

NCERT solution Linear equation Exercise 3

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

Answer - Let the number be x .

According to the given question,

$$8(x - 5/2) = 3x$$

$$8x - 20 = 3x$$

Transposing $3x$ to L.H.S and -20 to R.H.S, we obtain

$$8x - 3x = 20$$

$$5x = 20$$

Dividing both sides by 5, we obtain

$$x = 4$$

Hence, the number is 4.

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

Answer - Let the numbers be x and $5x$. As per question,

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

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

Transposing $2x$ to L.H.S and 21 to R.H.S, we obtain

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

$$3x = 21$$

Dividing both sides by 3, we obtain

$$x = 7$$

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

Hence, the numbers are 7 and 35 respectively.

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

Answer - Let the digits at tens place and one's place be x and $9 - x$ respectively.

Therefore, original number = $10x + (9 - x) = 9x + 9$

On interchanging the digits, the digits at ones place and tens place will be x and $9 - x$ respectively.

Therefore, new number after interchanging the digits = $10(9 - x) + x$

$$= 90 - 10x + x$$

$$= 90 - 9x$$

As per question,

New number = Original number + 27

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

$$90 - 9x = 9x + 36$$

Transposing $9x$ to R.H.S and 36 to L.H.S, we obtain

$$90 - 36 = 18x$$

$$54 = 18x$$

Dividing both sides by 18, we obtain

$$3 = x \text{ and } 9 - x = 6$$

Hence, the digits at tens place and ones place of the number are 3 and 6 respectively.

Therefore, the two-digit number is 36

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

Answer - Let the digits at tens place and one's place be x and $3x$ respectively.

Therefore, original number = $10x + 3x = 13x$

On interchanging the digits, the digits at ones place and tens place will be x and $3x$ respectively.

Number after interchanging = $10 \times 3x + x = 30x + x = 31x$

According to the given question,

Original number + New number = 88

$$13x + 31x = 88$$

$$44x = 88$$

Dividing both sides by 44, we obtain

$$x = 2$$

Therefore, original number = $13x = 13 \times 2 = 26$

By considering the tens place and ones place as $3x$ and x respectively, the two-digit number obtained is 62.

Therefore, the two-digit number may be 26 or 62.

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

Answer - Let Shobo's age be x years. Therefore, his mother's age will be $6x$ years.

According to the given question,

$$(x+5)=6x/3$$

$$x + 5 = 2x$$

Transposing x to R.H.S, we obtain

$$5 = 2x - x$$

$$5 = x$$

$$6x = 6 \times 5 = 30$$

Therefore, the present ages of Shobo and Shobo's mother will be 5 years and 30 years respectively.

Question 6- There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 11:4. At the rate Rs 100 per metre it will cost the village panchayat Rs 75, 000 to fence the plot. What are the dimensions of the plot?

Answer - Let the common ratio between the length and breadth of the rectangular plot be x . Hence, the length and breadth of the rectangular plot will be $11x$ m and $4x$ m respectively.

Perimeter of the plot = $2(\text{Length} + \text{Breadth})$

It is given that the cost of fencing the plot at the rate of Rs 100 per metre is Rs 75, 000.

So

$$100 \times \text{Perimeter} = 75000$$

$$100 \times 30x = 75000$$

$$3000x = 75000$$

Dividing both sides by 3000

$$x = 25$$

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

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

Hence, the dimensions of the plot are 275 m and 100 m respectively.

Question 7- Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him Rs 50 per metre and trouser material that costs him Rs 90 per metre. For every 2 meters of the trouser material he buys 3 metres of the shirt material. He sells the materials at 12% and 10% profit respectively. His total sale is Rs 36660. How much trouser material did he **buy**?

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

Per metre selling price of trouser material = Original Price + Profit

$$= 90 + 12\% \text{ Profit}$$

$$= 90 + 12 \times 90 / 100$$

$$= \text{Rs } 100.80$$

Per metre selling price of shirt material

= Original Price + Profit

$$= 50 + 10\% \text{ Profit}$$

$$= 50 + 10 \times 50 / 100$$

$$= \text{Rs } 55$$

We know from question that total amount of selling = Rs 36660, So

$$100.80 \times (2x) + 55 \times (3x) = 36660$$

$$201.60x + 165x = 36660$$

$$366.60x = 36660$$

Dividing both sides by 366.60

$$x = 100$$

$$\text{Trouser material} = 2x \text{ m} = (2 \times 100) \text{ m} = 200 \text{ m}$$

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

Answer - Let the number of deer be x .

Number of deer grazing in the field = $x/2$

So remaining would be $x/2$

Now Number of Deer playing near by = $(3/4)(x/2) = 3x/8$

Number of deer drinking water from the pond = 9

So

$$x - \left(\frac{x}{2} + \frac{3x}{8}\right) = 9$$

Multiplying both sides by 8, we obtain

$$8x - (4x + 3x) = 72$$

$$x = 72$$

Hence, the total number of deer in the herd is 72.

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

Answer - Let the granddaughter's age be x years. Therefore, grandfather's age will be $10x$ years.

According to the question,

Grandfather's age = Granddaughter's age + 54 years

$$10x = x + 54$$

Transposing x to L.H.S, we obtain

$$10x - x = 54$$

$$9x = 54$$

$$x = 6$$

Granddaughter's age = x years = 6 years

Grandfather's age = $10x$ years = (10×6) years = 60 years

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

Answer - Let Aman's son's age be x years. Therefore, Aman's age will be $3x$ years. Ten years ago, their age were $(x - 10)$ years and $(3x - 10)$ years respectively.

According to the question,

10 years ago, Aman's age = $5 \times$ Aman's son's age 10 years ago

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

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

Transposing $3x$ to R.H.S and 50 to L.H.S, we obtain

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

$$40 = 2x$$

Dividing both sides by 2, we obtain

$$20 = x$$

Aman's son's age = x years = 20 years

Aman's age = $3x$ years = (3×20) years = 60 years

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