## Exercise 2.1 Page: 23

**Solve the following equations.**

1. **$x - 2 = 7$**

Solution:

$x - 2 = 7$
$x=7+2$
$x=9$

2. **$y + 3 = 10$**

Solution:

$y + 3 = 10$
$y = 10 - 3$
$y = 7$

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

Solution:

$6 = z + 2$
$z + 2 = 6$
$z = 6-2$
$z=4$

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

Solution:

$\frac{3}{7} + x = \frac{17}{7}$
$x = \frac{17}{7} - \frac{3}{7}$
$x = \frac{14}{7}$
$x = 2$

5. **$6x = 12$**

Solution:

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

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

Solution:

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

$t = 10 \times 5$
$t = 50$

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

Solution:

$\frac{2x}{3} = 18$
$2x = 18 \times 3$
$2x = 54$
$x = \frac{54}{2}$
$x = 27$

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

Solution:

$1.6 = \frac{y}{1.5}$
$\frac{y}{1.5} = 1.6$
$y = 1.6 \times 1.5$
$y = 2.4$

**9.** $7x - 9 = 16$

Solution:

$7x - 9 = 16$
$7x = 16 + 9$
$7x = 25$
$x = \frac{25}{7}$

**10.** $14y - 8 = 13$

Solution:

$14y - 8 = 13$
$14y = 13 + 8$
$14y = 21$
$y = \frac{21}{14}$
$y = \frac{3}{2}$

**11.** $17 + 6p = 9$

Solution:

$17 + 6p = 9$
$6p = 9 - 17$
$6p = -8$

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

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

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

Solution:

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

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

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

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

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

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

## Exercise 2.2 Page: 28

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?**

Solution:

Let the number be x.
According to the question,

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

$\Rightarrow \frac{x}{2} - \frac{1}{4} = \frac{1}{8}$

$\Rightarrow \frac{x}{2} = \frac{1}{8} + \frac{1}{4}$

$\Rightarrow \frac{x}{2} = \frac{1}{8} + \frac{2}{8}$

$\Rightarrow \frac{x}{2} = \frac{1+2}{8}$

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

$\Rightarrow x = \frac{6}{8}$

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

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?**

Solution:

Given that,
Perimeter of rectangular swimming pool = 154 m
Let the breadth of rectangle be = x
According to the question,
Length of the rectangle = 2x + 2
We know that,
Perimeter = 2(length + breadth)

$\Rightarrow 2(2x + 2 + x) = 154$ m

$\Rightarrow 2(3x + 2) = 154$

$\Rightarrow 3x + 2 = \frac{154}{2}$

$\Rightarrow 3x = 77 - 2$

$\Rightarrow x = \frac{75}{3}$

$\Rightarrow x = 25$ m

∴,Breadth = x = 25 m
Length = 2x + 2

$= (2\times25)+2$
$= 50 + 2$
$= 52$ 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?**

Solution:

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

Perimeter of triangle $= 4\frac{2}{15}$cm$=\frac{62}{15}$

Let the length of equal sides of triangle be x.

According to the question,

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

$\Rightarrow 2x = (\frac{62}{15} - \frac{4}{3})$ cm

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

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

$\Rightarrow x = \frac{42}{15} \times \frac{1}{2}$

$\Rightarrow x = \frac{42}{30}$ cm

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

The length of either of the remaining equal sides are $\frac{7}{5}$ cm.

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

Solution:

Let one of the numbers be= x.

Then, the other number becomes x + 15

According to the question,

$x + x + 15 = 95$

$\Rightarrow 2x + 15 = 95$

$\Rightarrow 2x = 95 - 15$

$\Rightarrow 2x = 80$

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

$\Rightarrow x = 40$

First number $= x = 40$

And, other number $= x + 15 = 40 + 15 = 55$

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

Solution:

Let the two numbers be 5x and 3x.
According to the question,

$5x - 3x = 18$

$\Rightarrow 2x = 18$

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

$\Rightarrow x = 9$

Thus,

the numbers are $5x = 5 \times 9 = 45$

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

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

Solution:

Let the three consecutive integers be x, x+1 and x+2.
According to the question,

$x + (x+1) + (x+2) = 51$

$\Rightarrow 3x + 3 = 51$

$\Rightarrow 3x = 51 - 3$

$\Rightarrow 3x = 48$

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

$\Rightarrow x = 16$

Thus, the integers are

$x = 16$

$x+1 = 17$

$x+2 = 18$

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

Solution:

Let the three consecutive multiples of 8 be 8x, 8(x+1) and 8(x+2).
According to the question,

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

$\Rightarrow 8 (x + x+1 + x+2) = 888$ (Taking 8 as common)

$\Rightarrow 8 (3x + 3) = 888$

$\Rightarrow 3x + 3 = \frac{888}{8}$

$\Rightarrow 3x + 3 = 111$

$\Rightarrow 3x = 111 - 3$

$\Rightarrow 3x = 108$

$\Rightarrow x = \frac{108}{3}$

$\Rightarrow x = 36$

Thus, the three consecutive multiples of 8 are:

$8x = 8 \times 36 = 288$

$8(x+1) = 8 \times (36+1) = 8 \times 37 = 296$
$8(x+2) = 8 \times (36+2) = 8 \times 38 = 304$

**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.**

Solution:

Let the three consecutive integers are x, x+1 and x+2.
According to the question,

$2x + 3(x+1) + 4(x+2) = 74$
$\Rightarrow 2x + 3x + 3 + 4x + 8 = 74$
$\Rightarrow 9x + 11 = 74$
$\Rightarrow 9x = 74 - 11$
$\Rightarrow x = \frac{63}{9}$
$\Rightarrow x = 7$

Thus, the numbers are:

$x = 7$
$x+1 = 8$
$x+2 = 9$

**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?**

Solution:

Let the ages of Rahul and Haroon be 5x and 7x.
Four years later,
The ages of Rahul and Haroon will be (5x + 4) and (7x + 4) respectively.
According to the question,

$(5x + 4) + (7x + 4) = 56$
$\Rightarrow 5x + 4 + 7x + 4 = 56$
$\Rightarrow 12x + 8 = 56$
$\Rightarrow 12x = 56 - 8$
$\Rightarrow x = \frac{48}{12}$
$\Rightarrow x = 4$

$\therefore$, Present age of Rahul $= 5x = 5 \times 4 = 20$
And, present age of Haroon $= 7x = 7 \times 4 = 28$

**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?**

Solution:

Let the number of boys be 7x and girls be 5x.
According to the question,

$7x = 5x + 8$

$\Rightarrow 7x - 5x = 8$
$\Rightarrow 2x = 8$
$\Rightarrow x = \frac{8}{2}$
$\Rightarrow x = 4$

$\therefore$, Number of boys $= 7 \times 4 = 28$
And, Number of girls $= 5 \times 4 = 20$
Total number of students = 20+28 = 48

**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?**

Solution:

Let the age of Baichung's father be x.
Then, the age of Baichung's grandfather = (x+26)
and, Age of Baichung = (x-29)
According to the question,

$x + (x+26) + (x-29) = 135$
$\Rightarrow 3x + 26 - 29 = 135$
$\Rightarrow 3x - 3 = 135$
$\Rightarrow 3x = 135 + 3$
$\Rightarrow 3x = 138$
$\Rightarrow x = \frac{138}{3}$
$\Rightarrow x = 46$

Age of Baichung's father = x = 46
Age of Baichung's grandfather = (x+26) = 46 + 26 = 72
Age of Baichung = (x-29) = 46 - 29 = 17

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

Solution:

Let the present age of Ravi be x.
Fifteen years later, Ravi age will be x+15 years.
According to the question,

$x + 15 = 4x$
$\Rightarrow 4x - x = 15$
$\Rightarrow 3x = 15$
$\Rightarrow x = \frac{15}{3}$
$\Rightarrow x = 5$

$\therefore$, Present age of Ravi = 5 years.

**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?**

Solution:

Let the rational be x.

According to the question,

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

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

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

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

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

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

$$\Rightarrow x = (\frac{-5}{4}) \times \frac{2}{5}$$

$$\Rightarrow x = \frac{-10}{20}$$

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

$\therefore$, the rational number is $\frac{-1}{2}$

**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?**

Solution:

Let the numbers of notes of ₹100, ₹50 and ₹10 be 2x, 3x and 5x respectively.

Value of ₹100 = $2x \times 100 = 200x$

Value of ₹50 = $3x \times 50 = 150x$

Value of ₹10 = $5x \times 10 = 50x$

According to the question,

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

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

$$\Rightarrow x = \frac{400000}{400}$$

$$\Rightarrow x = 1000$$

Numbers of ₹100 notes = $2x = 2000$

Numbers of ₹50 notes = $3x = 3000$

Numbers of ₹10 notes = $5x = 5000$

**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?**

Solution:

Let the number of ₹5 coins be x.

Then,

number ₹2 coins = 3x

and, number of ₹1 coins = (160 - 4x)

Now,

Value of ₹5 coins = x × 5 = 5x

Value of ₹2 coins = 3x × 2 = 6x

Value of ₹1 coins = (160 - 4x) × 1 = (160 - 4x)

According to the question,

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

$\Rightarrow 11x + 160 - 4x = 300$

$\Rightarrow 7x = 140$

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

$\Rightarrow x = 20$

Number of ₹5 coins = x = 20

Number of ₹2 coins = 3x = 60

Number of ₹1 coins = (160 - 4x) = 160 - 80 = 80

**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.**

Solution:

Let the numbers of winner be x.

Then, the number of participants who didn't win = 63 - x

Total money given to the winner = x × 100 = 100x

Total money given to participant who didn't win = 25×(63-x)

According to the question,

$100x + 25\times(63-x) = 3,000$

$\Rightarrow 100x + 1575 - 25x = 3,000$

$\Rightarrow 75x = 3,000 - 1575$

$\Rightarrow 75x = 1425$

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

$\Rightarrow x = 19$

∴, the numbers of winners are 19.

## Exercise 2.3 Page: 30

**Solve the following equations and check your results.**

**1. $3x = 2x + 18$**

Solution:

$3x = 2x + 18$
$\Rightarrow 3x - 2x = 18$
$\Rightarrow x = 18$
Putting the value of x in RHS and LHS we get,
$3 \times 18 = (2 \times 18)+18$
$\Rightarrow 54 = 54$
$\Rightarrow$ LHS = RHS

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

Solution:

$5t - 3 = 3t - 5$
$\Rightarrow 5t - 3t = -5 + 3$
$\Rightarrow 2t = -2$
$\Rightarrow t = -1$
Putting the value of t in RHS and LHS we get,
$5\times(-1) - 3 = 3\times(-1) - 5$
$\Rightarrow -5 - 3 = -3 - 5$
$\Rightarrow -8 = -8$
$\Rightarrow$ LHS = RHS

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

Solution:

$5x + 9 = 5 + 3x$
$\Rightarrow 5x - 3x = 5 - 9$
$\Rightarrow 2x = -4$
$\Rightarrow x = -2$
Putting the value of x in RHS and LHS we get,
$5\times(-2) + 9 = 5 + 3\times(-2)$
$\Rightarrow -10 + 9 = 5 + (-6)$
$\Rightarrow -1 = -1$
$\Rightarrow$ LHS = RHS

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

Solution:

$4z + 3 = 6 + 2z$
$\Rightarrow 4z - 2z = 6 - 3$
$\Rightarrow 2z = 3$

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

Putting the value of z in RHS and LHS we get,

$(4 \times \frac{3}{2}) + 3 = 6 + (2 \times \frac{3}{2})$

$\Rightarrow 6 + 3 = 6 + 3$

$\Rightarrow 9 = 9$

$\Rightarrow$ LHS = RHS

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

Solution:

$2x - 1 = 14 - x$

$\Rightarrow 2x + x = 14 + 1$

$\Rightarrow 3x = 15$

$\Rightarrow x = 5$

Putting the value of x in RHS and LHS we get,

$(2\times5) - 1 = 14 - 5$

$\Rightarrow 10 - 1 = 9$

$\Rightarrow 9 = 9$

$\Rightarrow$ LHS = RHS

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

Solution:

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

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

$\Rightarrow 8x + 4 = 3x + 4$

$\Rightarrow 8x - 3x = 4 - 4$

$\Rightarrow 5x = 0$

$\Rightarrow x = 0$

Putting the value of x in RHS and LHS we get,

$(8\times0) + 4 = 3(0 - 1) + 7$

$\Rightarrow 0 + 4 = 0 - 3 + 7$

$\Rightarrow 4 = 4$

$\Rightarrow$ LHS = RHS

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

Solution:

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

$\Rightarrow x = \frac{4x}{5} + \frac{40}{5}$

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

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

$\Rightarrow x = 8 \times 5$

$\Rightarrow x = 40$

Putting the value of x in RHS and LHS we get,

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

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

$\Rightarrow 40 = \frac{200}{5}$

$\Rightarrow 40 = 40$

$\Rightarrow$ LHS = RHS

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

Solution:

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

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

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

$\Rightarrow 3x = 2 \times 15$

$\Rightarrow 3x = 30$

$\Rightarrow x = 10$

Putting the value of x in RHS and LHS we get,

$\frac{(2\times10)}{3} + 1 = \frac{(7\times10)}{15} + 3$

$\Rightarrow \frac{20}{3} + 1 = \frac{70}{15} + 3$

$\Rightarrow \frac{(20+3)}{3} = \frac{(70+45)}{15}$

$\Rightarrow \frac{23}{3} = \frac{115}{15}$

$\Rightarrow \frac{23}{3} = \frac{23}{3}$

$\Rightarrow$ LHS = RHS

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

Solution:

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

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

$\Rightarrow 3y = \frac{26-5}{3}$

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

$\Rightarrow 3y = 7$

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

Putting the value of y in RHS and LHS we get,

$(2\times\frac{7}{3}) + \frac{5}{3} = \frac{26}{3} - \frac{7}{3}$

$\frac{14}{3} + \frac{5}{3} = \frac{26}{3} - \frac{7}{3}$

$\Rightarrow \frac{14+5}{3} = \frac{26-7}{3}$

$\Rightarrow \frac{19}{3} = \frac{19}{3}$

$\Rightarrow$ LHS = RHS

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

Solution:

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

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

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

$\Rightarrow 2m \times 5 = 8$

$\Rightarrow 10m = 8$

$\Rightarrow m = \frac{8}{10}$

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

Putting the value of m in RHS and LHS we get,

$3 \times \frac{4}{5} = (5 \times \frac{4}{5}) - \frac{8}{5}$

$\Rightarrow \frac{12}{5} = 4 - \frac{8}{5}$

$\Rightarrow \frac{12}{5} = \frac{(20-8)}{5}$

$\Rightarrow \frac{12}{5} = \frac{12}{5}$

$\Rightarrow$ LHS = RHS

## Exercise 2.4 Page: 31

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?**

Solution:

Let the number be x.
According to the question,

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

$\Rightarrow 8x - \frac{40}{2} = 3x$

$\Rightarrow 8x - 3x = \frac{40}{2}$

$\Rightarrow 5x = 20$

$\Rightarrow x = 4$

Thus, the number is 4.

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?**

Solution:

Let one of the positive number be x then other number will be 5x.
According to the question,

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

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

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

$\Rightarrow 3x = 21$

$\Rightarrow x = 7$

One number $= x = 7$

Other number $= 5x = 5 \times 7 = 35$

The two numbers are 7 and 35.

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?**

Solution:

Let the digit at tens place be x then digit at ones place will be (9-x).
Original two digit number $= 10x + (9-x)$
After interchanging the digits, the new number $= 10(9-x) + x$
According to the question,

$10x + (9-x) + 27 = 10(9-x) + x$

$\Rightarrow 10x + 9 - x + 27 = 90 - 10x + x$

$\Rightarrow 9x$
$+ 36 = 90 - 9x$
$\Rightarrow 9x + 9x = 90 - 36$
$\Rightarrow 18x = 54$
$\Rightarrow x = 3$
Original number $= 10x + (9-x) = (10\times3) + (9-3) = 30 + 6 = 36$
Thus, the number is 36.

**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?**

Solution:

Let the digit at tens place be x then digit at ones place will be 3x.
Original two digit number $= 10x + 3x$
After interchanging the digits, the new number $= 30x + x$
According to the question,
$(30x + x) + (10x + 3x) = 88$
$\Rightarrow 31x + 13x = 88$
$\Rightarrow 44x = 88$
$\Rightarrow x = 2$
Original number $= 10x + 3x = 13x = 13\times2 = 26$

**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?**

Solution:

Let the present age of Shobo be x then age of her mother will be 6x.
Shobo's age after 5 years $= x + 5$
According to the question,
$(x + 5) = \frac{1}{3}\times 6x$
$\Rightarrow x + 5 = 2x$
$\Rightarrow 2x - x = 5$
$\Rightarrow x = 5$
Present age of Shobo $= x = 5$ years
Present age of Shobo's mother $= 6x = 30$ years

**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 ₹100 per metre it will cost the village panchayat ₹75000 to fence the plot. What are the dimensions of the plot?**

Solution:

Let the length of the rectangular plot be 11x and breadth be 4x.
Rate of fencing per metre = ₹100
Total cost of fencing = ₹75000
Perimeter of the plot $= 2(l+b) = 2(11x + 4x) = 2\times15x = 30x$

Total amount
of fencing = (30x × 100)

According to the question,

$(30x \times 100) = 75000$

$\Rightarrow 3000x = 75000$

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

$\Rightarrow x = 25$

Length of the plot = 11x = 11×25 = 275m

Breadth of the plot = 4x = 4×25 = 100m

**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 3 meters of the shirt material he buys 2 metres of the trouser material. He sells the materials at 12% and 10% profit respectively. His total sale is ₹36,600. How much trouser material did he buy?**

Solution:

Let 2x m of trouser material and 3x m of shirt material be bought by him.

Selling price of shirt material per metre = $₹ 50 + 50\times(\frac{12}{100}) = ₹ 56$

Selling price of trouser material per metre = $₹ 90 + 90\times(\frac{10}{100}) = ₹99$

Total amount of sale = ₹36,600

According to the question,

$(2x \times 99) + (3x \times 56) = 36600$

$\Rightarrow 198x + 168x = 36600$

$\Rightarrow 366x = 36600$

$\Rightarrow x = \frac{36600}{366}$

$\Rightarrow x = 100$

Total trouser material he bought = 2x = 2×100 = 200 m.

**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.**

Solution:

Let the total number of deer be x.

Deer grazing in the field = $\frac{x}{2}$

Deer playing nearby = $\frac{3}{4}(x - \frac{x}{2}) = \frac{3}{4}\times\frac{x}{2} = \frac{3x}{8}$

Deer drinking water = 9

According to the question,

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

$\Rightarrow \frac{4x+3x}{8} + 9 = x$

$\Rightarrow \frac{7x}{8} + 9 = x$

$\Rightarrow x - \frac{7x}{8} = 9$

$\Rightarrow \frac{(8x-7x)}{8} = 9$

$\Rightarrow x = 9 \times 8$

$\Rightarrow x = 72$

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

Solution:

Let the age of granddaughter be x and grandfather be 10x.
Also, he is 54 years older than her.
According to the question,

$10x = x + 54$
$\Rightarrow 10x - x = 54$
$\Rightarrow 9x = 54$
$\Rightarrow x = 6$
Age of grandfather $= 10x = 10 \times 6 = 60$ years.
Age of granddaughter $= x = 6$ years.

**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.**

Solution:

Let the age of Aman's son be x then age of Aman will be 3x.
According to the question,

$5(x - 10) = 3x - 10$
$\Rightarrow 5x - 50 = 3x - 10$
$\Rightarrow 5x - 3x = -10 + 50$
$\Rightarrow 2x = 40$
$\Rightarrow x = 20$
Aman's son age $= x = 20$ years
Aman age $= 3x = 3 \times 20 = 60$ years

## Exercise 2.5

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**Solve the following linear equations.**

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

Solution:

$$\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$$
$$\Rightarrow \frac{x}{2} - \frac{x}{3} = \frac{1}{4} + \frac{1}{5}$$
$$\Rightarrow \frac{(3x-2x)}{6} = \frac{(5+4)}{20}$$
$$\Rightarrow 3x - 2x = \frac{9}{20} \times 6$$
$$\Rightarrow x = \frac{54}{20}$$
$$\Rightarrow x = \frac{27}{10}$$

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

Solution:

$$\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$$
$$\Rightarrow \frac{(6n-9n+10n)}{12} = 21$$
$$\Rightarrow \frac{7n}{12} = 21$$
$$\Rightarrow 7n = 21 \times 12$$
$$\Rightarrow n = \frac{252}{7}$$
$$\Rightarrow n = 36$$

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

Solution:

$$x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$$
$$\Rightarrow x - \frac{8x}{3} + \frac{5x}{2} = \frac{17}{6} - 7$$
$$\Rightarrow \frac{6x-16x+15x}{6} = \frac{17-42}{6}$$

$\Rightarrow \frac{5x}{6} = \frac{-25}{6}$
$\Rightarrow 5x = -25$
$\Rightarrow x = -5$

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

Solution:

$\frac{x-5}{3} = \frac{x-3}{5}$
$\Rightarrow 5(x-5) = 3(x-3)$
$\Rightarrow 5x-25 = 3x-9$
$\Rightarrow 5x - 3x = -9+25$
$\Rightarrow 2x = 16$
$\Rightarrow x = 8$

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

Solution:

$\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$
$\Rightarrow \frac{3t}{4} - \frac{1}{2} - (\frac{2t}{3} + 1) = \frac{2}{3} - t$
$\Rightarrow \frac{3t}{4} - \frac{1}{2} - \frac{2t}{3} - 1 = \frac{2}{3} - t$
$\Rightarrow \frac{3t}{4} - \frac{2t}{3} + t = \frac{2}{3} + 1 + \frac{1}{2}$
$\Rightarrow \frac{(9t-8t+12t)}{12} = \frac{2}{3} + \frac{3}{2}$
$\Rightarrow \frac{13t}{12} = \frac{4+9}{6}$
$\Rightarrow \frac{13t}{12} = \frac{13}{6}$
$\Rightarrow t = \frac{12}{6} = 2$

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

Solution:

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

$\Rightarrow m - (\frac{m}{2} - \frac{1}{2})$

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

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

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

$\Rightarrow \frac{m}{2} + \frac{m}{3} = \frac{1}{2} + \frac{2}{3}$

$\Rightarrow \frac{(3m+2m)}{6} = \frac{(3+4)}{6}$

$\Rightarrow \frac{5m}{6} = \frac{7}{6}$

$\Rightarrow m = \frac{7}{6} \times \frac{6}{5}$

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

**Simplify and solve the following linear equations.**

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

Solution:

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

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

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

$\Rightarrow -7t = 14$

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

$\Rightarrow t = -2$

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

Solution:

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

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

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

$\Rightarrow 18y = 12$

$\Rightarrow y = \frac{12}{18}$

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

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

Solution:

$3(5z - 7) - 2(9z - 11) = 4(8z - 13) - 17$
$\Rightarrow 15z - 21 - 18z + 22 = 32z - 52 - 17$
$\Rightarrow 15z - 18z - 32z = -52 - 17 + 21 - 22$
$\Rightarrow -35z = -70$
$\Rightarrow z = \frac{-70}{-35}$
$\Rightarrow z = 2$

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

Solution:

$0.25(4f - 3) = 0.05(10f - 9)$
$\Rightarrow f - 0.75 = 0.5f - 0.45$

$\Rightarrow f - 0.5f = -0.45 + 0.75$
$\Rightarrow 0.5f = 0.30$
$\Rightarrow f = \frac{0.30}{0.5}$
$\Rightarrow f = \frac{3}{5} = 0.6$

## Exercise 2.6

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**Solve the following equations.**

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

Solution:

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

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

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

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

$\Rightarrow \frac{(8-6)}{3} = \frac{1}{x}$

$\Rightarrow \frac{2}{3} = \frac{1}{x}$

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

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

Solution:

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

$\Rightarrow 9x = 15(7 - 6x)$

$\Rightarrow 9x = 105 - 90x$

$\Rightarrow 9x + 90x = 105$

$\Rightarrow 99x = 105$

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

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

Solution:

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

$\Rightarrow z = \frac{4}{9}(z + 15)$

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

$\Rightarrow 9z = 4z + 60$

$\Rightarrow 9z - 4z = 60$

$\Rightarrow 5z = 60$

$\Rightarrow z = 12$

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

Solution:

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

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

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

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

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

$\Rightarrow 3y = -24$

$\Rightarrow y = -8$

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

Solution:

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

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

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

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

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

$\Rightarrow 25y = -20$

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

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.**

Solution:

Let the age of Hari be 5x and Harry be 7x.

4 years later,

Age of Hari = 5x + 4

Age of Harry = 7x + 4

According to the question,

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

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

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

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

$\Rightarrow x = 4$

Hari age = 5x = 5×4 = 20 years

Harry age = 7x = 7×4 = 28 years

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.**

Solution:

Let the numerator be x then denominator will be (x + 8).

According to the question,

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

$$\Rightarrow \frac{(x+17)}{(x+7)} = \frac{3}{2}$$

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

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

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

$\Rightarrow 13 = x$

The rational number is $\frac{x}{x+8} = \frac{13}{21}$