{5} = \frac{x-1}{6}$
b) -5	$\frac{0.2x + 5}{35x - 3} = \frac{2}{5}$
c) $\frac{31}{6}$	8x-7-3x=6x-2 x 3
d) 4	5(x-1) -2(x+8) = 0

a. iv	b. i	c. ii	d. iii

II. Match the following

Column A	Column B
a) $\frac{3x-8}{2x} = 1$	8
b) $\frac{5x}{2x-1} = 2$	$\frac{8}{3}$
c) $\frac{2x-3}{4x+5} = \frac{1}{3}$	-2
d) $\frac{8}{x} = \frac{5}{x-1}$	7

a. i	b. iii	c. iv	d. iii

I. Very Short Answer Question

1. $\frac{3x-8}{2x} = 1$ **[NCERT Exemplar]**

Sol. $\frac{3x-8}{2x} = 1$

$3x - 8 = 2x$

$3x - 2x = 8$

$x = 8$

2. $\frac{x}{5} = \frac{x-1}{6}$

Sol. $\frac{x}{5} = \frac{x-1}{6}$

$6x = 5x - 5$

$6x - 5x = -5$

$x = -5$

3. $0.4\,(3x-1) = 0.5x + 1$ **[NCERT Exemplar]**

Sol. $0.4\,(3x - 1) = 0.5x + 1$

$1.2x - 0.4 = 0.5x + 1$

$1.2x - 0.5x = 1 + 0.4$

$0.7x = 1.4$

$x = \frac{1.4}{0.7} = 2$

4. $8x - 7 - 3x = 6x - 2x - 3$ **[NCERT Exemplar]**

Sol. $8x - 7 - 3x = 6x - 2x - 3$

$5x - 7 = 4x - 3$

$5x - 4x = -3 + 7$

$x = 4$

5. $5\,(x-1) - 2\,(x + 8) = 0$ **[NCERT Exemplar]**

Sol. $5(x - 1) - 2\,(x + 8) = 0$

$5x - 5 - 2x - 16 = 0$

$3x - 21 = 0$

$3x = 21$

$x = 7$

6. Solve the equation:

$-1.5x = -4.5$

Sol. $-15x = -4.5$

$x = \frac{-4.5}{-1.5}$

or, $x = 3$

7. Write the equation for the following statements:

a. A number increased by 34 gives 86.

b. Twice a number equals to 20.

a. Let the number be x

Then $x + 34 = 86$

b. Let the number by y,

Then $2y = 20$

8. Seven times a number is 49. What is the number?

Sol. Let the number be x,

Then $7x = 49$

$\therefore$ $x = \frac{49}{7} = 7$

Hence, the number is 7.

9. Solve : $\frac{5(-7y-1)}{y} = -70$

Sol. $\frac{5(-7y-1)}{y} = -70$

$5(-7y - 1) = -70y$

$-35y - 5 = -70y$

$-35y + 70y = 5$

$35y = 5$

$\therefore$ $y = \frac{5}{35} = \frac{1}{7}$

II. Very Short Answer Question

1. Solve $2y + \frac{5}{3} = \frac{26}{3} - y$

Sol. $2y + \frac{5}{3} = \frac{26}{3} - y$

or $2y + y = \frac{26}{3} - \frac{5}{3}$ *or* $3y = \frac{26-5}{3}$

or $3y = \frac{21}{3} = 7$ *or* $y = \frac{7}{3}$

2. Solve $\frac{5x}{2x-1} = 2$ **[NCERT Exemplar]**

Sol. $\frac{5x}{2x-1} = 2$

or $5x = 2(2x - 1)$ or $5x = 4x - 2$

or $5x - 4x = -2$ or $x = -2$

3. Solve $5(x-1) - 2(x+8) = 0$ **[NCERT Exemplar]**

Sol. $5(x-1) - 2(x+8) = 0$

or $5x - 5 - 2x - 16 = 0$

or $5x - 2x = 16 + 5$

or $3x = 21$ or $x = \frac{21}{3} = 7$

4. Solve $0.4(3x-1) = 0.5x + 1$.

Sol. $0.4(3x-1) = 0.5x + 1$

or $1.2x - 0.4x = 0.5x + 1$ or $1.2x - 0.5x = 1 + 0.4$

or $0.7x = 1.4$ or $x = \frac{1.4}{0.7} = 2$

5. Two numbers are in the ration 5:3 . If they differ by 18 what are the numbers?

Sol. Let the numbers be $5x$ *and* $3x$

$\therefore 5x - 3x = 18$

or $2x = 18$ or $x = 9$

So, the numbers are 45 and 27.

III. Very Short Answer Questions.

1. Find the solution of $2y + 18 = 30$
2. Solve $\frac{13}{5} - 5x = 13$
3. What should be subtracted from thrice the rational number $\frac{-13}{4}$ to get $\frac{5}{8}$?
4. Find the solution of $\frac{3x+4}{2x+5} = 1$
5. Solve $0.25(8a - 0.5) = 7.5$
6. A rational number x such that when we multiplied by $\frac{3}{4}$ and added5, then it became$\frac{1}{2}$. Find the rational number.
7. What should be added to five seventh of rational number $\frac{-3}{5}$ so that it becomes $\frac{3}{7}$?
8. Find the solution of $\frac{1}{x} - \frac{3}{x} = \frac{5}{2x} - 3$

9. Solve $0.44t - 1.05 = 2(0.71t - 0.01) + 1.11$.

10. Find the solution of $\frac{3m-5}{m-3} + \frac{1}{2}(4m-6) = 2m-3$

Ans:

1. We have $2y + 18 = 30$

$\Rightarrow 2y = 30 - 18 \Rightarrow 2y = 12$

$\Rightarrow Y = 12 + 2 \Rightarrow y = 6$

2. We have, $\frac{13}{5} - 5x = 13$

$\Rightarrow \frac{13}{5} - 13 = 5x \Rightarrow \frac{13-65}{5} = 5x$

$\Rightarrow \frac{-52}{5} = 5x \Rightarrow x = \frac{52}{25}$

3. Let x be the required number

$\therefore 3 \times \left(\frac{-13}{4}\right) - x = \frac{5}{8}$

$\Rightarrow \frac{-39}{4} - x = \frac{5}{8} \Rightarrow \frac{-39}{4} - \frac{5}{8} = x$

$\Rightarrow \frac{-78-5}{8} = x \Rightarrow x = \frac{-83}{8}$

4. We have $\frac{3x+4}{2x+5} = 1$

$\frac{(3x+4)}{(2x+5)}(2x+5) = 1 \times (2x+5)$

$\langle multiplying\ (2x+5)\ in\ both\ sides \rangle$

$\Rightarrow (3x+4) = (2x+5)$

$\Rightarrow 3x - 2x = 5 - 4 \Rightarrow x = 1$

5. We have $0.25(8a - 0.5) = 7.5$

$\Rightarrow 0.25 \times 8a - 0.25 \times 0.5 = 7.5$

$\Rightarrow 0.25 \times 8a = 7.5 + 0.25 \times 0.5$

$\Rightarrow 2.0 \times a = 7.5 + 0.125$

$\Rightarrow a = 7.625 \times \frac{1}{2} = 3.8125$

6. Given Number = x

$= \frac{3}{4}x + 5 = \frac{1}{2} \Rightarrow \frac{3}{4}x = \frac{1}{2} - 5 = \frac{1-10}{2}$

$\Rightarrow \frac{3}{4}x = \frac{-9}{2} \times \frac{4}{3} \Rightarrow x = -6$

7. Let x be the required number then, according to the question,

$= \frac{5}{7} \times \left(\frac{-3}{5}\right) + x = \frac{3}{7} \Rightarrow x = \frac{3}{7} + \frac{3}{7} \Rightarrow x = \frac{6}{7}$

8. We have, $\frac{1}{x} - \frac{3}{x} = \frac{5}{2x} = -3 \Rightarrow \frac{1-3}{x} - \frac{5}{2x} = -3$

$\Rightarrow \frac{-2}{x} - \frac{5}{2x} - 3 \Rightarrow \frac{-4-5}{2x} - \frac{5}{2x} = -3$

$\Rightarrow \frac{-9}{2x} = -3$

$\Rightarrow x = \frac{-9}{2} \times \left(\frac{-1}{3}\right) \Rightarrow x = \frac{3}{2}$

9. We have

$0.44t - 1.05 = 2 \times 0.71t - 2 \times 0.01 + 1.11$

$\Rightarrow 0.44t - 1.05 = 1.42t - 0.02 + 1.11$

$\Rightarrow 0.44t - 1.42t = 1.05 - 0.02 + 1.11$

$\Rightarrow 0.98\,t = 2.14$

$\Rightarrow t = \frac{2.14 \times 100}{-0.98 \times 100}$

$\Rightarrow t = \frac{214}{-98} = \frac{-107}{49}$

10. Given, $\frac{3m-5}{m-3} + \frac{1}{2}(4m-6) = 2m-3$

$\Rightarrow \frac{3m-5}{m-3} + 2m - 3 = 2m - 3 \Rightarrow \frac{3m-5}{m-3} = 0$

$\Rightarrow 3m - 5 = 0 \times (m-3) \Rightarrow 3m - 5 = 0$

$\Rightarrow 3m = 5 \Rightarrow m = \frac{5}{3}$

II. Short Answer Question

1. Sum of two numbers is 95. If one exceeds the other by 15, find the number.

Sol. Let the smallest number $= x$

$\therefore$ The other number $= x + 15$

According to the condition, we have

$x + (x + 15) = 95$

$2x + 15 = 95$

or $2x = 95 - 15$

or, $2x = 80$

or $x = \frac{80}{2} = 40$

$\therefore$ The smaller number $= 40$

The other number $= 40 + 15 = 55$

2. $\frac{1}{2}(x+1) + \frac{1}{3}(x-1) = \frac{5}{12}(x-2)$ **[NCERT Exemplar]**

Sol. $\frac{1}{2}(x+1) + \frac{1}{3}(x-1) = \frac{5}{12}(x-2)$

$\frac{1}{2}x + \frac{1}{2} + \frac{1}{3}x - \frac{1}{3} = \frac{5x}{12} - \frac{5}{6}$

$\frac{6x+4x-5x}{12} = \frac{2-3-5}{6}$

$\frac{5x}{12} = \frac{-6}{6}$

$\frac{5x}{12} = -1$

$5x = -1$

$x = \frac{-12}{5}$

3. Simplify and solve the equation.

$3(t-3) = 5(2t+1)$

Sol. $3(t-3) = 5(2t+1)$

or $3t - 9 = 10t + 5$

Transposing (-9) to R.H.S. and 10t to L.H.S, we have

$3t - 10t = 5 + 9$

or $-7t = 14$

or $t = \frac{14}{-7} = -2$

[Dividing both sides by -7]

$t = -2$

4. The sum of three consecutive even natural numbers is 48. Find the greatest of these numbers. **[NCERT Exemplar]**

Sol. Let the three consecutive even natural numbers be $2x, 2x+2 \; and \; 2x+4$

According to condition,

$2x + 2x + 2 + 2x + 4 = 48$

$6x + 6 = 48$

$6x = 48 - 6$

$6x = 42$

$x = \frac{42}{6} = 7$

Greatest number $= 2x + 4$

$= 2 \times 7 + 4 = 18$

5. Two numbers are in the ration 5 : 3. If they differ by 18. What are the numbers?

Sol. Let the two number be $5x \; and \; 3x$.

According to the condition, we have

$5x - 3x = 18$

or $2x = 18$

Dividing both sides by 2, we have

$\frac{2x}{2} = \frac{18}{2}$

or $x = 9$

$\therefore$ $5x = 5 \times 9 = 45$

and $3x = 3 \times 9 = 27$

$\therefore$ The required numbers are 45 and 27.

6. Solve:

$$\frac{3x+5}{4x+2} = \frac{3x+4}{4x+7}$$

Sol. *Since* $\frac{3x+5}{4x+2} = \frac{3x+4}{4x+7}$

or $(3x + 5) \times (4x + 7) = (4x + 2) \times (3x + 4)$,

[by cross- multiplication]

or $12x^2 + 21x + 20x + 35 = 12x^2 + 16x + 6x + 8$

or $12x^2 + 41x + 35 = 12x^2 + 22x + 8$

or $12x^2 + 41x - 12x^2 - 22x = 8 - 35$

or $19x = -27$

or $x = -\frac{27}{19}$

Hence, $x = -\frac{27}{19}$

7. The present age of father is four times the age of his son. After 10 years, age of father will become three times the age of his son. find their present ages.

[NCERT Exemplar]

Sol. Let the present age of son be x years

$\therefore$ The present age of father = $4x$ years

After 10 years

Age of son = $(x + 10)$ years

Age of father = $(4x + 10)$ *years*

According to the given condition,

$4x + 10 = 3(x + 10)$

$4x + 10 = 3x + 30$

$4x - 3x = 30 - 10$

$x = 20$

$\therefore$ Present age of son = 20 years.

and present age of father = $4x = 4 \times 20 = 80$ *years*.

8. The age of A is give years more than that of B. 5 years ago, the ratio of their ages was 3:2. Find their present ages. **[NCERT Exemplar]**

Sol. Let the age of B be x years, then

age of $A = x + 5$

According to condition, 5 year ago

B's age $= x - 5$

A's age $= x + 5 - 5$

$= x$

or, $\frac{x}{x-5} = \frac{3}{2}$

or, $2x = 3x - 15$

or, $2x - 3x = 15$

or, $x = 15$

Present age of $A : x = 15\ years$

Present age of $B : x - 5 = 15 - 5 = 10\ years$

II. Short Answer Question.

1. Solve $\frac{2x-3}{4x+5} = \frac{1}{3}$ **[NCERT Exemplar]**

Sol. $\frac{2x-3}{4x+5} = \frac{1}{3}$

On cross multiplication, we get

$6x - 9 = 4x + 5 \quad or \quad 6x - 4x = 5 + 9$

or $2x = 14 \quad or \quad x = \frac{14}{2} = 7$

2. Solve $\frac{0.2x+5}{3.5x-3} = \frac{2}{5}$ **[NCERT Exemplar]**

Sol. $\frac{0.2x+5}{3.5x-3} = \frac{2}{5}$

or $2(3.5x - 3) = 5(0.2x + 5)$

or $7.0x - 6 = 1.0x + 25$

or $7.0x - 1.0x = 25 + 6$

or $7.0x - 1.0x = 25 + 6$

or $6x = 31 \quad or \quad x = \frac{31}{6}$

3. Solve $1 - (x - 2) - [(x - 3) - (x - 1)] = 0$ **[NCERT Exemplar]**

Sol. $1 - (x - 2) - [(x - 3) - (x - 1)] = 0$

or $\quad 1-x+2-[x-3-x+1] = 0$

or $\quad 3-x-(-2) = 0$

or $\quad 3-x+2 = 0$

or $\quad 5-x = 0 \ or \ x = 5$

4. Two numbers differ by 40. When each number is increased by 8, the bigger becomes thrice the lesser number is x, then find the other number. [NCERT Exemplar]

If one number $= x$

Then other number $= x + 40$

According to question, $x + 40 + 8 = 3(x + 8)$

or $\quad x + 48 = 3x + 24$

or $\quad 48 - 24 = 3x - x$

or $\quad 24 = 2x \ or \ x = \frac{24}{2} = 12$

So, the numbers are 12 and 12 + 40 i.e. 52.

5. Divide 54 into two parts such that one part is $\frac{2}{7}$ of the other

Sol. Let one part be x.

So, other part $= 54 - x$

According to question,

$$x = \frac{2}{7}(54 - x)$$

or $\quad 7x = 2(54 - x) \ or \ 7x = 108 - 2x$

or $\quad 7x + 2x = 108 \ or \ 9x = 108$

or $\quad x = \frac{108}{9} = 12$

One part $= x = 12$

Other part $= 54 - x = 54 - 12 = 42$

6. The sum of three consecutive odd natural numbers is 69 , Find the prime numbers out of these numbers. [NCERT Exemplar]

Sol. Let the required numbers be $(2x + 1), (2x + 3) \ and \ (2x + 5)$

According to question

$$2x + 1 + 2x + 3 + 2x + 5 = 69$$

or, $\quad 6x + 9 = 69 \quad or \quad 6x = 69 - 9$

or $\quad 6x = 60 \quad or \quad x = \frac{60}{6}$

or $\quad x = 10$

Three numbers are (2 x 10 + 1) , (2 x 10 +3) and (2 x 10 + 5) = 21, 23 and 25.

∴ The prime number among these is 23.

7. If $\frac{1}{2}$ is subtracted from a number and the difference is multiplied by 4, the result is 5. What is the number? [NCERT Exemplar]

Let the number be x.

According to question

$4\left(x - \frac{1}{2}\right) = 5$

or $4x - 2 = 5$ or $4x = 5 + 2$

or $x = \frac{7}{4}$

∴ Required number $= \frac{7}{4}$

III. Short Answer Type Question.

1. Simplify and solve the following linear equation

3(5y- 7) – 2 (9y – 11) = 4 (8y - 13) - 17

2. The organisers of an essay competition decide that a winner in the competition decide that a winner in the competition gets a prize of Rs.500 and a participant. Who does not win gets a prize of Rs.100. The total prize money distributed is Rs.4800. Find the number of winners, if the total number of participants is 36.

3. The sum of digits of a two- digit number is 17. On reversing its digits the new number is 9 more than the original number . Find the number.

4. Divide 400 into two parts such that $\frac{1}{3}$ rd of the first part is 40 less than the other.

5. The sum of three consecutive odd number is 219. Find the least of these odd numbers.

6. Show that y = 4 is a solution of the equation $y + 7 - \frac{8y}{3} = \frac{17}{6} - \frac{5y}{8}$

7. Solve for z, $\frac{3x-5}{17} + \left(\frac{11-x}{76} - \frac{3}{4}\right) = \frac{4+x}{2} - 13$.

8. Find the root of the equation $\frac{(2+y)(7-Y)}{(5-Y)(4+Y)} = 1$.

9. Solve $\frac{x}{2} + \frac{x}{4} + \frac{x}{5} + 10000 = x$.

10. Radhika takes some flowers in a basket and visits three temples, one by one. At each temple. She offers one half of the flowers from the basket. If she is left with 3 flowers at the end. Find the number of flowers she had in the beginning.

11. **The present age of father is four times the age of his son. After 10 yr. age of father will become three times the age of his son. Find their present ages.**
12. **Anushka and Aarushi are friends. They have equal amount of money in their pockets. Anushaka gave $\frac{1}{3}$ of her money to Aarushi as her birthday gift. Then Aarushi gave a party at a restaurant and cleared the bill by paying half of the total money with her. If the remaining money in Aarushi's pocket is Rs.1600, then find the money gifted by Anushka.**
13. **The sum of three consecutive odd natural numbers is 69. Find the prime number out of these numbers.**
14. **The sum of three consecutive numbers is 156. Find the number, which is a multiple of 13 out of these numbers.**
15. **Solve $\frac{3t-2}{3} + \frac{2t+3}{2} = t+\frac{7}{6}$.**
16. **The base of an isosceles triangle is $\frac{4}{5}$ cm. The perimeter of the triangle is $5\frac{5}{13}$ cm. What is the length of either of the remaining equal sides?**
17. **Find a number, whose fifth part increased by 30 is equal to its fourth part decreased by 30.**
18. **Madhulika thought of a number, doubled it and added 20 to it. On dividing the resulting number by 25, she gets 4. What is the number?**

Answer :

1. We have 3(5y-7) -2 (9y-11)=4(8y-13)-17

15y-21-18y+22 = 32y-52-17

$\Rightarrow$ -3y + 1 = 32 y – 69

$\Rightarrow 1 + 69 = 32y + 3y \Rightarrow 70 = 35\,y \Rightarrow y = 2$

Check on putting y =2 in both sides of the given equation, we get

3(5 x 2-7) - 2(9 x 2-11) = 4 (8 x 2 -13)-17

$\Rightarrow$ 3(10-7)-2 (18-11) = 4(16-13) – 17

$\Rightarrow$3 x 3-2 x7 = 4 x 3-17

9-14= 12-17

-5 = -5

$\Rightarrow LHS = RHS$

So, y=2 is solution of the given linear equation.

2. Let the number of winners be x

Then, the number of participants who did not win = 36-x

Amount spent on x prizes = Rs.500 x x = Rs.500 x

Amount spend ton (36-x) prizes = Rs.100 x (36-x) = Rs(3600-100x)

But 500 x + (3600-100x) = 4800

$\Rightarrow$500 x + 3600 – 100x =4800

$\Rightarrow$ 400x = 4800 – 3600

$\Rightarrow x = 1200 \times \frac{1}{400} \Rightarrow x = 3$

So the number if winners is 3.

3. $\because$ sum of the digits = 17

Let the units' digit of the number be x

$\therefore$ Ten's it of the number = (17-x)

So, the number = 10 (17-x) +x

On reversing the digits, the new number = 10x +(17-x)

But according to the question

$\Rightarrow$10(17-x) + x+9 = 10x+(17-x)

$\Rightarrow 170 - 10x + x + 9 = 10x + 17 - x$

$\Rightarrow 179 - 9x = 9x + 17$

$\Rightarrow 162 = 18x$

$\Rightarrow 162\, x\, \frac{1}{18} = x \Rightarrow x = 9$

$\therefore$ Ten's digit of the number = 17 –x =17 -9=8

$\because$ Required number = 10(8) +9 = 89

4. Let the first part be x. Then, second part will be (400-x)

Now, as per the given condition,

$\frac{1}{3}$ x x= 400 (400-x) – 40

$\Rightarrow \frac{x}{3}$ = 400-x-40 $\Rightarrow \frac{x}{3}$ =360-x

$\Rightarrow \frac{x}{3} + x = 360$

$\Rightarrow \frac{x+3x}{3} = 360$

$\Rightarrow \frac{4x}{3} = 360$

x =360 x $\frac{3}{4}$ = 27

Other part = - (400-270) =130

5. Let first odd number be (2x+1)

Second consecutive odd number = (2x+1) +2

= 2x + 3

And third consecutive odd number = (2x + 1)+ 4

=2x + 5

As per the given the condition

2x + 1 + 2x +3+2x+5 = 219

$\Rightarrow$6x + 9 = 219

$\Rightarrow$6x = 219 – 9

$\Rightarrow$ x=210 x $\frac{1}{6}$ = 35

So the least odd number = 2x + 1 = 2 x 35 +1 =71

6. On substituting y=4 in the given equation, we get

LHS = $4 + 7 - \frac{8x4}{3}$ = 11- $\frac{32}{3}$ = $\frac{33-32}{3} = \frac{1}{3}$

And RHS = $\frac{17}{6} - \frac{5x4}{8} = \frac{17}{6} - \frac{20}{8} = \frac{68-60}{24} = \frac{8}{24} = \frac{1}{3}$

Thus, LHS = RHS

So, y= 4 is the solution of the given equation.

7. We have, $\frac{3x-5}{17} + \left(\frac{11-x}{76} - \frac{3}{4}\right) = \frac{4-x}{2} - 13$

$\Rightarrow \frac{3x}{17} - \frac{5}{7} + \frac{11}{16} - \frac{x}{76} - \frac{3}{4} = 2 + \frac{x}{2} - 13$

$\Rightarrow \frac{456x - 34x - 1292x}{2584}$

$= \frac{3x}{17} - \frac{x}{76} - \frac{x}{2} - 11 + \frac{5}{17} \quad \frac{-11}{76} + \frac{3}{4}$

$= \frac{-56848+1520-748+3876}{5168}$

$\Rightarrow \frac{456x-1326x}{2584} = -\frac{52200}{5168} \Rightarrow \frac{-870x}{2584} = \frac{-52200}{5168}$

X= $\frac{-52200}{5168}$ x $\left(\frac{-2584}{870}\right) = \frac{60}{2} = 30$

8. We have, $\frac{(2+y)(7-y)}{(5-y)(4+y)} = 1$

By cross –multiplication, we get

(2+ y) (7-y) =(5-y) (4+y)

$\Rightarrow$ 14-2y +7y-y^2 = 20 +5y-4y-y^2

$\Rightarrow$14+5y =20 + y $\Rightarrow$ 5y-y = 20 – 14

$\Rightarrow$ 4y = 6 $\Rightarrow$y = $\frac{6}{4} = \frac{3}{2}$

This, solution of the given equation is $\frac{3}{2}$

9. We have, $\frac{x}{2} + \frac{x}{4} + \frac{x}{5} + 10000 = x$

$\Rightarrow \frac{x}{2} + \frac{x}{4} + \frac{x}{5} - x = -10000$

$\Rightarrow \frac{10x+5x+4x-20x}{20} = -10000$

$\Rightarrow \frac{19x-20x}{20} = -10000$

$\Rightarrow \frac{-x}{20} = -10000$

$\Rightarrow \frac{-x}{20} = -10000 \quad \therefore x = 200000$

10. Suppose Radhika takes x flowers in the basket. At first temple. She offers flowers from the basket $= \frac{x}{2}$ Now flowers left, Now flowers left after visiting first temple

$= x - \frac{x}{2} = \frac{2x-x}{2} = \frac{x}{2}$

Thus, at second temple she offers flowers

$= \frac{x}{2} \div 2 = \frac{x}{4}$

Now, flowers left after visiting second temple

$= \frac{x}{2} - \frac{x}{4}$

$= \frac{4x-2x}{8} = \frac{2x}{8} = \frac{x}{4}$

Again at third temple $= \frac{x}{4} \div 2 = \frac{x}{8}$

And flowers left after visiting third temple $= \frac{x}{8}$

But from the given condition, she has 3 flowers at the end.

$\therefore \frac{x}{8} = 3 \Rightarrow x = 24$

Hence, Radhika takes 24 flowers.

Alternate method

Suppose she has x flowers in the basket

∴ Suppose she has x flowers in the basket.

∴ She has flowers at the end

$= x \div 2 \div 2 \div 2$

$= x \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{x}{8}$

Also, $\frac{x}{8} = 3 \Longrightarrow x = 24$.

11. Let the present age of son = xyr

Then, present age of father = 4 xyr

After 10 yr. Age of son = (x + 10) yr

And age of father = (4x +10) yr.

According to the given condition

4x +10 = 3 (x+10)

$\Longrightarrow$ 4x + 10 = 3 x + 30

$\Longrightarrow$ 4x -3x = 30 -10 $\Longrightarrow$ x = 20

∴ Present age of son = 20 yr

And present age of father = 4x = m4 x 20 = 80 yr.

12. Suppose, Anushka and Aarushi have their equal amount of sum, which is Rs. X

After giving $\frac{1}{3}$ of the money to Aarushi.

Anushka has the amount = Rs. $\left(x - \frac{x}{3}\right)$

And then amount of Aarushi = Rs. $\left(x + \frac{x}{3}\right)$

Now, as per the given condition, we have

$\left\langle x + \frac{x}{3} \right\rangle - \frac{1}{2} \times \left\langle x + \frac{x}{3} \right\rangle = 1600$

$\Longrightarrow \left\langle x + \frac{x}{3} \right\rangle \left\langle 1 - \frac{1}{2} \right\rangle = 1600$

$\Longrightarrow \left\langle x + \frac{x}{3} \right\rangle \times \frac{1}{2} = 1600$

$\Longrightarrow \frac{3x+x}{3} = 1600 \times 2 = 3200$

$\Longrightarrow \frac{4x}{3} = 3200 \Longrightarrow x = 3200 \times \frac{3}{4} = 2400$

So, money gifted by Anushka = $\frac{1}{3}$ of 2400

$= \frac{1}{3} \times 2400 =$ Rs.800

13. Let the three consecutive odd natural numbers be x, (x+2) and (x+4)

As per the given condition, we have $x+(x+2)+(x+4) = 69 \Rightarrow 3x + 6 = 69$

$\Rightarrow 3x = 69 - 6 \Rightarrow 3x = 69$

$X = 63 \times \frac{1}{3} = 21$

Thus the numbers are 21, (21 + 2) and (21 + 4) i.e. 21,23,25. Out of these only 23 is the prime number.

14. Let the consecutive numbers be x, (x + 1) and (x + 2) as per the given condition , we have

$X + (x + 1) + (x + 2) = 69 = 156$

$\Rightarrow 3x + 3 = 156$

$\Rightarrow 3x = 156 - 3 = 153$

$\Rightarrow x = 63 \times \frac{1}{3} = 51$

Thus, we get the numbers, 51, 52 and 53. Out of these only 52is a multiple of 13.

15. We have, $\frac{3t-2}{3} + , \frac{2t-3}{2} = t + \frac{7}{6}$

$\Rightarrow \frac{3t-2}{3} + , \frac{2t+3}{2} = \frac{t}{1} + \frac{7}{6}$

$\Rightarrow \frac{2 \times (3t-2) + 3 \times (2t+3) - 6 \times t}{6} = \frac{7}{6}$

$\Rightarrow \frac{6t-4+6t+9-6t}{6} = \frac{7}{6}$

$\Rightarrow \frac{6t+5}{6} = \frac{7}{6}$

$\Rightarrow (6t + 5) = \frac{7 \times 6}{6} \Rightarrow 6t + 5 = 7$

$\Rightarrow 6t = 7 - 5 = 2$

$\therefore t = \frac{2}{6} = \frac{1}{3}$

16. Let the length of either of the remaining equal sides be x cm

$\therefore \frac{4}{5} + (2 \times x) = 5\frac{5}{13}$

$\Rightarrow \frac{4}{5} + 2x = \frac{68}{13} \Rightarrow 2x = \frac{68}{13} - \frac{4}{5}$

$\Rightarrow 2x = \frac{340-52}{65} = \frac{288}{65} = x = \frac{288}{65} \times \frac{1}{2} = \frac{144}{65}$ cm

So, length of either of the remaining equal sides = $\frac{144}{65}$ cm

17. Let the number be x. According to the question

$\frac{x}{5}+30 = \frac{x}{4}-30 \implies \frac{x}{5}-\frac{x}{4} = -30-30$

$\implies \frac{4x-5x}{20} = -60 \implies -x = -60 \times 20 = -1200$

$\therefore x = 1200$

18. Let the number be x According to the question.

$\frac{2x+20}{25} = 4 \implies 2x+20 = 100$

$\implies 2x = 80 \implies x = 40$

Hence, the required number is 40

I. Long Answer Type Question.

1. Solve for x:

$\frac{(2+x)(7-x)}{(5-x)(4+x)} = 1$

Sol. We have, $\frac{(2+x)(7-x)}{(5-x)(4+x)} = 1$

By cross - multiplication, we get

$(2+x)(7-x) = (5-x)(4+x)$

or, $2(7-x) + x(7-x) = 5(4+x) - x(4+x)$

or, $14 - 2x + 7x - x^2 = 20 + 5x - 4x - x^2$

or, $14 + 5x = 20 + x$

or, $5x - x = 20 - 14$

or, $4x = 6$

or, $x = \frac{6}{4} = \frac{3}{2}$

Thus, the solution of the given equation is $x = \frac{3}{2}$

2. Solve the equation $\frac{x}{5} + 11 = \frac{1}{15}$ and check the result.

Sol. Since, $\frac{x}{5} + 11 = \frac{1}{15}$

or $\frac{x}{5} = \frac{1}{15} - \frac{11}{1}$

or $\frac{x}{5} = \frac{1-165}{15} = \frac{-164}{15}$

or $x = \frac{-164}{15} \times 5$

or $x = -\frac{164}{3}$

Hence, $x = -\frac{164}{3}$ is the solution.

Checking: Putting $x = -\frac{164}{3}$ in the given equation, then

$$\text{LHS} = \frac{x}{5} + 11$$

$$= \frac{-164/3}{5} + 11$$

$$= \frac{-164}{3} \times \frac{1}{5} + 11$$

$$= \frac{-164}{15} + \frac{11}{1}$$

$$= \frac{-164 + 165}{15} = \frac{1}{15}$$

and $RHS = \frac{1}{15}$

Therefore, LHS = RHS = $\frac{1}{15}$

Hence Verified

3. A steamer goes downstream from one point to another in 7 hours. It covers the same distance upstream in 8 hours. If the speed of stream be 2 km/hr, find the speed of the steamer in still water and the distance between the ports. [NCERT Exemplar]

Sol. Let speed of steam in still water = $x\ km/hr$

Speed of stream = $2\ km/hr$

Speed downstream = $(x + 2)\ km/hr$

Speed upstream = $(x - 2)\ km/hr$

Distance covered in 7 hours while downstream = $7(x + 2)$

Distance covered in 8 hours while upstream = $8(x - 2)$

According to the condition,

$$7(x + 2) = 8(x - 2)$$

$$7x + 14 = 8x - 16$$

$$x = 30\ km/hr$$

Total distance = $7(x + 2)\ km$

$$= 7(30 + 2)\ km$$

$$= 7 \times 32\ km$$

$$= 224\ km$$

4. Distance between two stations A and B is 690 km. Two cars start simultaneously from A and b towards each other, and the distance between them after 6 hours is 30 km. If the speed of one car is less than the other by 10 km/hr, find the speed of each car. [NCERT Exemplar]

Sol. Let speed of faster car = = $x\ km/hr$

then speed of other = $(x-10)\,km/hr$

Let 1st one start from A and other from B. M and N be their position after 6 hours.

$$AM = 6x, BN = 6(x-10)$$

According to condition,

$$6x + 6x - 60 + 30 = 690$$
$$12x = 690 + 30$$
$$12x = 720$$
$$x = 60\,km/hr$$

Speed of other car = $50\,km/hr$

5. If numerator is 2 less than denominator of a rational number and when 1 is subtracted from numerator and denominator both, the rational number in the simplest from is $\frac{1}{2}$. What is the rational number? [NCERT Exemplar]

Sol. Let the denominator be x, the numerator = $x-2$

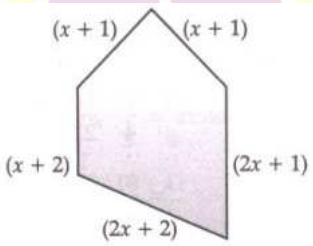
$\therefore$ Fraction = $\frac{x-2}{x}$

According to given condition,

$$\frac{x-2-1}{x-1} = \frac{1}{2}$$
$$\frac{x-3}{x-1} = \frac{1}{2}$$
$$2x - 6 = x - 1$$
$$2x - x = 6 - 1$$
$$x = 5$$

$\therefore$ Rational number = $\frac{x-2}{2} = \frac{5-2}{5} = \frac{3}{5}$

6. For what value of x is the perimeter of shape 77 cm? [NCERT Exemplar]



Sol. Perimeter = $(x+2) + (x+1) + (x+1) + (2x+1) + (2x+2)$

$= 7x + 7$

Since, perimeter of the given shape is 77 cm.

$\therefore$ $7x + 7 = 77$

$7(x + 1) = 77$

$x + 1 = \frac{77}{7} = 11$

$x + 1 = 11$

$x = 11 - 1$

$x = 10$

7. In a two digit number, digit in units place is twice the digit in tens place. If 27 is added to it, the digits are reversed. Find the number. [NCERT Exemplar]

Sol. Let the tens place digit be x then the unit place digit $2x$

Hence, two digit number $= 10x + 2x = 12x$

According to condition,

$12x + 27 = 10 \times 2x + x$

$12x + 27 = 20x + x$

$21x - 12x = 27$

$9x = 27$

$x = 3$

Hence, two digit number $= 12x = 12 \times 3$

$= 36$

8. Radha takes some flowers in a basket and visits three temples one by one. At each temple, she offers one half of the flowers from the basket. If she is left with 3 flowers at the end, find the number of flowers she had in the beginning.

[NCERT Exemplar]

Sol. Let she had x flowers,

I temple visit

No of flowers $= x - \frac{x}{2}$

$= \frac{x}{2}$

II temple visit

No. of flowers $= \frac{x}{1} - \frac{1}{2}\left(\frac{x}{2}\right)$

$= \frac{x}{2} - \frac{x}{4}$

$= \frac{2x - x}{4}$

$= \frac{x}{4}$

III temple visit

No. of flowers $= \frac{x}{4} - \frac{1}{2}\left(\frac{x}{4}\right)$

$= \frac{x}{4} - \frac{x}{8}$

$= \frac{2x - x}{8}$

$= \frac{x}{8}$

According to condition,

$\frac{x}{8} = 3$

$x = 24$

9. Two volume of water in tank is twice of that in the other. If we draw out 25 litres from the first and add it to the other, the volumes of the water in each tank will be the same. Find the volume of water in each tank. [NCERT Exemplar]

Sol. Let volume of smaller tank $= xL$

volume of larger tank $= 2xL$

According to condition,

$2x - 25 = x + 25$

$2x - x = 25 + 25$

$x = 50$

Volume of smaller tank $= 50\ L$

Volume of larger tank $= 100\ L$

10. Hamid has three boxes of different fruits. Box A weighs $2\frac{1}{2}$ kg more than Box B and Box C Weighs $10\frac{1}{4}\ kg$ more than Box B. The total weight of three boxes is $48\frac{3}{4}kg$. How many kilograms (kg) does Box A weighs? [NCERT Exemplar]

Sol. Let the weight of Box B be $x\ kg$

Since, box A weighs $2\frac{1}{2}\ kg$ more than Box B

$\therefore$ Weight of Box $A = \left(x + 2\frac{1}{2}\right) kg$

$= \left(x + \frac{5}{2}\right) kg$

Again, Box C weighs $10\frac{1}{4}\ kg$ more than Box B

$\therefore$ Weight of Box $C = \left(x + 10\frac{1}{4}\right)$

$= \left(x + \frac{41}{8}\right) kg$

According to condition,

$x + \frac{5}{2} + x + x + \frac{41}{4} = 48\frac{3}{4}$

$3x + \frac{5}{2} + \frac{41}{4} = \frac{195}{4}$

$\frac{12x + 10 + 41}{4} = \frac{195}{4}$

$12x + 51 = 195$

$12x = 195 - 51$

$12x = 144$

$x = \frac{144}{12}$

$x = 12$

Hence, weight of Box $A = x + \frac{5}{2} = 12 + \frac{5}{2}$

$= \frac{24+5}{2}$

$= \frac{29}{2} = 14\frac{1}{2} kg$

II. Long Answer Question

1. Solve $\frac{y-(4-3y)}{2y-(3+4y)} = \frac{1}{5}$ **[NCERT Exemplar]**

Sol. $\frac{y-(4-3y)}{2y-(3+4y)} = \frac{1}{5}$

$\Rightarrow \quad 5[y-(4-3y)] = 2y-(3+4y)$

$\Rightarrow \quad 5[y-4-3y] = 2y-3-4y$

$\Rightarrow \quad 5y-20+15y = 2y-3-4y$

$\Rightarrow \quad 20y-20 = -2y-3$

$\Rightarrow \quad 20y + 20y = 20-3$

or $\quad 22y = 17$ or $y = \frac{17}{22}$

2. Solve $\frac{x}{2} - \frac{1}{4}\left(x-\frac{1}{3}\right) = \frac{1}{6}(x+1) + \frac{1}{12}$ **[NCERT Exemplar]**

Sol. $\frac{x}{2} - \frac{1}{4}\left(x-\frac{1}{3}\right) = \frac{1}{6}(x+1) + \frac{1}{12}$

or $\frac{x}{2} - \frac{x}{4} + \frac{1}{12} = \frac{x}{6} - \frac{1}{6} + \frac{1}{12}$ or $\frac{x}{2} - \frac{x}{4} - \frac{x}{6} = \frac{1}{6} + \frac{1}{12} - \frac{1}{12}$

or $\frac{6x-3x-2x}{12} = \frac{1}{6}$ or $\frac{6x-5x}{12} = \frac{1}{6}$

or $\frac{x}{12} = \frac{1}{6}$ or $6x = 12$ or $x = 2$

3. ` 13, 500 are to be distributed among Salma, Kiran and Jenifer in such a way that Salma gets ` 1,000 more than Kiran and Jenifer gets ` 500 more than Kiran. Find the money received by Jenifer. **[NCERT Exemplar]**

Sol. Let money received by Kiran = ` x

Money received by Jenifer = ` $(x + 500)$

Money received by Salma = ` $(x + 1{,}000)$

According to question,

$x + x + 500 + x + 1000 = 13500$

or $3x + 1500 = 13500$ or $3x = 13500 - 1500$

or $3x = 12000$ or $x = \frac{12000}{3} = 4000$

Money received by Jenifer = `4,000 + `500 = `4,500.

4. Sum of the digits of a two –digit number is 11 . The given number is less than the number obtained by interchanging the digits by 9. Find the number. [NCERT Exemplar]

Sol. Let the digit at unit place be x.

Then digit at ten's place = $11 - x$

Number = (10 digit at ten's place) + digit at unit place.

$= 10(11 - x) + x = 110 - 10x + x = 110 - 9x$

Number formed by interchanging the digits = $10x + (11 - x) = 10x + 11 - x = 11 + 9x$

According to question

$(11 + 9x) - (110 - 9x) = 9$

or $9x + 11 - 110 + 9x = 9$ or $18x - 99 = 9$

or $18x = 108$ or $x = \frac{108}{18}$ or $x = 6$

So, number $= 10(11 - x) + x$

$= 10(11 - 6) + 6 = 10 \times 5 + 6 = 50 + 6 = 56$

5. Two equal sides of a triangle are each 4 m less than three times the third side. Find the dimensions of the triangle, if its perimeter is 55 m. [NCERT Exemplar]

Let third side be x

Then length of equal side = $3x - 4$

Sum of all sides of triangle = perimeter

$3x - 4 + 3x - 4 + x = 55$

or $7x - 8 = 55$

or $7x = 63$ or $x = \frac{63}{7}$

or $x = 9$

Third side $= x = 9m$

Length of equal sides $= 3x - 4 = 3 \times 9 - 4 = 27 - 4 = 23m$

6. The age of A is five years more than that of B. 5 years ago, the ration of their age was 3:2. Find their present age., [NCERT Exemplar]

Sol. Let present age of $B = x$ years

Present age of $A = x + 5$ years

Five years ago, Age of $B = x - 5$

Age of $A = x + 5 - 5 = x$

According to question.

$$\frac{x}{x-5} = \frac{3}{2}$$

or $3(x-5) = 2x$ or $3x - 15 = 2x$

or $3x - 2x = 15$ or $x = 15$

$\therefore$ Present age of $A = x + 5 = 15 + 5 = 20$ years

Present age of $B = x = 15$ years.

7. A streamer goes downstream and covers the distance between two ports in 3 hours. It covers the same distance in 5 hours when it goes upstream..If the stream flows at 3km/h then find what is the speed of the steamer up stream. [NCERT Exemplar]

Sol. Let the speed of steamer in still water $= x\ km/h$

Speed of stream $= 3\ km/h$

Speed downstream $= (x + 3)\ km/h$

Speed upstream $= (x - 3)\ km/h$

Distance covered in 3 hours while downstream $= 3(x + 3)$

Distance covered in 5 hours while upstream $= 5(x - 3)$

According question

$5(x-3) = 3(x + 3)$

or $5x - 15 = 3x + 9$

or $5x - 3x = 9 + 15 = 24$ or $2x = 24$

or $x = 12\ km/h$

Speed upstream $= x - 3 = 12 - 3 = 9\ km/h$

8. Distance between two places. A and B is 210 km. Two cars start simultaneously from A and B in opposite direction and distance between them after 3 hours is 54 km. If speed of one car is less than that of other by 8 km/hr. Find the speed of each.

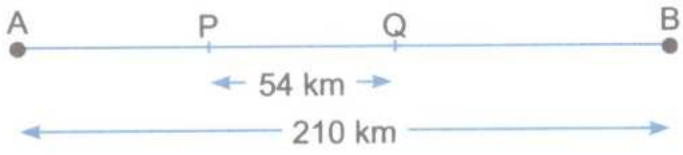
[NCERT Exemplar]

Sol. Let the speed of faster car $= x\ km/h$

Then speed of their $= (x - 8)\ km/h$

Let first car starts from A and the other from B

P and Q be their position after 3 hours



(Distance = speed x time)

$AP = 3x\ km, PQ = 54\ km$

$QB = 3(x - 8)\ km$

According to condition

$3x + 54 + 3(x - 8) = 210$

or $3x + 54 + 3x - 24 = 210$

or $6x + 30 = 210$ or $6x = 210 - 30$

or $6x = 180$ or $x = \frac{180}{6}$

or $x = 30$

So, Speed of faster car $= 30\ km/h$

Speed of other car $= x - 8$

$= 30 - 8 = 22\ km/h$

III. Long Answer Type Questions

1. A man was engaged as typist for the month of February in 2009. He was paid Rs.500 per day but Rs.100 per day were deducted for the days he remained absent. He received Rs.9200 as salary for the month. For how many days did he work?

2. About buys two kinds of cloth material for school uniforms shirt material which consists him Rs.50 per metre and trouser material that costs him Rs.90 per metre. For every 2m of the trouser material he buys 3m of the shirt material. He sells the material at 12% and 20% profit respectively. He sells the material respectively. His total sale is Rs.38160. How much trouser material did he buy?

3. Denominator of a number is 4 less than its numerator . If 6 is added to the numerator, it becomes thrice the denominator. Find the fraction.

4. Kusum buys some chocolates at the rate of Rs.10 per chocolate. She also buys an equal number of candies at the rate of Rs.5 per candy. She makes a 20% profit on chocolates and 8% profit on candies. At the end of the day, all chocolates and candies are sold out and her profit is Rs.240. Find the number of chocolates purchased.

5. In a rare coin collection, there is one gold coin for every three non-gold coins. If 10 more gold coins are added to the collection the ration of gold coins to non-gold coins becomes 1:2. Based on the information, find the total number of coins in the collection now?

6. Find the value of $2m + \frac{1}{2}n$, if m and n the solutions of the equations $\frac{m+3}{7-2m} = \frac{1}{2}$ and $\frac{1}{4}(n+4) = 2n - 3$, respectively.

7. It cost of five pencils is same as the cost of one notebook. If the cost of 7 pencils and 7 notebooks together is 210. Then, find the cost of 2 pencils and 3 notebooks.

8. Sahli and Suraj are close friends. Sahil's monthly salary is 3 times less than Suraj. Suraj helps shail every month with RTs.6000, after which Sahil is left with total money half of the money Suraj has. Then,

   a) find the salary of Sahil and Suraj

   b) What type of value is depicted by suraj?

Answer :

1. Suppose the man was absent on x days. Then he worked for (28-x) days .

Thus, he will get the amount as per the given condition for the February month.

$\therefore (28-x) \times 500 - x \times 100 = 9200$

$\Rightarrow 28 \times 500 - 500X - 100X = 9200$

$\Rightarrow -600X = 9200 - 14000 \Rightarrow -600X = -4800$

$\Rightarrow X = -4800 \times \left(-\frac{1}{600}\right) = 8$

So, the man works for (28 – 8) i.e. 20 days

2. Let Abdul buys 2 x m of trouser material Then, the shirt material bought by him = 3 x m

Sale price of 1m of trouser material

=Rs.(90 + 12% of 90)

= Rs. $\left(90 + \frac{12\,x\,90}{100}\right)$ = Rs.100.80

Sale price of 2 x m of trouser material = Rs. (2x x 100.80) = Rs.201.60 x

Sale price of 1 m of shirt material

Sale price of 1 x m of trouser material = Rs.50 + 20% of Rs.50 = Rs.$\left(50 + \frac{20\,x\,50}{100}\right)$ Rs.60

Sale price of 3 x m of shirt material = Rs.3 x × 60 = Rs.180 x

∴ Total sale = Rs.(201.60 + 180) x = Rs.381.60x

∴ 381.60 x = 38160

$\Longrightarrow$ x = $\frac{38160}{38.160}$ = 100

So, Abdul bought 2 x 100 = 200 m of trouser material.

3. Let the numerator of the number be x Then denominator of the number be (x-4)

So, fraction = $\frac{x}{x-4}$

According to the question, if 6 is added to numerator, it becomes thrice the denominator

∴ $\frac{x+6}{x-4} = \frac{3(x-4)}{x-4} \Longrightarrow \frac{x+6}{x-4} = 3$

$\Longrightarrow$ 3x-12 = x + 6(by cross multiplication)

$\Longrightarrow$2x= 18 $\Longrightarrow$ x=9

Put x = 9 in Eq. (i) we get

Fraction = $\frac{x}{x-4} = \frac{9}{9-4} = \frac{9}{5}$

4. Let Kusum purchased x chocolates. Then total cost of chocolates = 10x

Similarly, she purchased x candies. Then total cost of candies = 5x

According to the question

Profit on chocolates = 20% of 10 x = $\frac{20}{100}$ x 10 x = 2x

And profit on candies = 8% of 5x = $\frac{8}{100}$ x 5 x = 0.4 x

∴ Total profit = 2x + 0.4x = 2.4 x

Again according to the question

Total profit = 240 $\Longrightarrow$ x = 100

Hence, she purchased 100 chocolates.

5. Let the number of gold coins initially be x then, the number of non-gold coins be 3x when, 10 more gold coins added Then, according to the question $\frac{(10+x)}{3x}=\frac{1}{2}$

[∴ (10 + x) ; 3x=1:2]

$\Rightarrow$ 2(10 +x)= 3x $\Rightarrow$ 20 + 2x = 3x $\Rightarrow x = 20$

Then, total number of coins at last = 3x + 10 + x

=4x + 10 = 4 x 20 + 10 = 90

6. Given $\frac{m+3}{7-2m}=\frac{1}{2}$ = 2 (m + 3)=1 x (7-2m)

$\Rightarrow$ 2 m + 6 = 7-2 m $\Rightarrow 2m + 2m = 7 - 6$

$\Rightarrow$4m = 1 $\Rightarrow$ m = $\frac{1}{4}$ .....(1)

Now $\frac{1}{4}$ (n+4) =2n – 3 $\Rightarrow$ n+4 = 4 (2n-3)

$\Rightarrow$ n+4 = 8n – 12 $\Rightarrow$ 8 n-n = 12 + 4

$\Rightarrow$ 7n=16 $\Rightarrow n = \frac{16}{7}$

Then, 2m + $\frac{1}{2}$ n = 2 x $\frac{1}{4}$ + $\frac{1}{2}$ x $\frac{16}{7}$

= $\frac{1}{2}+\frac{8}{7}$ = $\frac{7+16}{14}$ = $\frac{23}{14}$

So, 2m+ $\frac{1}{2}$ n = $\frac{23}{14}$

7.

Let cost of one pencil be Rs.x

Then cost of one note book = Rs.5x

According to the question 7 xx+7 x 5 x = 210

$\Rightarrow$ 7x + 35x = 210 $\Rightarrow$ 42 x = 210

$\Rightarrow$ x = $\frac{210}{42}$ = 5

So, cost of one pencil = Rs.5

And cost of one notebook = 5 x 5= Rs.25

Then, cost of 2 pencils and 3 notebooks. = 2x5+3x5 = 10+75 = Rs.85

8. Let Sahil's monthly salary be Rs.x

Then Suraj's monthly salary be Rs.3x

After giving Rs6000 to Sahil has money

= x + 6000 and Suraj has money = 3x -6000

Then, according to the question

2(x+6000) = (2x -6000)

$\Rightarrow$ 2x + 12000 = 3x-6000

$\Rightarrow$3x-2x = 12000+6000 = 18000 x = 18000

So, Sahils monthly salary = Rs.18000

And Suraj's monthly salary = Rs.54000

b. The value depicted by Suraj is is their helpful nature. He helps his friend in the need.

I. High Order Thinking Skills (Hots) Questions.

1. The perimeter of a rectangle is 240 cm. If its length is increased by 10% and its breadth is decreased by 20% we get the same perimeter. Find the length and breadth of the rectangle.

Sol. Let the length of rectangle be x

$$2(x + b) = Perimeter$$

$$2(x + B) = 240$$

$$x + b = \frac{240}{2}$$

$$x + b = 120$$

or, $$b = 120 - x$$

New length $= x + 10\%\ of\ x$

$$= x + \frac{10x}{100} = x + \frac{x}{10}$$

$$= \frac{11x}{10}$$

New breadth $= (120 - x) - 20\%\ of\ (120 - x)$

$$= (120 - x) - \frac{20}{100} \times (120 - x)$$

$$= 120 - x - \frac{1}{5}(120 - x)$$

$$= 120 - x - \frac{120}{5} + \frac{x}{5}$$

$$= 120 - x - 24 + \frac{x}{5}$$

$$= 96 - x + \frac{x}{5}$$

$$= \frac{480 - 5x + x}{5}$$

$$= \frac{480 - 4x}{5}$$

According to condition,

or, $2\left(\frac{11x}{10}+\frac{480-4x}{5}\right)=240$

or, $\frac{11x}{10}+\frac{480-4x}{5}=120$

$\frac{11x+960-8x}{10}=120$

$\frac{3x+960}{10}=120$

$3x+960=1200$

$3x=1200-960$

$3x=240$

$x=\frac{240}{3}=80$

Hence,

length $=x=80\,cm$

breadth $=120-x=120-80=40\,cm$

II. High Order Thinking Skills (Hots) Questions.

1. The sum of three consecutive numbers is 156. Find the number which is a multiple of 13 out of these numbers.

Sol. Let one number $=x$

Second number $=x+1$

Third number $=x+2$

According to question,

$x+x+1+x+2=156$

or $3x+3=156$ or $3x=156-3$

$3x=153$ or $x=\frac{153}{2}=51$

Three consecutive numbers are 51, 52, and 53.

Out of these, multiple of 13 = 152

2. How much pure alcohol be added to 40 mL of a 15% solution to make its strength 32%?

Sol. Let $x\,mL$ pure alcohol be to 400 mL of a 15% solution to make its strengh 32%.

Here, 15% solution means that there is 15 mL pure alcohol in a solution of 100 mL.

Now, quantity of alcohol in 100 mL solution = 15 mL

$\therefore$ Quantity of alcohol in 400 mL solution $=\frac{15}{100}\times 400mL=60\,mL$

Total quantity of the solution $=(400+x)mL$

Total quantity of alcohol in in $(400 + x)mL$ solution = $(60 + x)ml$

$\therefore$ Quantity of alcohol in 1 mL = $\frac{60 + x}{400 + x}$ mL

Quantity of alcohol in 100 mL = $\frac{60 + x}{400 + x}$ x 100 mL

$\Rightarrow$ Strength of the solution = $\left(\frac{60 + x}{400 + x}\right)$ × 100%

But, the strength of the solution is given as 32%.

$\therefore$ $\frac{60 + x}{400x}$ × 100 = 32

$\Rightarrow$ 100 (60 + x) = 32 (400 + x) $\Rightarrow$ 6000 + 100x = 12800 + 32x

$\Rightarrow$ 100x − 32x = 12800 − 6000

$\Rightarrow$ 68x = 6800 $\Rightarrow$ $\frac{68x}{68} = \frac{6800}{68}$

$\Rightarrow$ x = 100

Thus, 100 mL alcohol must be added to make 32% strength of the solution.

3. If Dennis is $\frac{1}{3}rd$ the age of his father Keith now, and was $\frac{1}{4}th$ the age of his father 5 years ago, then how old will his father Keith be 5 years from now?

Sol. Let Keith's age now be x $years$.

Dennis's age now = $\frac{x}{3}years$

Keith's age 5 years ago = $(x - 5)$ $years$

Dennis's age 5 years ago = $\left(\frac{x}{3} - 4\right)$ $years$

According to question,

$\left(\frac{x}{3} - 5\right) = \frac{1}{4}$ $(x - 5)$ $\Rightarrow$ $\frac{x - 15}{3} = \frac{x - 5}{4}$

$\Rightarrow$ 4$(x - 15)$ = 3$(x - 5)$ $\Rightarrow$ 4x − 60 = 3x − 15

$\Rightarrow$ 4x − 3x = −15 + 60 $\Rightarrow$ x = 45

$\therefore$ Keith's age 5 years from now = $(45 + 5)years$ = 50 $years$.

I. Value Based Questions.

1. a. After 12 years I shall be 3 times as old as I was 4 years ago. Find my present age.

b. Verify that $x = 4$ is a root of the equation $2x - 3 = 5$.

Sol. a. Let my present age = x $years$

After 12 years my age = $(x + 12\ years$

4 years ago my age = $(x - 4) years$

According to questions,

$x + 12 = 3(3 - 4)$

or $x + 12 = 3x - 12$

or $x - 3x = -12 - 12$

or $-2x = -24$

or $x = \frac{-24}{-2}$

or $x = 12$

Therefore, my present age = $12\ years$.

b. Since, $2x - 3 = 5$

Putting $x = 4\ then$

$LHS = 2x - 3$

$= 2 \times 4 - 3 = 8 - 3 = 5$

and $RHS = 5$

Hence, $LHS = RHS = 5$

[Hence, verified]

2. a. Divide 34 into two parts in such a way that $\left(\frac{4}{7}\right)^{th}$ of one part is equal to $\left(\frac{2}{5}\right)^{th}$ of the other.

b. Which of the following equation are linear equation in one variable.

a. $x^2 + x = 1$ b. $2x - 7 = \frac{2}{3}$ c. $x^2 + x = 10$ d. $x - 15 = 3x$

Sol. a. Let, I st part $= x$

Then, II nd part $(34 - x)$

According to question,

$\left(\frac{4}{7}\right)^{th}$ of I st part $= \left(\frac{2}{5}\right)^{th}$ of II nd part

or $\frac{4}{7} x = \frac{2}{5}(34 - x)$

or $20x = 14(34 - x)$,

[by cross multiplication]

or $20x = 14\ x\ 34 - 14x$

or $20x + 14x = 14 \times 34$

$34x = 14 \times 34$

or $x = \frac{14 \times 34}{34}$

or $x = 14$

Hence, two parts are $14\ and\ 34 - 14 = 20$

i.e., I st part = 14 and I I nd part = 20

b. Linear equation in one varible are

b. $2x - 7 = \frac{2}{3}\ and\ (d) x - 15 = 3x$

3. a. The sum of the digits of a two-digit number is 15. If the number formed by reversing the digits is less than the original number by 27, find the original number.

b. Verify that $x = 2$ is a solution of the equation $2(x + 1) = 3(x + 1) - 3$

Sol. a. Let the unit place = x

Then the tens place = $(15 - x)$

Therefore, original number = $10(15 - x) + x$

$= (150 - 9x)$

By reversing the digits, we get

New number = $10x + (15 - x)$

$= 9x + 15$

According to question,

(original number) - (new number) = 27

$(150 - 9x) - (9x + 15) = 27$

or $135 - 18x = 27$

or $18x = 135 - 27$

or $18x = 108$

or $x = \frac{108}{18}$

or $x = 6$

Hence, original number $= 150 - 9x$

$= 150 - 9 \times 6$

$= 150 - 9 \times 6$

$= 150 - 54 = 96$

b. Verification: Since $2(x + 1) = 3(x + 1) - 3$

The putting $x = 2, then$

$$LHS = 2(x + 1)$$
$$= 2(2 + 1)$$
$$= 2 \times 3 = 6$$

and $$RHS = 3(x + 1) - 3$$
$$= 3(2 + 1) - 3$$
$$= 3 \times 3 - 3$$
$$= 9 - 3 = 6$$

Hence $LHS = RHS = 6$ [Hence, Verified]
