

LINEAR EQUATIONS ONE VARIABLE LATEST

EXERCISE 2.1

Solve the following equations :

1. $x - 2 = 7$

Sol :

We have $x - 2 = 7$

Adding 2 to both sides we get

$$x - 2 + 2 = 7 + 2$$

$$x = 9$$



PRACTICE :

1. Solve the following equations :

(a) $x - 3 = 8$ (b) $x - 1 = 6$

Ans : (a) $x = 11$ (b) 7

2. $y + 3 = 10$

Sol :

We have $y + 3 = 10$

Subtracting 3 from both sides we get

$$y + 3 - 3 = 10 - 3$$

$$y = 7$$



PRACTICE :

1. Solve the following equations :

(a) $y + 2 = 8$ (b) $y + 1 = 8$

Ans : (a) $y = 6$ (b) $y = 7$

3. $6 = z + 2$

Sol :

We have, $6 = z + 2$

$$z + 2 = 6$$

Subtracting 2 from both sides we get

$$z + 2 - 2 = 6 - 2$$

$$z = 4$$



PRACTICE :

1. Solve the following equations :

(a) $6 = z + 4$ (b) $6 = z + 3$

Ans : (a) $z = 2$ (b) $z = 3$

4. $\frac{3}{7} + x = \frac{17}{7}$

Sol :

We have, $\frac{3}{7} + x = \frac{17}{7}$

Subtracting $\frac{3}{7}$ from both sides we get

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

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



PRACTICE :

1. Solve the following equations :

(a) $\frac{6}{7} + x = \frac{17}{7}$ (b) $\frac{1}{7} + x = \frac{15}{7}$

Ans : (a) $x = \frac{11}{7}$ (b) $x = 2$

5. $6x = 12$

Sol :

We have, $6x = 12$

Dividing both sides by 6 we get

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

$$x = 2$$



PRACTICE :

1. Solve the following equations :

(a) $3x = 24$ (b) $4x = 16$

Ans : (a) $x = 8$ (b) $x = 4$

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

Sol :

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

Multiplying both sides by 5 we get



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

$$t = 50$$

PRACTICE :

1. Solve the following equations :

(a) $\frac{t}{7} = 5$ (b) $\frac{t}{4} = 5$

Ans : (a) 35 (b) 20

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

Sol :

We have, $\frac{2x}{3} = 18$

Multiplying both sides by $\frac{3}{2}$ we get

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

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



PRACTICE :

1. Solve the following equations :

(a) $\frac{4x}{3} = 16$ (b) $\frac{7x}{3} = 21$

Ans : (a) $x = 12$ (b) $x = 9$

8. $1.6 = \frac{y}{1.5}$

Sol :

We have, $1.6 = \frac{y}{1.5}$

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

Multiplying both sides by 1.5 we get

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

$$y = 2.40$$

$$y = 2.4$$



PRACTICE :

1. Solve the following equations :

(a) $1.3 = \frac{y}{1.2}$ (b) $1.4 = \frac{y}{1.9}$

Ans : (a) $y = 1.56$ (b) $y = 2.6$

9. $7x - 9 = 16$

Sol :

We have, $7x - 9 = 16$

Adding 9 to both sides we get

$$7x - 9 + 9 = 16 + 9$$



$$7x = 25$$

Now, dividing both sides by 7 we get

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

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

PRACTICE :

1. Solve the following equations :

(a) $6x - 8 = 14$ (b) $5x - 3 = 12$

Ans : (a) $x = \frac{11}{3}$ (b) $x = 3$

10. $14y - 8 = 13$

Sol :

We have, $14y - 8 = 13$

Adding 8 to both sides we get

$$14y - 8 + 8 = 13 + 8$$

$$14y = 21$$

Now, dividing both sides by 14 we get

$$\frac{14y}{14} = \frac{21}{14}$$

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



PRACTICE :

1. Solve the following equations :

(a) $14y - 1 = 13$ (b) $14y - 15 = 13$

Ans : (a) $y = 1$ (b) $y = 2$

11. $17 + 6p = 9$

Sol :

We have, $17 + 6p = 9$

Subtracting 17 from both sides we get

$$17 - 17 + 6p = 9 - 17$$

$$6p = -8$$

Now, dividing both sides by 6 we get

$$\frac{6p}{6} = \frac{-8}{6}$$

$$p = \frac{-4}{3}$$



PRACTICE :

1. Solve the following equations :

(a) $15 + 3p = 9$ (b) $20 + 11p = 9$

Ans : (a) $p = -2$ (b) $p = -1$

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

Sol :

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

Subtracting 1 from both sides we get



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

$$\frac{x}{3} = \frac{7-15}{15} = \frac{-8}{15}$$

Now, multiplying both sides by 3 we get

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

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

Note:

To check all above 1 to 12 questions, we can obtain Right Hand Side by placing the so obtained value of the variable in Left Hand Side.

PRACTICE :

1. Solve the following equations :

(a) $\frac{x}{2} + 1 = \frac{2}{15}$ (b) $\frac{x}{4} + 2 = \frac{1}{2}$

Ans : (a) $x = -\frac{26}{15}$ (b) $x = -6$

EXERCISE 2.2

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



Sol :

Let the number be x .

According to the question we have

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

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

$$x - \frac{1}{2} = \frac{1}{4}$$

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

Thus, the required number is $\frac{3}{4}$.

PRACTICE :

1. If you subtract $\frac{1}{4}$ from a number and multiply the result by $\frac{1}{4}$, you got $\frac{1}{8}$. What is the number.

Ans : $x = \frac{3}{4}$

2. If you subtract $\frac{1}{3}$ from a number and multiply the result by $\frac{1}{3}$, you got $\frac{1}{10}$. What is the number.

Ans : $x = \frac{57}{90}$

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 ?

Sol :

Let the breadth of the rectangular swimming pool be x .

Then, the length of the rectangular swimming pool will be

$$= (2x + 2) \text{ m}$$

The perimeter of the rectangular swimming pool

$$= 2(\text{length} + \text{breadth})$$

$$= 2(2x + 2 + x) \text{ m}$$

$$= 2(3x + 2) \text{ m}$$

$$= (6x + 4) \text{ m}$$

According to the question, we have

$$6x + 4 = 154$$

$$6x = 154 - 4 = 150$$

$$x = \frac{150}{6} = 25$$

Thus, the length of the rectangular swimming pool

$$= (2 \times 25 + 2) \text{ m} = 52 \text{ m}$$

The breadth of the rectangular swimming pool is 25 m.



PRACTICE :

1. The perimeter of a rectangular swimming pool is 164 m. Its length is 3 m more than twice its breadth. What are the length and the breadth of the pool ?

Ans : Breadth = 27 m, Length = 57 m

2. The perimeter of a rectangular swimming pool is 122 m. Its length is 4 m more than twice its breadth. What are the length and the breadth of the pool ?

Ans : Breadth = 19 m, Length = 42 m

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 ?

Sol :

Let the measure of the equal sides of the isosceles triangle be x .

$$\text{Base of isosceles triangle} = \frac{4}{3} \text{ cm}$$

$$\text{Perimeter of the isosceles triangle} = 4\frac{2}{15} \text{ cm}$$

$$= \frac{62}{15} \text{ cm}$$

According to the question,

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

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



$$= \frac{62 - 4 \times 5}{15}$$

$$2x = \frac{62 - 20}{15} = \frac{42}{15}$$

$$x = \frac{42}{15} \times \frac{1}{2} = \frac{21}{15} = \frac{7}{5} = 1\frac{2}{5}$$

Thus, the length of the equal sides is $1\frac{2}{5}$ cm

PRACTICE :

1. The base of an isosceles triangle is $\frac{3}{2}$ cm. The perimeter of the triangle is $5\frac{1}{15}$ cm. What is the length of either of the remaining equal sides ?

Ans : $\frac{107}{60}$ cm

2. The base of an isosceles triangle is $\frac{5}{3}$ cm. The perimeter of the triangle is $6\frac{2}{15}$ cm. What is the length of either of the remaining equal sides ?

Ans : $\frac{67}{30}$ cm

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



Sol :

Let the one number be x and the second number be $x + 15$.

According to the question, we have

$$x + (x + 15) = 95$$

$$2x + 15 = 95$$

$$2x = 95 - 15 = 80$$

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

Thus, the required numbers is 40 and $40 + 15 = 55$.

PRACTICE :

1. Sum of two numbers is 95. If one exceeds the other by 25, find the numbers.

Ans : 35 and 60

2. Sum of two numbers is 100. If one exceeds the other by 10, find the numbers.

Ans : 45 and 55

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



Sol :

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

According to the question,

$$5x - 3x = 18$$

$$2x = 18$$

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

Thus, the required numbers = 5×9 and $3 \times 9 = 45$ and 27

PRACTICE :

1. Two numbers are in the ratio 6 : 5. If they differ by 20 what are the numbers?

Ans : 120, 100

2. Two numbers are in the ratio 3 : 2. If they differ by 15, what are the numbers?

Ans : 45, 30

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



Sol :

Let three consecutive integers be $x, x + 1$ and $x + 2$

According to the question, we have

$$x + x + 1 + x + 2 = 51$$

$$3x + 3 = 51$$

$$3x = 51 - 3 = 48$$

$$x = \frac{48}{3} = 16$$

Thus, the required integers are 16, 17 and 18 Ans.

PRACTICE :

1. Three consecutive integers add up to 54. What are these integers?

Ans : 17, 18, 19

2. Three consecutive integers add up to 57. What are these integers?

Ans : 18, 19, 20

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

Sol :

Let three consecutive multiples of 8 be $8x, 8(x + 1)$ and $8(x + 2)$.

According to the question, we have

$$8x + 8(x + 1) + 8(x + 2) = 888$$

$$8x + 8x + 8 + 8x + 16 = 888$$

$$24x + 24 = 888$$



$$24x = 888 - 24 = 864$$

$$x = \frac{864}{24} = 36$$

Thus, the required multiples of 8

$$= 8 \times 36, 8(36 + 1), 8(36 + 2)$$

$$= 8 \times 36, 8 \times 37, 8 \times 38$$

$$= 288, 296 \text{ and } 304$$

PRACTICE :

- The sum of three consecutive multiples of 9 is 999. Find the multiples.
Ans : 324, 333, 342
- The sum of three consecutive multiples of 7 is 777. Find the multiples.
Ans : 196, 203, 210

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.



Sol :

Let three consecutive integers be $x, (x + 1)$ and $(x + 2)$
According to the question, we have

$$2 \times x + 3 \times (x + 1) + 4 \times (x + 2) = 74$$

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

$$9x + 11 = 74$$

$$9x = 74 - 11 = 63$$

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

Thus, the required integers = 7, 8 and 9

PRACTICE :

- Three consecutive integers are such that when they are taken in increasing order and multiplied by 1, 2 and 3 respectively, they add up to 74. Find these numbers.
Ans : 11, 12, 13
- Three consecutive integers are such that when they are taken in increasing order and multiplied by 3, 4 and 5 respectively, they add up to 74. Find these numbers.
Ans : 5, 6, 7

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?



Sol :

Let the present age of Rahul be $5x$ years and the present age of Haroon be $7x$ years

Age of Rahul after 4 years = $(5x + 4)$ years

Age of Haroon after 4 years = $(7x + 4)$ years

According to the question, we have

$$(5x + 4) + (7x + 4) = 56$$

$$5x + 4 + 7x + 4 = 56$$

$$12x + 8 = 56$$

$$12x = 56 - 8 = 48$$

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

Thus, the present age of Rahul = 5×4
= 20 years

and the present age of Haroon = 7×4
= 28 years

PRACTICE :

- The ages of Rahul and Haroon are in the ratio 3 : 4. three years later the sum of their ages will be 57 years. What are their present ages?
Ans : 21 year, 28 year
- The ages of Rahul and Haroon are in the ratio 1 : 2. two years later the sum of their ages will be 55 years. What are their present ages?
Ans : 17, 34

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 ?



Sol :

Let the number of boys in the class $7x$ and the number of girls in the class $5x$.

According to the question, we have

$$7x = 5x + 8$$

$$7x - 5x = 8$$

$$2x = 8$$

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

Thus, the number of boys in the class = $7 \times 4 = 28$

the number of girls in the class = $5 \times 4 = 20$

The total number of students in the class

$$= 28 + 20$$

$$= 48$$

PRACTICE :

- The number of boys and girls in a class are in the ratio 6 : 5. The number of boys is 10 more than the number of girls. What is the total class strength ?
Ans : 60, 50
- The number of boys and girls in a class are in the ratio 4 : 3. The number of boys is 7 more than the number of girls. What is the total class strength ?
Ans : 28, 21

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?

Sol :

Let the present age of Baichung be x years.

Then, the present age. of Baichung's father

$$= (x + 29) \text{ years}$$

and the present age of Baichung's grandfather

$$= [(x + 29) + 26] \text{ years}$$

$$= (x + 55) \text{ year}$$

According to the question,

$$x + (x + 29) + (x + 55) = 135$$

$$x + x + 29 + x + 55 = 135$$

$$3x + 84 = 135$$

$$3x = 135 - 84 = 51$$

$$x = \frac{51}{3} = 17$$

Thus, the present age of Baichung = 17 years

The present age of Baichung's father

$$= (17 + 29) \text{ years}$$

$$= 46 \text{ years}$$

The present age of Baichung's grandfather

$$= (17 + 55) \text{ years}$$

$$= 72 \text{ years}$$



Thus the present age of Ravi is 5 years.

PRACTICE :

1. Ten years from now Ravi's age will be two times his present age. What is Ravi's present .age ?

Ans : 10 years

2. Twenty years from now Ravi's age will be three times his present age. What is Ravi's present .age ?

Ans : 10 year

13. A rational number is such that when you multiply it by $\frac{5}{2}$ and add $\frac{2}{3}$ to the product you get $-\frac{7}{12}$. What is the number?



Sol :

Let the rational number be x .

According to the question, we have

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

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

$$\frac{5}{2}x = \frac{-7 - 2 \times 4}{12}$$

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

$$x = \frac{-15}{12} \times \frac{2}{5} = \frac{-1}{2}$$

Thus, the required rational number = $-\frac{1}{2}$

PRACTICE :

1. Baichung's father is 25 years younger than Baichung's grandfather and 27 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?

Ans : 17 year, 44 year, 69 year

2. Baichung's father is 24 years younger than Baichung's grandfather and 26 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?

Ans : 25 year, 51 year, 75 year

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

Sol :

Let the present age of Ravi be x years.

Then, the age of Ravi after 15 years

$$= (x + 15) \text{ years}$$

According to the question, we have

$$x + 15 = 4x$$

$$4x = x + 15$$

$$4x - x = 15$$

$$3x = 15$$

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



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



Sol :

Let the number of notes of ₹100 Lakshmi has = $2x$

Then, the number of notes of ₹50 Lakshmi has = $3x$

and the number of notes of ₹10 Lakshmi has = $5x$

According to the question,

$$100 \times 2x + 50 \times 3x + 10 \times 5x = 4,00,000$$

$$200x + 150x + 50x = 4,00,000$$

$$400x = 4,00,000$$

$$x = \frac{4,00,000}{400}$$

$$= 1000$$

Thus, the number of notes of ₹100 Lakshmi has

$$= 2 \times 1000$$

$$= 2000$$

The number of notes of ₹50 Lakshmi has

$$= 3 \times 1000$$

$$= 3000$$

The number of notes of ₹10 Lakshmi has

$$= 5 \times 1000$$

$$= 5000$$

PRACTICE :

1. Lakshmi is a cashier in a bank. She has currency notes of denominations ₹100, ₹50 and ₹10, respectively. The ratio of the number of these notes is 1 : 2 : 5. The total cash with Lakshmi is ₹2,00,000. How many notes of each denomination does she have ?

Ans : ₹ 100 = 800, ₹ 50 = 1600, ₹ 10 = 4000

2. Lakshmi is a cashier in a bank. She has currency notes of denominations ₹100, ₹50 and ₹10, respectively. The ratio of the number of these notes is 1 : 2 : 10. The total cash with Lakshmi is ₹3,00,000. How many notes of each denomination does she have ?

Ans : ₹ 100 = 1000, ₹ 50 = 2000, ₹10 = 10000

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



Sol :

Total number of coins = 160

Let the number of coins of denomination ₹5 = x

Then, the number of coins of denomination ₹2 = $3x$ and the number of coins of denomination ₹1

$$= 160 - x - 3x$$

$$= 160 - 4x$$

According to the question,

$$5 \times x + 2 \times 3x + 1 \times (160 - 4x) = 300$$

$$5x + 6x + 160 - 4x = 300$$

$$11x - 4x = 300 - 160$$

$$7x = 140$$

$$x = \frac{140}{7} = 20$$

Thus, the number of coins of denomination ₹1

$$= 160 - 4 \times 20 = 80$$

the number of coins of denomination ₹2

$$= 3 \times 20 = 60$$

number of coins of denomination ₹5 = 20

PRACTICE :

1. I have a total of ₹280 in coins of denomination ₹1, ₹2 and ₹5. The number of ₹2 coins is 2 times the number of ₹5 coins. The total number of coins is 160. How many coins of each denomination are with me?

Ans : ₹1 = 100, ₹2 = 40, ₹5 = 20

2. I have a total of ₹280 in coins of denomination ₹1, ₹2 and ₹5. The number of ₹2 coins is 2 times the number of ₹5 coins. The total number of coins is 100. How many coins of each denomination are with me?

Ans : ₹1 = 10, ₹2 = 60, ₹5 = 30

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



Sol :

Let the number of winners in the competition be x . Then, the number of remaining participants in the competition will be $(63 - x)$.

According to the question,

$$x \times 100 + (63 - x) \times 25 = 3000$$

$$100x + 1575 - 25x = 3000$$

$$100x - 25x = 3000 - 1575$$

$$75x = 1425$$

$$x = \frac{1425}{75} = 19$$

Thus, the number of winners in the competition = 19

PRACTICE :

1. The organisers of an essay competition decide that a winner in the competition gets a prize of ₹100 and a participant who does not win gets a prize of ₹25. The total prize money distributed is ₹4,000. Find the number of winners, if the total number of participants is 70.

Ans : 30

2. The organisers of an essay competition decide that a winner in the competition gets a prize of ₹150 and a participant who does not win gets a prize of ₹25. The total prize money distributed is ₹6,000. Find the number of winners, if the total number of participants is 65.

Ans : 35

EXERCISE 2.3

Solve the following equations and check your results:

1. $3x = 2x + 18$

Sol :

We have $3x = 2x + 18$
 $3x - 2x = 18$ (Transposing $2x$ to LHS)
 $x = 18$

Check :

Placing $x = 18$ in the given equation

$$\text{LHS} = 3x = 3 \times 18 = 54$$

$$\text{RHS} = 2x + 18$$

$$= 2 \times 18 + 18 = 54$$

Thus, for $x = 18$.

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $5x = 3x + 30$

(b) $6x = 4x + 40$

Ans : (a) 15 (b) 20

2. $5t - 3 = 3t - 5$

Sol :

We have $5t - 3 = 3t - 5$

Transposing $3t$ to LHS and -3 to RHS we get

$$5t - 3t = -5 + 3$$

$$2t = -2$$

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

Check :

Placing $t = -1$ in the given equation we have

$$\text{LHS} = 5t - 3 = 5 \times (-1) - 3$$

$$= -5 - 3 = -8$$

$$\text{RHS} = 3t - 5 = 3 \times (-1) - 5$$

$$= -3 - 5 = -8$$

Thus, for $t = -1$

$$\text{LHS} = \text{RHS.}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $6t - 3 = 4t - 7$

(b) $9t - 3 = 8t - 7$

Ans : (a) -2 (b) -4

3. $5x + 9 = 5 + 3x$

Sol :

We have $5x + 9 = 5 + 3x$

Transposing $3x$ to LHS and 9 to RHS we get

$$5x - 3x = 5 - 9$$

$$2x = -4$$

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

Check :

Placing $x = -2$ in the given equation we have

$$\text{LHS} = 5x + 9 = 5 \times (-2) + 9$$

$$= -10 + 9 = -1$$

$$\text{RHS} = 5 + 3x = 5 + 3 \times (-2)$$

$$= 5 - 6 = -1$$

Thus, for $x = -2$,

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $10x + 9 = 5 + 6x$

(b) $10x + 7 = 9 + 12x$

Ans : (a) -1 (b) -1

4. $4z + 3 = 6 + 2z$

Sol :

We have $4z + 3 = 6 + 2z$

Transposing $2z$ to LHS and 3 to RHS we have

$$4z - 2z = 6 - 3$$

$$2z = 3$$

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

Check :

Placing $z = \frac{3}{2}$ in the given equation we have

$$\text{LHS} = 4z + 3 = 4 \times \frac{3}{2} + 3$$

$$= 6 + 3 = 9$$

$$\text{RHS} = 6 + 2z = 6 + 2 \times \frac{3}{2}$$

$$= 6 + 3 = 9$$

Thus, for $z = \frac{3}{2}$,

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $4z + 6 = 9 + 2z$

(b) $8z + 3 = 6 + 4z$

Ans : (a) $\frac{3}{2}$ (b) $\frac{3}{4}$

5. $2x - 1 = 14 - x$



Sol :

We have $2x - 1 = 14 - x$

Transposing $-x$ to LHS and -1 to RHS we have

$$2x + x = 14 + 1$$

$$3x = 15$$

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

Check :

Placing $x = 5$, in the given equation

$$\text{LHS} = 2x - 1 = 2 \times 5 - 1$$

$$= 10 - 1 = 9$$

$$\text{RHS} = 14 - x = 14 - 5 = 9$$

Thus, for $x = 5$

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $4x - 6 = 14 - x$ (b) $6x - 7 = 14 - x$

Ans : (a) $x = 4$ (b) $x = 3$

6. $8x + 4 = 3(x - 1) + 7$



Sol :

We have $8x + 4 = 3(x - 1) + 7$

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

$$8x + 4 = 3x + 4$$

[Transposing $3x$ to LHS and 4 to RHS we have

$$8x - 3x = 4 - 4$$

$$5x = 0$$

$$x = \frac{0}{5} = 0$$

Check :

Placing $x = 0$ in the given equation we get

$$\text{LHS} = 8x + 4 = 8 \times 0 + 4$$

$$= 0 + 4 = 4$$

$$\text{RHS} = 3(x - 1) + 7 = 3(0 - 1) + 7$$

$$= 3 + 7 = 4$$

Thus, for $x = 0$,

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $9x + 3 = 3(x - 1) + 12$

(b) $9x + 1 = 4(x - 1) + 20$

Ans : (a) $x = 1$ (b) $x = 3$

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



Sol :

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

Multiplying by 5 from both sides

$$5x = 4(x + 10)$$

$$5x = 4x + 40$$

$$5x - 4x = 40$$

Thus,

$$x = 40$$

Check :

Placing $x = 40$, in the given equation

$$\text{LHS} = x = 40$$

$$\text{RHS} = \frac{4}{5}(x + 10) = \frac{4}{5}(40 + 10)$$

$$= \frac{4}{5} \times 50 = 40$$

Thus, for $x = 40$

$$\text{LHS} = \text{RHS.}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $x = \frac{7}{9}(x + 10)$ (b) $x = \frac{8}{10}(x + 5)$

Ans : (a) $x = 35$ (b) $x = 20$

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



Sol :

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

Multiplying both sides by 15 (LCM of 3 and 15)

$$15\left(\frac{2x}{3} + 1\right) = 15\left(\frac{7x}{15} + 3\right)$$

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

$$10x + 15 = 7x + 45$$

Transposing $7x$ to LHS and 15 to RHS we have

$$10x - 7x = 45 - 15$$

$$x = \frac{30}{3} = 10$$

Check :

Placing $x = 10$ in the given equation

$$\text{LHS} = \frac{2x}{3} + 1 = \frac{2}{3} \times 10 + 1$$

$$= \frac{20}{3} + 1 = \frac{20+3}{3} = \frac{23}{3}$$

$$\text{RHS} = \frac{7x}{15} + 3 = \frac{7}{15} \times 10 + 3$$

$$= \frac{14}{3} + 3 = \frac{14+9}{3} = \frac{23}{3}$$

Thus, for $x = 10$

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $\frac{4x}{3} + 1 = \frac{14x}{15} + 3$ (b) $\frac{x}{3} + 1 = \frac{x}{15} + 3$

Ans : (a) $x = 5$ (b) $x = 15$

9. $2y + \frac{5}{3} = \frac{26}{3} - y$

Sol :

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

Transposing $-y$ to LHS and $\frac{5}{3}$ to RHS we have

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

$$3y = \frac{26-5}{3} = \frac{21}{3} = 7$$

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

Check :

Placing $y = \frac{7}{3}$ in the given equation

$$\text{LHS} = 2y + \frac{5}{3} = 2 \times \frac{7}{3} + \frac{5}{3}$$

$$= \frac{14}{3} + \frac{5}{3} = \frac{14+5}{3} = \frac{19}{3}$$

$$\text{RHS} = \frac{26}{3} - y = \frac{26}{3} - \frac{7}{3}$$

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

Thus, for $y = \frac{7}{3}$,

$$\text{LHS} = \text{RHS.}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $4y + \frac{5}{4} = \frac{15}{4} - 2y$ (b) $y + \frac{3}{4} = \frac{13}{4} - 2y$

Ans : (a) $5/12$ (b) $5/6$

10. $3m = 5m - \frac{8}{5}$

Sol :

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

Transposing $5m$ to LHS we have

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

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

$$m = -\frac{8}{5} \times -\frac{1}{2} = \frac{4}{5}$$

Check :

Placing $m = \frac{4}{5}$ in the given equation

$$\text{LHS} = 3m = 3 \times \frac{4}{5} = \frac{12}{5}$$

$$\text{RHS} = 5m - \frac{8}{5} = 5 \times \frac{4}{5} - \frac{8}{5}$$

$$= \frac{20}{5} - \frac{8}{5} = \frac{12}{5}$$

Thus, for $m = \frac{4}{5}$,

$$\text{LHS} = \text{RHS}$$

PRACTICE :

1. Solve the following equation and check your results:

(a) $5m = 9m - \frac{8}{5}$ (b) $10m = 18m - \frac{16}{10}$

Ans : (a) $\frac{2}{5}$ (b) $\frac{1}{5}$

EXERCISE 2.4

1. Amina thinks of a number and subtracts $\frac{5}{2}$ 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?

Sol :

Let the number Amina thought of be x .
According to the question

$$\left(x - \frac{5}{2}\right) \times 8 = 3x$$

$$8x - \frac{5}{2} \times 8 = 3x$$

Transposing $3x$ to LHS and -20 to RHS we have

$$8x - 20 = 3x$$

$$8x - 3x = 20$$

$$5x = 20$$

$$x = \frac{20}{5} = 4$$

Thus, the number Amina thought 4.



PRACTICE :

1. Amina thinks of a number and subtracts $\frac{1}{2}$ from it. She multiplies the result by 8. The result now obtained is 4 times the same number she thought of. What is the number?

Ans : 1

2. Amina thinks of a number and subtracts $\frac{3}{2}$ from it. She multiplies the result by 16. The result now obtained is 8 times the same number she thought of. What is the number?

Ans : 3

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 of the other new number. What are the numbers?

Sol :

Let the second number be x .

Then, the first number = $5x$

According to the question, we have

$$5x + 21 = 2 \times (x + 21)$$

$$5x + 21 = 2x + 42$$

$$5x - 2x = 42 - 21$$

[Transposing $2x$ to LHS and 21 to RHS]

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

Thus, the first number = $5 \times 7 = 35$

The second number = 7



PRACTICE :

1. A positive number is 4 times another number. If 20 is added to both the numbers, then one of the new numbers becomes thrice of the other new number. What are the numbers?

Ans : 40, 160

2. A positive number is 6 times another number. If 15 is added to both the numbers, then one of the new numbers becomes thrice of the other new number. What are the numbers?

Ans : 10, 60

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?

Sol :

Let the ones digit of the number be x .

Then, the tens digit of the number = $(9 - x)$

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



$$= 90 - 10x + x$$

$$= 90 - 9x$$

The number obtained by interchanging the place of digits

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

$$= 10x + 9 - x$$

$$= 9x + 9$$

According to the question,

$$9x + 9 = (90 - 9x) + 27$$

$$9x + 9 = 90 - 9x + 27$$

Transposing $-9x$ to LHS and 9 to RHS,

$$9x + 9x = 90 + 27 - 9$$

$$18x = 117 - 9 = 108$$

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

Thus, the required two-digit number

$$= 90 - 9 \times 6$$

$$= 90 - 54 = 36$$

PRACTICE :

1. Sum of the digits of a two-digit number is 8. When we interchange the digits, it is found that the resulting new number is greater than the original number by 36. What is the two-digit number?

Ans : 26

2. Sum of the digits of a two-digit number is 7. When we interchange the digits, it is found that the resulting new number is greater than the original number by 9. What is the two-digit number?

Ans : 34

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?



Sol :

Let the ones digit of the number be x , then, the tens digit of the number will be $3x$.

$$\text{Number} = 10 \times 3x + x$$

$$= 30x + x$$

$$= 31x$$

The number obtained by interchanging the place of digits

$$= 10 \times x + 3x$$

$$= 10x + 3x$$

$$= 13x$$

According to the question,

$$31x + 13x = 88$$

$$44x = 88$$

$$x = \frac{88}{44} = 2$$

Thus, the required original number = $31 \times 2 = 62$

PRACTICE :

1. One of the two digits of a two digit number is four. 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 110. What is the original number?

Ans : 82

2. One of the two digits of a two digit number is two 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 99. What is the original number?

Ans : 63

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 ?



Sol :

Let Shobo's present age be x years.

Then, Shobo's mother's present age = $6x$ years

After 5 years Shobo's age = $(x + 5)$ years

According to the question,

$$x + 5 = \frac{1}{3} \times (6x)$$

$$x + 5 = 2x$$

$$2x = x + 5$$

$$2x - x = 5 \quad [\text{Transposing } x \text{ to LHS}]$$

Shobo's present age = 5 years

Thus, Shobo's mother's present age = (5×6) years
= 30 years

PRACTICE :

1. Shobo's mother's present age is twele times Shobo's present age. Shobo's age ten years from now will be half of his mother's present age. What are their present ages ?

Ans : 2 year, 24 year

2. Shobo's mother's present age is eight times Shobo's present age. Shobo's age six years from now will be one fourth of his mother's present age. What are their present ages ?

Ans : 6 year, 48 year

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 of ₹100 per metre it will cost the village panchayat ₹75,000 to fence the plot. What are the dimensions of the plot ?

Sol :

Let the length of the rectangular plot = $11x$ m
and the breadth of the rectangular plot = $4x$ m
The perimeter of the rectangular plot,

$$= 2 \times (\text{length} + \text{breadth})$$

$$= 2 \times (11x + 4x) \text{ m}$$

$$= 2 \times 15x \text{ m}$$

$$= 30x \text{ m}$$

The cost of fencing $30x$ m plot at the rate of ₹100 per metre

$$= ₹ (100 \times 30x)$$

$$= ₹ 3000x$$



According to the question,

$$3000x = 75,000$$

$$x = \frac{75,000}{3,000}$$

$$= 25$$

Thus, the length of the rectangular plot

$$= (11 \times 25) \text{ m} = 275 \text{ m}$$

the breadth of the rectangular plot

$$= (4 \times 25) \text{ m} = 100 \text{ m}$$

PRACTICE :

1. There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 9 : 2. At the rate of ₹100 per metre it will cost the village panchayat ₹88,000 to fence the plot. What are the dimensions of the plot ?

Ans : 360 m, 80 m

2. There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 7 : 2. At the rate of ₹100 per metre it will cost the village panchayat ₹90,000 to fence the plot. What are the dimensions of the plot ?

Ans : 450 m, 100 m

7. Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him ₹50 per metre and trouser material that costs him ₹90 per metre. For every 2 metres 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 ₹36,660. How much trouser material did he buy?

Sol :

Let the cloth bought by Hasan for trouser $2x$.

Then, the cloth bought by Hasan for shirt = $3x$ m

Cost price of $3x$ m shirt cloth .at the
rate of ₹50 = ₹(50 × 3x) = ₹150x

Cost price of $2x$ m trouser cloth at the
rate of ₹90 = ₹(90 × 2x) = ₹180x

Now, profit on the cloth of shirt = 12%
Selling price of the cloth of shirt

$$= \text{Cost price} \times \frac{(100 + \text{Profit}\%)}{100}$$

$$= 150x \times \frac{(100 + 12)}{100}$$

$$= 150x \times \frac{112}{100}$$

$$= ₹168x$$



Now, profit on the cloth of trouser = 10%
Selling price of the cloth of trouser

$$= \text{Cost price} \times \frac{(100 + \text{Profit}\%)}{100}$$

$$= 180x \times \frac{(100 + 10)}{100}$$

$$= 180x \times \frac{110}{100} = ₹198x$$

According to the question,

$$168x + 198x = 36,660$$

$$366x = 36,660$$

$$x = \frac{36,660}{366} = 100.16$$

Thus, the cloth bought by Hasan for trouser

$$= (2 \times 100.16) \text{ m}$$

$$= 200.32 \text{ m} \simeq 200 \text{ m}$$

PRACTICE :

1. Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him ₹50 per metre and trouser material that costs him ₹100 per metre. For every 4 metres of the trouser material he buys 3 metres of the shirt material. He sells the materials at 12% .and 12% profit respectively. His total sale is ₹60,500. How much trouser material did he buy?

Ans : 400, 300

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 reeds in the herd.

Sol :



Let the number of deer in the herd = x

Then, the number of deer grazing in the field = $\frac{x}{2}$
and the number of deer playing in the field

$$= \frac{3}{4} \times \left(x - \frac{x}{2}\right)$$

$$= \frac{3}{4} \times \frac{x}{2} = \frac{3x}{8}$$

The number of deer drinking water in the pond = 9
According to the question,

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

Multiplying both sides by 8

$$\frac{x}{2} \times 8 + \frac{3x}{8} \times 8 + 9 \times 8 = x \times 8$$

$$4x + 3x + 72 = 8x$$

Transposing $8x$ to LHS and 72 to RHS we have

$$7x - 8x = - 72$$

$$- x = - 72$$

$$x = 72$$

Thus, the number of deers in the herd = 72

PRACTICE :

1. Half of a herd of deer are grazing in the field and three-fourths of the remaining are playing nearby. The rest 10 are drinking water from the pond. Find the number of reeds in the herd.

Ans : 80

2. Half of a herd of deer are grazing in the field and three-fourths of the remaining are playing nearby. The rest 12 are drinking water from the pond. Find the number of reeds in the herd.

Ans : 96

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



Sol :

Let the present age of the granddaughter be x years
Then, the present age of the grandfather = $10x$ years
According to the question,

$$10x = x + 54$$

$$10x - x = 54 \quad [\text{Transposing } x \text{ to LHS}]$$

$$9x = 54$$

$$x = \frac{54}{9} = 6$$

Thus, the present age of the granddaughter = 6 years
the present age of the grandfather = (10×6) years = 60 years

PRACTICE :

1. A grandfather is fifteen times older than his granddaughter. He is also 54 years older than her. Find their present ages.

Ans : 4 year, 60 year

2. A grandfather is eight times older than his granddaughter. He is also 49 years older than her. Find their present ages.

Ans : 7 year, 56 year

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.



Sol :

Let the present age of the son be x .

Then, the present age of Aman (father) will be $3x$.

The age of the son 10 years before

$$= (x - 10) \text{ years}$$

The age of Aman (father) 10 years before

$$= (3x - 10) \text{ years}$$

According to the question,

$$3x - 10 = 5 \times (x - 10)$$

$$3x - 10 = 5x - 50$$

Transposing $5x$ to LHS and -10 to RHS, we have

$$3x - 5x = -50 + 10$$

$$-2x = -40$$

$$x = \frac{-40}{-2} = 20$$

Thus, the present age of the son = 20 years

the present age of Aman (father)

$$= (3 \times 20) \text{ years}$$

$$= 60 \text{ years}$$

PRACTICE :

1. Aman’s age is three times his son’s age. Twenty years ago he was eight times his son’s age. Find their present ages.

Ans : 28 year, 84 year

2. Aman’s age is four times his son’s age. Ten years ago he was six times his son’s age. Find their present ages.

Ans : 25 year, 100 year

EXERCISE 2.5

Solve the following linear equations (Questions 1 to 6) :

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



Sol :

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

LCM of 2, 5, 3 and 4 is 60. Thus multiplying both sides by 60,

$$60 \times \frac{x}{2} - 60 \times \frac{1}{5} = 60 \times \frac{x}{3} + 60 \times \frac{1}{4}$$

$$30x - 12 = 20x + 15$$

Transposing $20x$ to LHS and -12 to RHS,

$$30x - 20x = 15 + 12$$

$$10x = 27$$

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

PRACTICE :

1. Solve the following linear equations .

(a) $\frac{x}{3} - \frac{1}{6} = \frac{x}{4} + \frac{1}{4}$ (b) $\frac{x}{2} - \frac{1}{3} = \frac{x}{4} + \frac{1}{5}$

Ans : (a) $x = 5$ (b) $\frac{32}{15}$

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



Sol :

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

LCM of 2, 4 and 6 is 12. Thus multiplying both sides by 12,

$$12 \times \frac{n}{2} - 12 \times \frac{3n}{4} + 12 \times \frac{5n}{6} = 12 \times 21$$

$$6n - 9n + 10n = 252$$

$$16n - 9n = 252$$

$$7n = 252$$

$$n = \frac{252}{7} = 36$$

PRACTICE :

1. Solve the following linear equations .

(a) $\frac{n}{2} - \frac{n}{3} + \frac{5n}{6} = 28$ (b) $\frac{n}{5} - \frac{n}{3} + \frac{5n}{6} = 35$

Ans : 2.(a) $n = 28$ (b) $n = 50$

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



Sol :

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

LCM of 3, 6 and 2 is 6. Thus multiplying both sides by 6,

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

$$6x + 42 - 16x = 17 - 15x$$

Transposing $-15x$ to LHS and 42 to RHS,

$$6x - 16x + 15x = 17 - 42$$

$$21x - 16x = -25$$

$$5x = -25$$

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

PRACTICE :

1. Solve the following linear equations .

(a) $x + 5 - \frac{7x}{3} = \frac{16}{6} - \frac{5x}{2}$

(b) $x + 2 - \frac{7x}{2} = \frac{18}{6} - \frac{7x}{2}$

Ans : (a) $x = -2$ (b) $x = 1$

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

Sol :

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

LCM of 3 and 5 is 15. Thus multiplying both sides by 15

$$15 \times \frac{(x-5)}{3} = 15 \times \frac{(x-3)}{5}$$

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

$$5x - 25 = 3x - 9$$

Transposing $3x$ to LHS and -25 to RHS,

$$5x - 3x = -9 + 25$$

$$2x = 16$$

$$x = \frac{16}{2} = 8$$



PRACTICE :

1. Solve the following linear equations

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

(b) $\frac{6t-2}{3} - \frac{4t+3}{2} = \frac{1}{3} - t$

Ans : (a) $t = 1$ (b) $t = \frac{5}{2}$

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

Sol :

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

LCM of 2 and 3 is 6. Thus multiplying both sides by 6

$$6 \times m - 6 \times \frac{(m-1)}{2} = 6 \times 1 - 6 \times \frac{(m-2)}{3}$$

$$6m - 3(m-1) = 6 - 2(m-2)$$

$$6m - 3m + 3 = 6 - 2m + 4$$

Transposing $-2m$ to LHS and 3 to RHS,

$$6m - 3m + 2m = 6 + 4 - 3$$

$$5m = 7$$

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



Simplify and solve the following linear equations.

PRACTICE :

1. Solve the following linear equations .

(a) $\frac{x-3}{2} = \frac{x-2}{4}$ (b) $\frac{x-2}{3} = \frac{x-4}{6}$

Ans : (a) $x = 4$ (b) $x = 0$

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

Sol :

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

LCM of 4, 3 and 3 is 12. Thus multiplying both sides by 12

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

$$3(3t-2) - 4(2t+3) = 4 \times 2 - 12t$$

$$9t - 6 - 8t - 12 = 8 - 12t$$

Transposing $-12t$ to LHS and -6 and -12 to RHS,

$$9t - 8t + 12t = 8 + 6 + 12$$

$$13t = 26$$

$$t = \frac{26}{13} = 2$$



PRACTICE :

1. Solve the following linear equations

(a) $m - \frac{m-2}{3} = 1 - \frac{m-1}{5}$

(b) $2m - \frac{m-4}{3} = 1 - \frac{m-4}{5}$

Ans : (a) $m = \frac{8}{13}$ (b) $m = \frac{1}{4}$

7. $3(t-3) = 5(2t+1)$

Sol :

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

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

Transposing $10t$ to LHS and -9 to RHS,

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

$$-7t = 14$$

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



PRACTICE :

1. Solve the following linear equations

(a) $3(t-3) = 3(3t+1)$

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

Ans : (a) $t = -2$ (b) $t = -7$

8. $15(y - 4) - 2(y - 9) + 5(y + 6) = 0$



Sol :

We have,

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

$$15y - 60 - 2y + 18 + 5y + 30 = 0$$

$$15y - 2y + 5y = 60 - 18 - 30$$

[Transposing $-60, 18, 30$ to RHS]

$$20y - 2y = 60 - 48$$

$$18y = 12$$

$$y = \frac{12}{18} = \frac{2}{3}$$

PRACTICE :

1. Solve the following linear equations
 (a) $20(y - 4) - 3(y - 1) + 10(y + 7) = 0$
 (b) $10(y - 2) - 2(y - 1) + 10(y + 9) = 0$
Ans : (a) $y = \frac{7}{27}$ (b) $y = -4$

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



Sol :

We have

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

$$15z - 21 - 18z + 22 = 32z - 52 - 17$$

Transposing $32z$ to LHS and -21 and 22 to RHS,

$$15z - 18z - 32z = -52 - 17 + 21 - 22$$

$$15z - 50z = 21 - 91$$

$$-35z = -70$$

$$z = \frac{-70}{-35} = 2$$

PRACTICE :

1. Solve the following linear equations
 (a) $2(4z - 6) - 2(4z - 10) = 2(7z - 12) - 16$
 (b) $3(4z - 5) - 2(3z - 7) = 2(7z - 12) - 9$
Ans : (a) $z = \frac{24}{7}$ (b) $z = 4$

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



Sol :

We have

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

$$1.00f - 0.75 = 0.50f - 0.45$$

Transposing $0.50f$ to LHS and -0.75 to RHS,

$$1.00f - 0.50f = -0.45 + 0.75$$

$$0.50f = 0.30$$

$$f = \frac{0.30}{0.50} = 0.6$$

PRACTICE :

1. Solve the following linear equations
 (a) $0.30(2f - 3) = 0.20(10f - 9)$
 (b) $0.30(f - 3) = 0.20(f - 12)$
Ans : (a) $f = 0.9$ (b) $f = -15$

EXERCISE 2.6

Solve the following equations (Q.1 to Q.5) :

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



Sol :

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

Multiplying both sides by $3x$

$$3x \times \frac{(8x - 3)}{3x} = 3x \times 2$$

$$8x - 3 = 6x$$

$$8x - 6x = 3$$

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

Thus, $x = \frac{3}{2}$ is the required solution.

PRACTICE :

1. Solve the following equations :
 (a) $\frac{9x - 3}{2x} = 3$ (b) $\frac{18x - 27}{x} = 9$
Ans : (a) $x = 1$ (b) $x = 3$

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



Sol :

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

Multiplying both sides by $(7 - 6x)$, we have

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

$$9x = 105 - 90x$$

$$9x + 90x = 105$$

$$99x = 105$$

$$x = \frac{105}{99} = \frac{35}{33}$$

Thus, $x = \frac{35}{33}$ is the required solution.

PRACTICE :

1. Solve the following equations :

(a) $\frac{8x}{9-6x} = 10$ (b) $\frac{8x}{11-6x} = 14$

Ans : (a) $x = \frac{45}{34}$ (b) $x = \frac{77}{46}$

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

Sol :

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

By cross-multiplication we get

$$9z = 4(z + 15)$$

$$9z = 4z + 60$$

$$9z - 4z = 60$$

$$5z = 60$$

$$z = \frac{60}{5} = 12$$

Thus, $z = 12$ is the required solution.



PRACTICE :

1. Solve the following equations :

(a) $\frac{z}{z+15} = \frac{2}{8}$ (b) $\frac{z}{z+10} = \frac{5}{7}$

Ans : 3. (a) $z = 5$ (b) $z = 25$

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

Sol :

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

By cross-multiplication we get

$$5(3y + 4) = -2(2 - 6y)$$

$$15y + 20 = -4 + 12y$$

$$15y - 12y = -4 - 20$$

$$3y = -24$$

$$y = \frac{-24}{3} = -8$$

Thus, $y = -8$ is the required solution.



PRACTICE :

1. Solve the following equations :

(a) $\frac{y+2}{2-6y} = \frac{-2}{10}$ (b) $\frac{y+1}{2-6y} = \frac{-3}{10}$

Ans : 4. (a) $y = 12$ (b) $y = 2$

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

Sol :

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



By cross-multiplication we get

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

$$21y + 12 = -4y - 8$$

$$21y + 4y = -8 - 12$$

$$25y = -20$$

$$y = \frac{-20}{25} = \frac{-4}{5}$$

Thus, $y = \frac{-4}{5}$ is the required solution

PRACTICE :

1. Solve the following equations :

(a) $\frac{(6y+1)}{y+2} = \frac{-3}{2}$ (b) $\frac{(6y+1)}{(2y+3)} = \frac{-3}{5}$

Ans : (a) $y = \frac{-8}{15}$ (b) $y = \frac{-7}{18}$

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.

Sol :

Let the present age of Hari = $5x$ years

and the present age of Harry = $7x$ years

After 4 years, the age of Hari = $(5x + 4)$ years

After 4 years, the age of Harry = $(7x + 4)$ years

According to the question, we have

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

By cross-multiplication we get

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

$$20x + 16 = 21x + 12$$

$$20x - 21x = 12 - 16$$

$$-x = -4$$

$$x = 4$$

Thus, the present age of Hari = $5 \times 4 = 20$ years

and the present age of Harry = $7 \times 4 = 28$ years



PRACTICE :

1. The ages of Hari and Harry are in the ratio 3 : 5. Five years from now the ratio of their ages will be 4 : 5. Find their present ages.

Ans : 3 year, 5 year

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

Ans : 10 year, 14 year

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.

Sol :

Let the numerator of the rational number be x .

Then, the denominator of the rational number = $x + 8$

and rational number = $\frac{x}{x+8}$

According to the question, we have

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

By cross-multiplication we get

$$2(x+17) = 3(x+7)$$

$$2x+34 = 3x+21$$

$$2x-3x = 21-34$$

$$-x = -13$$

$$x = 13$$

Thus, the required rational number = $\frac{13}{13+8} = \frac{13}{21}$



PRACTICE :

1. The denominator of a rational number is greater than its numerator by 7. If the numerator is increased by 15 and the denominator is decreased by 2, the number obtained is $\frac{3}{2}$. Find the rational number.

Ans : $\frac{15}{22}$

2. The denominator of a rational number is greater than its numerator by 6. If the numerator is increased by 14 and the denominator is decreased by 3, the number obtained is $\frac{3}{2}$. Find the rational number.

Ans : $\frac{19}{25}$