Chapter – 02

Linear Equations in One Variable

Exercises 2.1

Question 1. Solve the following equations.

$x - 2 = 7$

Answer: Taking 2 to right hand side of the equation we write,

$x - 2 = 7$

$x = 7 + 2$

$x = 9$

Question 2. Solve the following equations.

$y + 3 - 10$

Answer:

Taking 3 to right hand side of the equation we write,

$y = 10 - 3$

$y = 3$

Question 3. Solve the following equations.

$6 = z + 2$

Answer:

$6 = z + 2$

Sending Variables on the LHS and Constants on the RHS.

$z = 6 - 2$

$z = 4$

Question 4. Solve the following equations.

$\frac{3}{7} + \times = \frac{17}{7}$

Answer: Taking $\frac{3}{7}$ to right hand side of the equation we write,

$\mathrm{x} = \frac{17}{7} - \frac{3}{7}$

$\mathrm{x} = \frac{17-3}{7} = \frac{14}{7}$

$\mathrm{x} = 2$

Question 5. Solve the following equations.

$6x = 12$

Answer:

$6 \times = 12$

Taking 6 from L.H.S. to R.H.S, multiplication changes into division

$x = \frac{12}{6} = 2.$

Question 6. Solve the following equations.

$\frac{t}{5} = 10$

Answer: Taking 5 from L.H.S to R.H.S, division changes into multiplication.

$t = 5 \times 10 = 50$

Question 7. Solve the following equations.

$\frac{2x}{3} = 18$

Answer:

$\frac{2x}{3} = 18$

Cross Multiplying, we get

$2x = 3 \times 18$

$x = \frac{3 \times 18}{2}$

$x = 3 \times 9$

$x = 27$

Question 8. Solve the following equations.

$1.6 = \frac{y}{1.5}$

Answer:

$1.6 = \frac{y}{1.5}$

Taking 1.5 from R.H.S. to L.H.S, division changes into multiplication, $1.5 \times 1.6 = y = 2.4$

Question 9. Solve the following equations.

$7x - 9 = 16$

Answer:

$7x - 9 = 16$

On taking 9 to the RHS, $7x = 16 + 97x = 25$

$x = \frac{25}{7}$

Question 10. Solve the following equation.

$14y - 8 = 13$

Answer:

14 y – 8 = 13

Transposing 8 to RHS.

⇒ 14 y = 13 + 8

⇒ 14 y = 21

$\Rightarrow y = \frac{21}{14} = \frac{3}{2}$

Question 11. Solve the following equation.

17 + 6p = 9

Answer:

17 + 6p = 9

Taking 9 to left-hand side of the equation we write,

17 – 9 = 6p

⇒ 8 = -6p

$\Rightarrow p = \frac{-8}{6} = \frac{-4}{3}$

Question 12. Solve the following equations.

$\frac{x}{3} + 1 = \frac{7}{15}$

Answer: Taking 1 from left hand side to the right side of the equation we write.

$\frac{x}{3} = \frac{7}{15} - 1$

$\frac{x}{3} = \frac{7-15}{15}$

$\frac{x}{3} = \frac{-8}{15}$

$x = \frac{-8 \times 3}{15}$

$x = \frac{-8}{5}$

[as 3 × 5 = 15 is canceled out]

Exercises 2.2

Question 1. If you subtract $\frac{1}{2}$ from a number and multiply the result by $\frac{1}{2}$, you get $\frac{1}{8}$. What is the number?

Answer:

Let the number is x.

Then, on subtracting ½ from x, we get, x – ½.

On multiplying, (x- ½) by ½, we get 1/8.

Thus, solving we get,

(x – ½) × ½ = 1 1/8 Now, we will take L.C.M and cross-multiplying, we get,

$\Rightarrow \left(x - \frac{1}{2}\right)\frac{1}{2} = \frac{1}{8}$

$\Rightarrow \left(\frac{2x-1}{2}\right)\frac{1}{2} = \frac{1}{8}$

$\Rightarrow \left(\frac{2x-1}{4}\right) = \frac{1}{8}$

Multiplying both side by 4, we have $\Rightarrow \frac{2x-1}{1} = \frac{1}{2}$

$\Rightarrow 2(2x-1) = 1 \Rightarrow 4x - 2 = 1 \Rightarrow 4x = 3 \Rightarrow x = \frac{3}{4}$

Question 2. The perimeter of a rectangular swimming pool is 154 m. Its length is 2 m more than twice its breadth. What are the length and the breadth of the pool?

Answer:

Let the length be "l" and breadth be "b"

Given:

Perimeter of rectangle = 154m Length is two more than twice of breadth, twice of breadth means 2b, and 2 more than this means: 2b + 2 Therefore, l = (2b + 2)m Then, perimeter = 2(l + b) = 154m Putting the value of l in above equation,

2{(2b + 2) + b} = 154

2{2b + b + 2} = 154

2{3b + 2} = 1546b + 4 = 1546b = 154 - 46b = 150b = $\frac{150}{6}$ = 25

Hence, Breadth of the rectangle = 25 m So, length of the rectangle = 2b + 2 = 2(25) + 2 = 52 m

Question 3. The base of an isosceles triangle is $\frac{4}{3}$ cm. The perimeter of the triangle is $4\frac{2}{15}$ cm. What is the length of either of the remaining equal sides?

Answer: The isosceles triangle is the one which has two side equal, say side is x. And it is given that the base side = 4/3 cm

Now, the perimeter = sum of three sides = 2 x + base

Perimeter of triangle $= 4\frac{2}{15}$

$2x + \frac{4}{3} = 4\frac{2}{15}$

Now $4\frac{2}{15} = \frac{15\times4+2}{15} = \frac{62}{15}$

Therefore,

$2x + \frac{4}{3} = \frac{62}{15}$

$2x = \frac{62}{15} - \frac{4}{3}$

$2x = \frac{62}{15} - \frac{4}{3}$

$2x = \frac{62-4\times5}{15}$

$2x = \frac{62-4\times5}{15}$

$2x = \frac{62-20}{15}$

$2x = \frac{42}{15}$

$x = \frac{42}{15\times2}$

$x = \frac{7}{5}$

Therefore, each side is of length $\frac{7}{5} = 1\frac{2}{5}$ cm.

Question 4. Sum of two numbers is 95. If one exceeds the other by 15, find the numbers.

Answer:

Let the number be x.

The other number is 15 more than the number x.

Therefore, other number is x + 15. [given second number exceeds first by 15]

Now, x + (x + 15) = 95 [given sum of numbers to be 95]

2 x = 95-15

2 x = 80

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

Therefore, one number is 40 and other number is 40+15 = 55

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

Answer:

Let the common ratio be x.

Then, the numbers are 5 x and 3 x.

Given: Difference of numbers is 18

Now, Difference of 5x and 3x = 185 x – 3 x = 18

2 x = 18

$x = \frac{18}{2} = 9$

Therefore, one number is 5 × 9 = 45 and other number is 3 × 9 = 27.

Question 6. Three consecutive integers add up to 51. What are these integers?

Answer: Let the three consecutive numbers be x+1, x, x-1

Then,

x+1 + x + x - 1 =51

x + x + x + 1 - 1 = 51

3x = 51

$x = \frac{51}{3}$

x = 17Also, x - 1 = 17 - 1 = 16x + 1 = 17 + 1 = 18

Hence, three consecutive integers are 16, 17 and 18. Method 2:Let the three consecutive integers be x, x + 1, x + 2Sum of these numbers = 51x + x + 1 + x + 2 = 513 x + 3 = 513 x = 48x = 16Now the numbers are 16, 16 + 1, 16 + 2Therefore, numbers are 16, 17, 18

Question 7. The sum of three consecutive multiples of 8 is 888. Find the multiples.

Answer:

Three consecutive multiples of 8 means, three consecutive numbers that are divisible by 8.

Let the three consecutive multiples of 8 are = 8(x - 1), 8x, 8(x + 1)= 8 x - 8, 8 x, 8 x + 8

Then,

Sum of three consecutive multiples of 8 = 8888 x - 8 + 8 x + 8 x + 8 = 888

24 x = 888

$x = \frac{888}{24} = 37$

Now, 8(x - 1) = 8(37 - 1) = 8(36) = 2888x = 8(37) = 2968(x + 1) = 8(37 + 1) = 8(38) = 304

Therefore, the numbers are, 288,296 and 304.

Question 8. Three consecutive integers are such that when they are taken in increasing order and multiplied by 2, 3 and 4 respectively, they add up to 74. Find these numbers.

Answer:

As the numbers are consecutive they will be one after another

Let the numbers are x, x + 1, x + 2

According to the question,

2x + 3(x + 1) + 4(x + 2) = 74Opening brackets we get,

2x + 3x + 3 + 4x + 8 = 74

9x = 74 - 8 - 3

9x = 63 $x = \frac{63}{9} = 7$

Also, x + 1 = 7 + 1 = 8x + 2 = 7 + 2 = 9Thus, the numbers are, 7, 8 and 9.

Question 9. The ages of Rahul and Haroon are in the ratio 5:7. Four years later the sum of their ages will be 56 years. What are their present ages?

Answer:

Let the common ratio be x.

So their present ages be 5x and 7x.4 years later their individual ages will be (5x+4) and (7x+4)

According to question,

5x+4+7x+4 = 56

12x = 56-8=48

$x = \frac{48}{12} = 4$

Therefore, the age of Rahul is 5 × 4 = 20 yrs and the age of Harron is 7 × 4 = 28 yrs

Question 10. The number of boys and girls in a class are in the ratio 7:5. The number of boys is 8 more than the number of girls. What is the total class strength?

Answer:

Given ratio 7:5

Let the number of boy and girls be 7x and 5x respectively.

Then, 7x = 5x + 8

7x - 5x = 8

2x = 8

x = 4

Also, 7x = 7(4) = 285x = 5(4) = 20

Therefore, the number of girls is 20 and the number of boys is 28. The total class strength is 48.

Question 11. Baichung's father is 26 years younger than Baichung's grandfather and 29 years older than Baichung. The sum of the ages of all the three is 135 years. What is the age of each one of them?

Answer:

Let Baichung's father age is x.

Given, Baichung's father is 26 years younger than Baichung's grandfather⇒ Age of Baichung's father = x + 26andBaichung's father is 29 years older than Baichung⇒ Age of Baichung = x - 29

Now,

Sum of ages = 135⇒ x + (x+ 26) + (x- 29) = 135⇒ 3x -3 = 135⇒ 3x = 138

$\Rightarrow x = \frac{138}{3} = 46$

So, Baichung's Father Age = 46 years

Baichung's Age = x - 29 = 46 - 29 = 17 years

Baichung's grandfather Age = x + 26 = 46 + 26 = 72 years

Question 12. Fifteen years from now Ravi's age will be four times his present age. What is Ravi's present age?

Answer:

Let present age is x years.

Then, fifteen years later, his age will be 4x years.

Thus, x + 15 = 4x

4x - x = 15

3x = 15

x = 5

Thus, his present age is 5 years.

Question 3. A rational number is such that when you multiply it by 5/2 and add 2/3 to the product, you get - 7/12 What is the number?

Answer: Let the rational number be x.

Now according to the question,

$$\left(x \times \frac{5}{2}\right) + \frac{2}{3} = -\frac{7}{12}$$

$$\frac{5x}{2} + \frac{2}{3} = -\frac{7}{12}$$

$$\frac{5x}{2} = -\frac{7}{12} - \frac{2}{3}$$

$$\frac{5x}{2} = \frac{-7-8}{12}$$

$$\frac{5x}{2} = \frac{-15}{12}$$

$$x = \frac{-15 \times 2}{12 \times 5}$$

$$x = \frac{-1}{2}$$

Question 14. Lakshmi is a cashier in a bank. She has currency notes of denominations Rs 100, Rs 50 and Rs 10, respectively. The ratio of the number of these notes is 2:3:5. The total cash with Lakshmi is Rs 4,00,000. How many notes of each denomination does she have?

Answer:

Let the number of notes of denominations Rs 100, Rs 50 and Rs 10, be 2x, 3x and 5x respectively as they are in the ratio 2:3:5.

Hence, Total Amount of 100 Rupees Notes are = 100 × 2x = 200x

Total Amount of 50 Rupees Notes are = 50 × 3x = 150x

Total Amount of 10 Rupees Notes are = 10 × 5x = 50x

Given: Total Amount = 400000Therefore,

Thus, 200x + 150x + 50x = 400000

⇒ 400x = 400000

⇒ x = 1000

So, Number of 100 Rs Notes = 2 × 1000 = 2000

Number of 50 Rs Notes = 3 × 1000 = 3000

Number of 10 Rs Notes = 5 × 1000 = 5000

Question 15. I have a total of Rs 300 in coins of denomination Re 1, Rs 2 and Rs 5. The number of Rs 2 coins is 3 times the number of Rs 5 coins. The total number of coins is 160. How many coins of each denomination are with me?

Answer: Let the number of Rs 5 coin be x

Then, No of Rs 2 coins = 3 x

And no. of 1 Re coin = 160 – (3 x + x) = 160 - 4 x

The, the total amount of rupee coin is: Rs (1 × (160 - 4x)) = Rs. 160 - 4xTotal amount of 2 rupee coins is: Rs. 2 × 3x = Rs. 6xThe, total amount of 5 rupee coins is: Rs. 5 × x = Rs. 5xThus, 160 - 4x + 6x + 5x =

300160 + 7x = 3007x = 300 - 160x = 140/7 = 20 Therefore, Number of 1 Rs coins = 160 - (4 × 20) = 160 - 80 = 80Number of 2 Rs coins = 3x = 3 × 20 = 60Number of 5 Rs coins = x = 20

Question 16. The organizers of an essay competition decide that a winner in the competition gets a prize of Rs 100 and a participant who does not win gets a prize of Rs 25. The total prize money distributed is Rs 3,000. Find the number of winners, if the total number of participants is 63.

Answer:

Let the number of winners be x. therefore, the number of participants who did not win = 63 - x.

Each winner gets Rs. 100 as prize money, therefore

Total amount given to winners be Rs 100x

Then, Amount given to the participants who did not win = Rs 25(63 - x) = Rs 1575 – 25x

Total Amount distributed = Rs. 3000

100 x + 1575 – 25 x = 3000

75 x = 3000 – 1575

75 x = 1425

Thus, the number of winners are 19.

Exercises 2.3

Question 1. Solve the following equations and check your results.

3x = 2x + 18

Answer:

3 x = 2 x + 18

3 x - 2 x = 18x = 18

Checking the result:

L.H.S: = 3 x= 3 (18) = 54

R.H.S:

= 2 x + 18= 2(18) + 18 = 36 +18 = 54

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 2. Solve the following equations and check your results.

$5t - 3 = 3t - 5$

Answer:

5t – 3 = 3t - 5

Rearranging the terms, we get,

5t - 3t = -5 + 3

2t = -2

t = -1

L.H.S: 5(-1) -3 = -8

R.H.S: = 3(-1) -5 = - 8

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 3. Solve the following equations and check your results.

$5x + 9 = 5 + 3x$

Answer:

$5x + 9 = 5 + 3x$

$5x – 3x = 5 - 9$

$2x = -4$

$x = -2$

L.H.S: $5x + 9$

$= 5(-2) + 9 = -1$

R.H.S: $5 + 3x$

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

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 4. Solve the following equations and check your results.

$4x + 3 = 6 + 2x$

Answer:

$4x – 2x = 6 - 3$

$2x = 3$

$x = \frac{3}{2}$.

L.H.S: $4\left(\frac{3}{2}\right) + 3 = 9$

R.H.S: $= 6 + 2\left(\frac{3}{2}\right) = 9$

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 5. Solve the following equations and check your results.

$2x - 1 = 14 - x$

Answer:

$2x + x = 14 + 1$

$3x = 15$

$x = \frac{15}{3} = 5.$

L.H.S: $2(5) - 1 = 9$

R.H.S: $= 14 - 5 = 9$

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 6. Solve the following equations and check your results.

$8x + 4 - 3\,(x - 1) + 7$

Answer:

$8x + 4 = 3x - 3 + 7$

$8x + 4 = 3x + 4$

$8x - 3x = 4 - 4$

$5x = 0$

x = 0

Check for the solution:

L.H.S: 8 (0) + 4 = 4

R.H.S: = 3 (0 -1) + 7 = 4

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 7. Solve the following equations and check your results.

$x = \frac{4}{5}(x + 10)$

Answer:

$x = \frac{4}{5}(x + 10)$

5 x = 4 x + 405 x - 4 x = 40x = 40

Check:

L.H.S: x = 40

R.H.S $= \frac{4}{5}(40 + 10) = \frac{4}{5}(50) = 40$

Since L.H.S. = R.H.S

Hence, the solution is correct.

Question 8. Solve the following equations and check your results.

$\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Answer:

$\frac{2x}{3} - \frac{7x}{15} = 3 - 1$

$\frac{10x-7x}{15} = 2$

$3x = 2 \times 15$

$3x = 30$

$x = 10$

L.H.S: $\frac{2\times10}{3} + 1 = \frac{20+3}{3} = \frac{23}{3}$

R.H.S. $= \frac{7\times10}{15} + 3 = \frac{70+45}{15} = \frac{115}{15} = \frac{23}{3}$

Since L.H.S. = R.H.S.

Hence, the solution is correct.

Question 9.

Solve the following equations and check your results.

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

Answer:

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

$3\,y = 21/3$

$3y = 7$

$y = \frac{7}{3}$

L.H.S.

$2\,y + \frac{5}{3} = 2 \times \frac{7}{3} + \frac{5}{3} = \frac{14}{3} + \frac{5}{3} = \frac{19}{3}$

R.H.S:

$\frac{26}{3} - y = \frac{26}{3} - \frac{7}{3} = \frac{26-7}{3} = \frac{19}{3}$

Since L.H.S. = R.H.S.

Hence, the solution is correct.

Question 10. Solve the following equations and check your results.

$3m = 5m - \frac{8}{5}$

Answer:

$3m - 5m = \frac{-8}{5}$

$-2\ m = \frac{-8}{5}$

$m = \frac{8}{2\times5}$

$m = \frac{4}{5}$

L.H.S: $3\ \left(\frac{4}{5}\right) = \frac{12}{5}$

R.H.S: $5\left(\frac{4}{5}\right) - \frac{8}{5} = \frac{20-8}{5} = \frac{12}{5}$

Since L.H.S. = R.H.S.

Hence, the solution is correct.

Exercises 2.4

Question 1. Amina thinks of a number and subtracts 5/2 from it. She multiplies the result by 8. The result now obtained is 3 times the same number she thought of. What is the number?

Answer:

Let the number Amina thinks of be x.

According to question. She subtracts 5/2 from it, then she multiplies the result by 8 and the result equals 3 times the original number

$\left(x-\frac{5}{2}\right) \times 8 = 2\,x$

Multiplying inside the bracket, we get,8x - 5/2 × 8 = 3x8x - 5 × 4 = 3x

⇒ 8x - 20 = 3x

⇒ 8x - 3x = 20

⇒ 5x = 20

⇒ x = 4

Thus, the number is 4.

Question 2. A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new numbers becomes twice the other new number. What are the numbers?

Answer:

Let the numbers be x and 5x (as one number is 5 times the other number)

Given, if 21 is added to both the numbers, numbers become (x + 21) and (5 x + 21), then one of the new numbers becomes twice the other new number

Then,

$21 + 5x = 2(x + 21) 21 + 5x = 2x + 42 5x - 2x = 42 - 2 13x = 21 x = 7$

Also,

$5 x = 5(7) = 35$

Thus, one number is 7 and the other number is 35.

Question 3. Sum of the digits of a two-digit number is 9. When we interchange the digits, it is found that the resulting new number is greater than the original number by 27. What is the two-digit number?

Answer: Let the two-digit number be $= 10 x + y$

Given: Sum of digits of two-digit number = 9, $x + y = 9$So, if one of the digit is x, second digit will be $9 – x$ So we have our 2-digit number $= 10 x + (9 - x)$ Reversing the digits of this number $= 10 (9 - x) + x$ Now it is given that resulting new number is greater than the original number by 27. Therefore, $10(9 - x) + x - (10 x + 9 - x) = 27 90 - 10 x + x - 10 x - 9 + x = 27 81 - 18 x = 27 18 x = 81 - 27 18 x = 54 x = 54/18 x = 3$So the number is $10 x 3 + (9 - 3) = 36$

Question 4. One of the two digits of a two-digit number is three times the other digit. If you interchange the digits of this two-digit number and add the resulting number to the original number, you get 88. What is the original number?

Answer: Let the digit at ten's place and one's place be x and 3x.

Then original number $=10(x) + 1(3x) = 13x$

On interchanging the digits, the digits at one's place and tens place will be x and 3x

The number formed after interchanging $= 10(3x) + x = 31x$

Now, New Number + Original Number = 88

13x + 31x = 88

44x = 88

$x = \frac{88}{44}$

We get, x = 2

Thus, the two-digit number is 13x = 13(2) = 26 or 62.

Question 5. Shobo's mother's present age is six times Shobo's present age. Shobo's age five years from now will be one third of his mother's present age. What are their present ages?

Answer:

Let Shobo's present age is x years.

Thus, his mother's present age will be 6x years.

After 5 Years: Shobo's Age = x + 5 years Given, Shobo's age five years from now will be one third of his mother's present age

⇒ 3(x + 5) = 6x

⇒ 3x + 15 = 6x

⇒ 15 = 6x − 3x

⇒ 3x = 15

⇒ x = 5

Hence, Age of Shabo = x= 5 years

Age of his mother = 6x = 6(5) = 30 years

Question 6. There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 11:4. At the rate Rs 100 per metre it will cost the village panchayat Rs 75000 to fence the plot. What are the dimensions of the plot?

Answer:

Since, the ratio given is 11: 4

Let the length and breadth of the plot be l = 11x and b = 4x respectively.

Since the plot is of rectangular shape and we know the perimeter of a rectangle is 2(l + b)

Also, rate of fencing the plot is Rs 100 for 1m

Now,

Perimeter of Rectangular plot = 2(l + b) = 2(11x + 4x)

Perimeter of rectangular plot = 2(15 x) = 30x

Cost of fencing one meter = Rs. 100

Therefore, cost of fencing 30x m = 30 x × 100 = 75000

3000x = 75000

$x = \frac{75000}{3000}$

x = 25

Thus, the length = 11 x (25) = 275 m

And the breadth = 4 x (25) = 100 m

Question 7. Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him Rs 50 per metre and trouser material that costs him Rs 90 per metre. For every 2 meters of the trouser material, he buys 3 metres of the shirt material. He sells the

materials at 12% and 10% profit respectively. His total sale is Rs 36,600. How much trouser material did he buy?

Answer: Cost of 1 m shirt material = Rs. 50

Cost of 1 m trouser material = Rs. 90Now after 12% Profit, Selling Price of 1 m shirt material = 50 + 12% of 50 + $\left(\frac{12}{100} \times 50\right)$

= 50 + 6 = Rs. 56And after 10% Profit, Selling Price of 1 m shirt material = 90 + 10% of 90 = $90 + \left(\frac{10}{100} \times 90\right)$

= 90 + 9 = Rs. 99It is given that if he buys 2 m of shirt material then he buys 3 m of shirt material. Let that he buys 2x m of shirt material then he will buy 3x m of trouser material. Total Selling Price = 56 x 3x + 99 x 2x = 168x + 198x = Rs. 366x It is given that the total selling price = 36600Therefore,366 x = 36600x = 100So the trouser material he buys = 2x = 2 x 100 = 200 m Therefore, the trouser material is 200 m.

Question 8. Half of a herd of deer are grazing in the field and three fourths of the remaining are playing nearby. The rest 9 are drinking water from the pond. Find the number of deer in the herd.

Answer:

Let the number of deer be x

The no. of deer grazing in the field= half of x = x/2

No. of deer remaining = x - x/2The no. of Deer playing in the field = three-fourth of remaining deer =

The no. of Deer drinking water = 9∵ Total Deer= (Grazing Deer) + (Playing Deer) + (Deer drinking water) ∴ $x = \frac{x}{2} + \frac{3x}{8} + 9$

$x - \frac{x}{2} - \frac{3x}{8} = 9$

$\frac{8x-4x-3x}{8} = 9$

$x = 72$

∴ the number of deer is 72.

Question 9. A grandfather is ten times older than his granddaughter. He is also 54 years older than her. Find their present ages.

Answer:

Let granddaughter's age is x years.

∴ grandfather's age will be 10x years

Now, 10x = x + 54

9x =54

x = 6

Granddaughter's age is 6 years and the grandfather's age is 60

Question 10. Aman's age is three times his son's age. Ten years ago he was five times his son's age. Find their present ages.

Answer:

Let the son's present age is x years.

Then, Aman's present age is 3 x years.10 years before, Aman's age = 3 x - 10Son's age = x - 10

3 x – 10 = 5 (x - 10) [Age 10 years before]

3 x – 5 x = - 50 + 10

- 2 x = - 40

x = 20

thus, son's age is 20 years and Aman's age is 60.

Exercises 2.5

Question 1. Solve the following linear equations.

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

Answer:

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

L.C.M of 2 and 5 = 10 and L.C.M of 3 and 4 = 12Therefore, $\frac{5x-2}{10} = \frac{4x+3}{12}$

Cross Multiplying we get,12(5 x - 2) = 10(4 x + 3)60 x - 24 = 40 x + 3060 x - 40 x = 30 + 2420 x

$$x = \frac{54}{20}$$

$= 54$

$$x = \frac{27}{10}$$

Question 2. Solve the following linear equations.

$\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

Answer:

$\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

L.C.M. of 2,6, and 4 is 12

$$\frac{6n - 9n + 10n}{12} = 21$$

$\frac{7\,n}{12} = 21$

Cross multiplying we get,

Thus,

$7\,n = 12 \times 21$

$n = \frac{12 \times 21}{7}$

$n = 12 \times 3$

$n = 36$

Question 3. Solve the following linear equations.

$x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

Answer:

$x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

As the equation contains variable as well as constants. First step should be taking variables at one side and constants at other side. Therefore, the equation becomes

$x - \frac{8x}{3} + \frac{5x}{2} = \frac{17}{6} - 7$

L.C.M of 3 and 2 = 6 and on right hand side L.C.M. will be just 6

$\frac{6x - 2 \times 8x + 5c \times 3}{6} = \frac{17 - 7 \times 6}{6}$

$\frac{6x - 16x + 15x}{6} = \frac{17 - 42}{6}$

As the denominator is same, it gets cancelled out.

$5x = -25$

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

$$x = -5$$

Question 4. Solve the following linear equations.

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

Answer:

Method 1:

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

Cross multiplying we get,

5 (x - 5) = 3 (x - 3)5 x - 25 = 3 x - 95 x - 3 x = 25 - 92 x = 16x = 16/2x = 8

Question 5. Solve the following linear equation.

$$\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$$

Answer:

$$\left(\frac{3\,t-2}{4} - \frac{2\,t+3}{3}\right) = \frac{2}{3} - t$$

L.C.M of 4 and 3 is 12

Thus,

$$\frac{3\,(3\,t-2)-4\,(2\,t+3)}{12} = \frac{2-3\,t}{3}$$

$$\frac{9\,t-6-8\,t-12}{12} = \frac{2\,-3\,t}{3}$$

$\frac{t-18}{12} = \frac{2-3t}{3}$

Cross Multiplying, we get,

$3\ (t-18) = 12\ (2-3\ t)$

$3\ t-54 = 24-36\ t$

$39\ t = 78$

$t = \frac{78}{39}$

$t = 2$

Question 6. Solve the following linear equations.

$m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

Answer:

To Solve: $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

Taking L.C.M on both sides we get,

$\frac{2\,m-(m-1)}{2} = \frac{3-(m-2)}{3}$

$\frac{2\,m-m+1}{2} = \frac{3-m+2}{3}$

$\frac{m+1}{2} = \frac{5-m}{3}$

Cross Multiplying we get,$3\ (m+1) = 2\ (5-m) 3\ m+3 = 10-$
$2\ m 3\ m+2\ m = 10-35\ m = 7$

$m = \frac{7}{5}$

Question 7. Simplify and solve the following linear equations.

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

Answer:

Opening the brackets, we write,

$3t-9=10t+5$

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

$-14=7t$

$t=-2$

Question 8. Simplify and solve the following linear equations.

$15(y-4)-2(y-9)+5(y+6)-0$

Answer:

$15\ (y-4)-2\ (y-9)+5\ (y+6)=0$

Opening brackets 15y - 15 x 4 - 2y + 2 x 9 + 5y + 5 x 6 = 015y - 60 - 2y + 18 + 5y + 30 = 0(15y - $y=\frac{12}{18}$ 2y + 5y) + 30 + 18 - 60 = 018 y - 12 = 018 y = 12 $y=\frac{2}{3}$

Question 9. Simplify and solve the following linear equations.

$3(5z-7)-2(9z-11)-4(8z-13)-17$

Answer:

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

Opening the brackets, we write,

15z – 21 – 18z + 22 = 32z -52 -17

15z - 18z - 21 + 22 = 32z - 69

-3z + 1 = 32z – 69

-3z - 32z = -69 - 1- 35z = -70 35z = 70z = 2

Question 10. Simplify and solve the following linear equations.

$0.25(4f - 3) - 0.05(10f - 9)$

Answer:

0.25 (4 f - 3) = 0.05 (10 f - 9)

Opening Brackets, Multiply Component-wisely0.25 x 4 f - 0.25 x 3 = 0.05 x 10 f - 0.05 x 9f - 0.75 = 0.5 f - 0.45f - 0.5 f = 0.75 - 0.450.5 f = 0.30f = 0.30/0.5f = 0.6

Exercises. 2.6

Question 1. Solve the following equations.

$\frac{8x-3}{3x} = 2$

Answer:

The given Equation can be written as:

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

On Solving this By Cross Multiplication,

$8x - 3 = 2 \times 3x$

$8x - 3 = 6x$

$8x - 6x = 3$

$2x = 3$

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

Question 2. Solve the following equations.

$\frac{9x}{7-6x} = 15$

Answer:

The given equation can be written as:

$\frac{9x}{7-6x} = \frac{15}{1}$

Now, on doing Cross Multiplication we have,

9 x = 15 (7 - 6 x)

9 x = 105 – 90 x

9 x + 90 x = 105

99 x = 105

$x = \frac{105}{99}$

$x = \frac{35}{33}$

Question 3. Solve the following equations.

$\frac{z}{z+15} = \frac{4}{9}$

Answer:

$\frac{z}{z+15} = \frac{4}{9}$

By Cross Multiplication,

9z = 4 (z + 15)

9z = 4z + 60

5z = 60

z = 60/5

z = 12

Question 4. Solve the following equations.

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

Answer:

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

5(3y + 4) = -2(2-6y) ⇒ 15 y + 20 = - 4 + 12y⇒ 15 y - 12 y = -4 - 20⇒ 3 y = -24 ⇒y = -8

Question 5. Solve the following equations.

$\frac{7y+4}{y+2} = \frac{-4}{3}$

Answer:

Multiplying by 3(y+2) on both the sides we get,

3(7y+4) = - 4 (y+2)

21y + 12 = - 4y - 8

25y = -20

$y = -\frac{4}{5}$

Question 6. The ages of Hari and Harry are in the ratio 5:7. Four years from now the ratio of their ages will be 3:4. Find their present ages.

Answer:

Let the present ages of Hari and Harry are 5 x and 7 x

Then, four years later, Hari age will be 5 x + 4 years and Harry age will be 7 x + 4 years

Now,

Ratio of ages of Hari and Harry after four years = 3:4

Therefore,

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

Multiplying on both the sides by, $4(7x + 4)$

$4(5x + 4) = 3(7x + 4)$

$20x + 16 = 21x + 12$

$16 - 12 = 21x - 20x$

$4 = x$

Thus, presently, Hari age is 20 and Harry age is 28

Question 7. The denominator of a rational number is greater than its numerator by 8. If the numerator is increased by 17 and the denominator is decreased by 1, the number obtained is $\frac{3}{2}$. Find the rational number.

Answer:

Let the numerator of rational number is x and the denominator of rational number is y.

∵ Denominator y = x+ 8

∴ The rational number is

$\frac{x}{y} = \frac{x}{x+8}$

Now according to question,

$\frac{x+17}{x+8-1} = \frac{3}{2}$

Cross multiplying both sides, we get

$2x + 34 = 3x + 21$

$34 - 21 = 3x - 2x$

$13 = x$

Thus, numerator $= 13$ and denominator $= 21$

Therefore, rational number is $\frac{13}{21}$

[Since, denominator, y = x + 8, denominator = 13 + 8 = 21]