

NCERT solution Linear equation Exercise 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 x be the number then as per the question

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

The LCM of denominator is 8, so multiplying by 8 on both sides

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

$$4x - 2 = 1$$

Transposing 2 to R.H.S, we obtain

$$4x = 3$$

Dividing 4 on both the sides

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

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 breadth be x m.

Then as per question the length will be $(2x + 2)$ m.

Perimeter of swimming pool = $2(l + b) = 154$ m

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

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

Dividing both sides by 2

$$3x + 2 = 77$$

Transposing 2 to R.H.S, we obtain

$$3x = 77 - 2$$

$$3x = 75$$

Dividing 3 on both the sides

$$x = 25$$

So

Breadth is 25 m

$$\text{Length} = 2x + 2 = 2 \times 25 + 2 = 52\text{m}$$

Hence, the breadth and length of the pool are 25 m and 52 m respectively.

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:

Let the length of equal sides be x cm.

Perimeter = x cm + x cm + Base

Substituting the values, we get

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

The LCM of the denominator is 15, so multiplying both the sides by 15

$$30x + 20 = 62$$

Transposing 20 to R.H.S, we obtain

$$30x = 42$$

Dividing by 30 on both the sides

$$x = \frac{42}{30} = \frac{7}{5}$$

Therefore, the length of equal sides is $\frac{7}{5}$ cm.

Question 4:

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

Answer:

Let one number be x . Therefore, the other number will be $x + 15$.

According to the question,

$$x + x + 15 = 95$$

$$2x + 15 = 95$$

Transposing 15 to R.H.S, we obtain

$$2x = 95 - 15$$

$$2x = 80$$

Dividing both sides by 2, we obtain

$$x = 40$$

So the other number will be

$$x + 15 = 40 + 15 = 55$$

Hence, the numbers are 40 and 55.

Question 5:

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

Answer:

In this type of question, the strategy is to choose common ratio and solve the equation to find the exact numbers

Let the common ratio between these numbers be x . Therefore, the numbers will be $5x$ and $3x$ respectively.

Difference between these numbers = 18

$$5x - 3x = 18$$

$$2x = 18$$

Dividing both sides by 2,

$$x = 9$$

$$\text{First number} = 5x = 5 \times 9 = 45$$

$$\text{Second number} = 3x = 3 \times 9 = 27$$

Question 6:

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

Answer:

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

Then as per question

$$\text{Sum of these numbers} = x + x + 1 + x + 2 = 51$$

$$3x + 3 = 51$$

Transposing 3 to R.H.S, we obtain

$$3x = 51 - 3$$

$$3x = 48$$

Dividing both sides by 3

$$x = 16, \text{ so other numbers will be}$$

$$x + 1 = 17$$

$$x + 2 = 18$$

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

Question 7:

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

Answer :

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

As per questions,

$$\text{Sum of these numbers} = 8x + 8(x + 1) + 8(x + 2) = 888$$

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

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

Dividing both sides by 8

$$3x + 3 = 111$$

Transposing 3 to R.H.S, we obtain

$$3x = 111 - 3$$

$$3x = 108$$

Dividing both sides by 3, we obtain

$$x = 36, \text{ so the three multiples will be}$$

$$\text{First multiple} = 8x = 8 \times 36 = 288$$

$$\text{Second multiple} = 8(x + 1) = 8 \times (36 + 1) = 8 \times 37 = 296$$

Third multiple = $8(x + 2) = 8 \times (36 + 2) = 8 \times 38 = 304$
Hence, the required 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:

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

According to the question,

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

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

$$9x + 11 = 74$$

Transposing 11 to R.H.S, we obtain

$$9x = 74 - 11$$

$$9x = 63$$

Dividing both sides by 9, we obtain

$$x = 7, \text{ so the integers are}$$

$$x + 1 = 7 + 1 = 8$$

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

Hence, 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 :

In this type of question, the strategy is to choose common ratio and solve the equation to find the exact numbers

Let common ratio between Rahul's age and Haroon's age be y .

Then

Age of Rahul = $5y$ years

Age of haroon = $7y$ years

So After 4 years, the age of Rahul and Haroon will be $(5y + 4)$ years and $(7y + 4)$ years respectively.

According to the given question, after 4 years, the sum of the ages of Rahul and Haroon is 56 years.

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

$$12y + 8 = 56$$

Transposing 8 to R.H.S, we obtain

$$12y = 56 - 8$$

$$12y = 48$$

Dividing both sides by 12

$$y = 4, \text{ so the ages will be}$$

$$\text{Rahul's age} = 5y \text{ years} = (5 \times 4) \text{ years} = 20 \text{ years}$$

$$\text{Haroon's age} = 7y \text{ years} = (7 \times 4) \text{ years} = 28 \text{ years}$$

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 :

Let the common ratio between the number of boys and numbers of girls be y

$$\text{Number of boys} = 7y$$

$$\text{Number of girls} = 5y$$

As per the question,

$$\text{Number of boys} = \text{Number of girls} + 8$$

$$7y = 5y + 8$$

Transposing $5y$ to L.H.S, we obtain

$$7y - 5y = 8$$

$$2y = 8$$

Dividing both sides by 2

$$y = 4$$

So the strength of boys and girls are

$$\text{Number of boys} = 7y = 7 \times 4 = 28$$

$$\text{Number of girls} = 5y = 5 \times 4 = 20$$

$$\text{Hence, total class strength} = 28 + 20 = 48 \text{ students}$$

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 us assume Baichung's father's age be x years.

Therefore, Baichung's age and Baichung's grandfather's age will be $(x - 29)$ years and $(x + 26)$ years respectively.

As per the question,

The sum of the ages of these 3 people is 135 years.

So

$$x + (x - 29) + (x + 26) = 135$$

$$3x - 3 = 135$$

Transposing 3 to R.H.S, we obtain

$$3x = 135 + 3$$

$$3x = 138$$

Dividing both sides by 3

$x = 46$, then the ages of three people will be

Baichung's father's age = x years = 46 years

Baichung's age = $(x - 29)$ years = $(46 - 29)$ years = 17 years

Baichung's grandfather's age = $(x + 26)$ years = $(46 + 26)$ years = 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 Ravi's present age be x years.

Fifteen years later, Ravi's age = $4 \times$ His present age

$$x + 15 = 4x$$

Transposing x to R.H.S, we obtain

$$15 = 4x - x$$

$$15 = 3x$$

Dividing both sides by 3, we obtain

$$5 = x$$

Hence, Ravi's present age = 5 years

Question 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?

Answer:

Let x be the rational number, then

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

The LCM of 2, 3 and 12 is 12, so multiplying by 12

$$30x + 8 = -7$$

Transposing 8 to R.H.S, we obtain

$$30x = -15$$

Dividing by 30 on both the sides

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

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 common ratio between the numbers of notes of different denominations be y . Therefore, numbers of Rs 100 notes, Rs 50 notes, and Rs 10 notes will be $2y$, $3y$, and $5y$ respectively.

Amount of Rs 100 notes = Rs $(100 \times 2y) = \text{Rs } 200y$

Amount of Rs 50 notes = Rs $(50 \times 3y) = \text{Rs } 150y$

Amount of Rs 10 notes = Rs $(10 \times 5y) = \text{Rs } 50y$

As per question the total amount is Rs 400000.

$$200x + 150x + 50x = 400000$$

$$400x = 400000$$

Dividing both sides by 400, we obtain

$x = 1000$, so number of notes of each denominations

$$\text{Number of Rs 100 notes} = 2x = 2 \times 1000 = 2000$$

$$\text{Number of Rs 50 notes} = 3x = 3 \times 1000 = 3000$$

$$\text{Number of Rs 10 notes} = 5x = 5 \times 1000 = 5000$$

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 coins be x .

Then Number of Rs 2 coins = $3x$

Now it is given that that total number of coins is 160, so

Number of Re 1 coins = $160 - (\text{Number of coins of Rs 5 and of Rs 2})$

$$= 160 - (3x + x) = 160 - 4x$$

$$\text{Amount of Re 1 coins} = \text{Rs } [1 \times (160 - 4x)] = \text{Rs } (160 - 4x)$$

$$\text{Amount of Rs 2 coins} = \text{Rs } (2 \times 3x) = \text{Rs } 6x$$

$$\text{Amount of Rs 5 coins} = \text{Rs } (5 \times x) = \text{Rs } 5x$$

As per question total amount is Rs 300.

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

$$160 + 7x = 300$$

Transposing 160 to R.H.S, we obtain

$$7x = 300 - 160$$

$$7x = 140$$

Dividing both sides by 7, we obtain

$x = 20$, so the number of coins of each denominations will be

$$\text{Number of Re 1 coins} = 160 - 4x = 160 - 4 \times 20 = 160 - 80 = 80$$

$$\text{Number of Rs 2 coins} = 3x = 3 \times 20 = 60$$

$$\text{Number of Rs 5 coins} = x = 20$$

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 3000. 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 will be $63 - x$.

Amount given to the winners = Rs $(100 \times x) = \text{Rs } 100x$

Amount given to the participants who did not win = Rs $[25(63 - x)]$
= Rs $(1575 - 25x)$

As per the question,

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

Transposing 1575 to R.H.S, we obtain

$$75x = 3000 - 1575$$

$$75x = 1425$$

Dividing both sides by 75, we obtain

$$x = 19$$

Hence, number of winners = 19