



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Linear Equation

Exercise-2.2

Q.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?

Sol: Let the number be x .

According to the conditions,

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

$$\Rightarrow 8 \left(x - \frac{1}{2} \right) = 2 \quad (\text{By cross Multiplication})$$

$$\Rightarrow 8x - 4 = 2$$

$$\Rightarrow 8x = 2 + 4 \quad (\text{Transposing 4 to R.H.S})$$

$$\Rightarrow 8x = 6$$

$$\Rightarrow x = \frac{6}{8} \quad (\text{Dividing both sides by 8})$$

$$\text{or } x = \frac{3}{4}$$

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

Q.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 pool be x m.

Then, the length of the pool = $(2x + 2)$ m

$$\text{Perimeter} = 2(1 + b)$$

According to the conditions,

$$154 = 2(2x + 2 + x)$$

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

$$\Rightarrow 154 = 6x + 4$$

$$\Rightarrow 154 - 4 = 6x \quad (\text{Transposing 4 to L.H.S})$$

$$\Rightarrow 6x = 150 \quad (\text{Changing the positions})$$

$$\Rightarrow x = \frac{150}{6} \quad (\text{Dividing both sides by 6})$$

$$\text{or } x = 25$$

Hence, the length of the pool $(2x + 2) \text{ m} = 2 \times 25 + 2 = 52 \text{ m}$ and the breadth of the pool = 25 m.

Q.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 equal sides of an isosceles triangle be x cm.

We know that, Perimeter of triangle = $a + b + c$

According to the condition,

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

$$\Rightarrow \frac{62}{15} - \frac{4}{3} = 2x \quad (\text{Transposing } \frac{4}{3} \text{ to L.H.S.})$$

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

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

$$\Rightarrow 30x = 42 \quad (\text{by Cross Multiplication})$$

$$\Rightarrow x = \frac{42}{30} \quad (\text{Dividing both sides by 30})$$

$$\text{or } x = \frac{7}{5} = 1\frac{2}{5} \text{ cm.}$$

Hence, each equal side of an isosceles triangle is $1\frac{2}{5}$ cm.

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

Sol: Given, sum of two numbers = 95

Let the first number be x , then the second number be $x + 15$.

According to the condition,

$$\Rightarrow x + x + 15 = 95$$

$$\Rightarrow 2x + 15 = 95$$

$$\Rightarrow 2x = 95 - 15 \quad (\text{Transposing } 15 \text{ to R.H.S.})$$

$$\Rightarrow 2x = 80$$

$$\Rightarrow x = \frac{80}{2} \quad (\text{Dividing both sides by } 2)$$

or $x = 40$ Hence, the first number = 40 and the second number = $x + 15 = 40 + 15 = 55$.

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

Sol: Given, difference of the numbers = 18

Let two numbers be $5x$ and $3x$ respectively.

According to the conditions,

$$5x - 3x = 18$$

$$\Rightarrow 2x = 18$$

$$\Rightarrow x = \frac{18}{2} \quad (\text{Dividing both sides by } 2)$$

$$\text{or } x = 9$$

Hence, first number = $5x = 5 \times 9 = 45$ and second number = $3x = 3 \times 9 = 27$.

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

Sol: Given, sum of three consecutive integers = 51.

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

According to the conditions,

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

$$\Rightarrow 3x + 3 = 51$$

$$\Rightarrow 3x = 51 - 3 \quad (\text{Transposing } 3 \text{ to R.H.S.})$$

$$\Rightarrow 3x = 48$$

$$\Rightarrow x = \frac{48}{3} \quad (\text{Dividing both sides by } 3)$$

$$\text{Or } x = 16$$

Hence, first integer = 16,

Second integer = $16 + 1 = 17$

and third integer = $16 + 2 = 18$

Therefore, the consecutive integers are 16, 17 and 18.

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

Sol: Given, the sum of three consecutive multiples of 8 = 888.

Let the three consecutive multiples of 8 be x , $x + 8$ and $x + 16$.

According to the conditions,

$$(x) + (x + 8) + (x + 16) = 888$$

$$\Rightarrow 3x + 24 = 888$$

$$\Rightarrow 3x = 888 - 24 \text{ (Transposing 24 to R.H.S.)}$$

$$\Rightarrow 3x = 864$$

$$\Rightarrow x = \frac{864}{3} \text{ (Dividing both sides by 24)}$$

$$\text{or } x = 288$$

Hence, first multiple of 8 = $x = 288$,

Second multiple of 8 = $x + 8 = 288 + 8 = 296$,

and third multiple of 8 = $x + 16 = 288 + 16 = 304$.

Therefore, the three consecutive multiples of 8 are 288, 296 and 304.

Q.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 x , $x + 1$ and $x + 2$ and given sum of these numbers is 74.

According to the conditions,

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

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

$$\Rightarrow 9x + 11 = 74$$

$$\Rightarrow 9x = 74 - 11 \text{ (Transposing 11 to R.H.S.)}$$

$$\Rightarrow 9x = 63$$

$$\Rightarrow x = \frac{63}{9} = 7 \text{ (Dividing both sides by 9)}$$

$$\text{or } x = 7$$

Hence, first integer = $x = 7$,

Second integer = $(x + 1) = (7 + 1) = 8$,

and third integer = $(x + 2) = (7 + 2) = 9$.

Therefore, the three consecutive integers are 7, 8 and 9.

Q.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 ages of Rahul and Haroon be $5x$ years and $7x$ years respectively.

After four years, the age of Rahul = $(5x + 4)$ years and the age of Haroon = $(7x + 4)$ years.

According to the conditions, $5x + 4 + 7x + 4 = 56$

$$\Rightarrow 12x + 8 = 56$$

$$\Rightarrow 12x = 56 - 8 \text{ (Transposing 8 to R.H.S.)}$$

$$\Rightarrow 12x = 48$$

$$\Rightarrow x = \frac{48}{12} \text{ (Dividing both sides by 12)}$$

$$\text{or } x = 4$$

Hence, present age of Rahul = $5x = 5 \times 4 = 20$ years and present age of Haroon = $7x = 7 \times 4 = 28$ years.

Q.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 girls be x .

Then, the number of boys = $x + 8$

According to the- conditions,

$$\frac{8+x}{x} = \frac{7}{5}$$

$$\Rightarrow 5 \times (8 + x) = 7 \times x \text{ (By cross multiplication)}$$

$$\Rightarrow 40 + 5x = 7x$$

$$\Rightarrow 5x - 7x = -40 \text{ (Transposing } 7x \text{ to L.H.S. and } 40 \text{ to R.H.S.)}$$

$$\Rightarrow -2x = -40$$

$$\Rightarrow x = \frac{-40}{-2} \text{ (Dividing both sides by } -2)$$

$$\text{Or } x = 20$$

The number of girls = $x = 20$ and the number of boys = $x + 8 = 20 + 8 = 28$.

Hence, the strength of the class = $28 + 20 = 48$ students.

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

Sol: Let Baichung's age be x years.

Then, Baichung's father's age = $(x + 29)$ years and Baichung's grandfather's age = $(x + 29 + 26)$ years

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

According to the conditions,

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

$$\Rightarrow 3x + 84 = 135$$

$$\Rightarrow 3x = 135 - 84 \text{ (Transposing } 84 \text{ to R.H.S.)}$$

$$\Rightarrow 3x = 51$$

$$\Rightarrow x = \frac{51}{3} \text{ (Dividing both sides by } 3)$$

$$\text{or } x = 17$$

Hence, Baichung's age = 17 years,

Baichung's father's age = $x + 29 = 17 + 29 = 46$ years

and Baichung's grandfather's age = $x + 55 = 17 + 55 = 72$ years.

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

Sol: Let Ravi's present age be x years.

After fifteen years, Ravi's age = $4x$ years

Fifteen years from now Ravi's age = $(x + 15)$ years

According to the conditions,

$$4x = x + 15$$

$$\Rightarrow 4x - x = 15 \text{ (Transposing } x \text{ to L.H.S)}$$

$$\Rightarrow 3x = 15$$

$$\Rightarrow x = \frac{15}{3} \quad \text{(Dividing both sides by 3)}$$

$$\text{or } x = 5$$

Hence, Ravi's present age is 5 years.

Q.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 conditions,

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

$$\Rightarrow \frac{5x}{2} = \frac{-7}{12} - \frac{2}{3} \quad \text{(Tranposing } \frac{2}{3} \text{ to R. H. S.)}$$

$$\Rightarrow \frac{5x}{2} = \frac{-7-8}{12} \quad \text{(L. C. M. of 3 and 12 is 12)}$$

$$\Rightarrow \frac{5x}{2} = \frac{-15}{12} \Rightarrow 5x \times 12 = -15 \times 2 \quad \text{(By cross multiplication)}$$

$$\Rightarrow 60x = -30$$

$$\Rightarrow x = \frac{-30}{60}$$

(Dividing both sides by 60)

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

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

Q.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 number of notes be $2x$, $3x$ and $5x$.

According to the conditions,

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

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

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

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

$$\text{Or } x = 1000$$

Hence, number of denominations of ₹ 100 notes = $2 \times 1000 = 2,000$

Number of denominations of ₹ 50 notes = $3 \times 1000 = 3,000$

Number of denominations of ₹ 10 notes = $5 \times 1000 = 5,000$

Therefore, required denominations of notes of ₹ 100, ₹ 50 and ₹ 10 are 2,000, 3,000 and 5,000 respectively.

Q.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: Given, total sum of money = Rs 300

Let the number of Rs 5 coins be x .

Then, number of Rs 2 coins = $3x$

and number of Rs 1 coins = $160 - (x + 3x) = 160 - 4x$.

According to the conditions,

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

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

$$\Rightarrow 7x + 160 = 300$$

$$\Rightarrow 7x = 300 - 160 \quad (\text{Transposing } 160 \text{ to R. H.S.})$$

$$\Rightarrow 7x = 140$$

$$\Rightarrow x = \frac{140}{7} \quad (\text{Dividing both sides by } 7)$$

$$\text{or } x = 20$$

Hence, number of coins of Rs 5 denomination = 20

Number of coins of Rs 2 denomination = $3x = 3 \times 20 = 60$

Number of coins on 1 denomination = $160 - 4x = 160 - 4 \times 20 = 160 - 80 = 80$.

Therefore, the number on 1 coins, Rs 2 coins and Rs 5 coins are 80, 60 and 20 respectively.

Q.16 The organizers of an essay competition decide that a winner in the competition gets a prize of Rs100 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.

Sol: Total sum of money = Rs 3000

Let the number of winners of Rs 100 be x and those who are not winners = $63 - x$.

According to the conditions, $100 \times x + 25 \times (63 - x) = 3000$

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

$$\Rightarrow 75x = 3000 - 1575 \quad (\text{Transposing } 1575 \text{ to R.H.S.})$$

$$\Rightarrow 75x = 1425$$

$$\Rightarrow x = \frac{1425}{75} \quad (\text{Dividing both sides by } 75)$$

$$\Rightarrow x = 19$$

Hence, the number of winners = 19.