Chapter – 02

Linear Equations in One Variable

Exercises 2.2

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 the number is x.

Then, on subtracting ½ from x, we get, x – ½.

On multiplying, (x- ½) by ½, we get 1/8.

Thus, solving we get,

(x – ½) × ½ = 1 1/8 Now, we will take L.C.M and cross-multiplying, we get,

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

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

$\Rightarrow \left(\frac{2x-1}{4}\right) = \frac{1}{8}$

Multiplying both side by 4, we have $\Rightarrow \frac{2x-1}{1} = \frac{1}{2}$

$\Rightarrow 2(2x-1) = 1 \Rightarrow 4x - 2 = 1 \Rightarrow 4x = 3 \Rightarrow x = \frac{3}{4}$

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 length be “l” and breadth be “b”

Given:

Perimeter of rectangle = 154m Length is two more than twice of breadth, twice of breadth means 2b, and 2 more than this means: 2b + 2 Therefore, l = (2b + 2)m Then, perimeter = 2(l + b) = 154m Putting the value of l in above equation,

2{(2b + 2) + b} = 154

2{2b + b + 2} = 154

2{3b + 2} = 1546b + 4 = 1546b = 154 - 46b = 150b $= \frac{150}{6} = 25$

Hence, Breadth of the rectangle = 25 m So, length of the rectangle = 2b + 2 = 2(25) + 2 = 52 m

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: The isosceles triangle is the one which has two side equal, say side is x. And it is given that the base side = 4/3 cm

Now, the perimeter = sum of three sides = 2 x + base

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

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

Now $4\frac{2}{15} = \frac{15\times4+2}{15} = \frac{62}{15}$

Therefore,

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

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

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

$2x = \frac{62-4\times5}{15}$

$2x = \frac{62-4\times5}{15}$

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

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

$x = \frac{42}{15\times2}$

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

Therefore, each side is of length $\frac{7}{5} = 1\frac{2}{5}$ cm.

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

Answer:

Let the number be x.

The other number is 15 more than the number x.

Therefore, other number is x + 15. [given second number exceeds first by 15]

Now, x + (x + 15) = 95 [given sum of numbers to be 95]

2 x = 95-15

2 x = 80

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

Therefore, one number is 40 and other number is 40+15 = 55

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

Answer:

Let the common ratio be x.

Then, the numbers are 5 x and 3 x.

Given: Difference of numbers is 18

Now, Difference of 5x and 3x = 185 x – 3 x = 18

2 x = 18

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

Therefore, one number is 5 × 9 = 45 and other number is 3 × 9 = 27.

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

Answer: Let the three consecutive numbers be x+1, x, x-1

Then,

x+1 + x + x - 1 =51

x + x + x + 1 - 1 = 51

3x = 51

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

x = 17Also, x - 1 = 17 - 1 = 16x + 1 = 17 + 1 = 18

Hence, three consecutive integers are 16, 17 and 18. Method 2:Let the three consecutive integers be x, x + 1, x + 2Sum of these numbers = 51x + x + 1 + x + 2 = 513 x + 3 = 513 x = 48x = 16Now the numbers are 16, 16 + 1, 16 + 2Therefore, numbers are 16, 17, 18

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

Answer:

Three consecutive multiples of 8 means, three consecutive numbers that are divisible by 8.

Let the three consecutive multiples of 8 are = 8(x - 1), 8x, 8(x + 1)= 8 x - 8, 8 x, 8 x + 8

Then,

Sum of three consecutive multiples of 8 = 8888 x - 8 + 8 x + 8 x + 8 = 888

24 x = 888

$x = \frac{888}{24} = 37$

Now, 8(x - 1) = 8(37 - 1) = 8(36) = 2888x = 8(37) = 2968(x + 1) = 8(37 + 1) = 8(38) = 304

Therefore, the 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:

As the numbers are consecutive they will be one after another

Let the numbers are x, x + 1, x + 2

According to the question,

2x + 3(x + 1) + 4(x + 2) = 74Opening brackets we get,

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

9x = 74 - 8 - 3

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

Also, x + 1 = 7 + 1 = 8x + 2 = 7 + 2 = 9Thus, 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:

Let the common ratio be x.

So their present ages be 5x and 7x.4 years later their individual ages will be (5x+4) and (7x+4)

According to question,

5x+4+7x+4 = 56

12x = 56-8=48

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

Therefore, the age of Rahul is 5 × 4 = 20 yrs and the age of Harron is 7 × 4 = 28 yrs

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:

Given ratio 7:5

Let the number of boy and girls be 7x and 5x respectively.

Then, 7x = 5x + 8

7x - 5x = 8

2x = 8

x = 4

Also, 7x = 7(4) = 285x = 5(4) = 20

Therefore, the number of girls is 20 and the number of boys is 28. The total class strength is 48.

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 Baichung's father age is x.

Given, Baichung's father is 26 years younger than Baichung's grandfather⇒ Age of Baichung's father = x + 26andBaichung's father is 29 years older than Baichung⇒ Age of Baichung = x - 29

Now,

Sum of ages = 135⇒ x + (x+ 26) + (x- 29) = 135⇒ 3x -3 = 135⇒ 3x = 138

$\Rightarrow x = \frac{138}{3} = 46$

So, Baichung's Father Age = 46 years

Baichung's Age = x - 29 = 46 - 29 = 17 years

Baichung's grandfather Age = x + 26 = 46 + 26 = 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 present age is x years.

Then, fifteen years later, his age will be 4x years.

Thus, x + 15 = 4x

4x - x = 15

3x = 15

x = 5

Thus, his present age is 5 years.

Question 3. A rational number is such that when you multiply it by 5/2 and add 2/3 to the product, you get - 7/12 What is the number?

Answer: Let the rational number be x.

Now according to the question,

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

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

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

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

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

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

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

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 number of notes of denominations Rs 100, Rs 50 and Rs 10, be 2x, 3x and 5x respectively as they are in the ratio 2:3:5.

Hence, Total Amount of 100 Rupees Notes are = 100 × 2x = 200x

Total Amount of 50 Rupees Notes are = 50 × 3x = 150x

Total Amount of 10 Rupees Notes are = 10 × 5x = 50x

Given: Total Amount = 400000Therefore,

Thus, 200x + 150x + 50x = 400000

⇒ 400x = 400000

⇒ x = 1000

So, Number of 100 Rs Notes = 2 × 1000 = 2000

Number of 50 Rs Notes = 3 × 1000 = 3000

Number of 10 Rs Notes = 5 × 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 coin be x

Then, No of Rs 2 coins = 3 x

And no. of 1 Re coin = 160 – (3 x + x) = 160 - 4 x

The, the total amount of rupee coin is: Rs (1 × (160 - 4x)) = Rs. 160 - 4xTotal amount of 2 rupee coins is: Rs. 2 × 3x = Rs. 6xThe, total amount of 5 rupee coins is: Rs. 5 × x = Rs. 5xThus, 160 - 4x + 6x + 5x =

300160 + 7x = 3007x = 300 - 160x = 140/7 = 20 Therefore, Number of 1 Rs coins = 160 - (4 × 20) = 160 - 80 = 80Number of 2 Rs coins = 3x = 3 × 20 = 60Number of 5 Rs 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 3,000. 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 = 63 - x.

Each winner gets Rs. 100 as prize money, therefore

Total amount given to winners be Rs 100x

Then, Amount given to the participants who did not win = Rs 25(63 - x) = Rs 1575 – 25x

Total Amount distributed = Rs. 3000

100 x + 1575 – 25 x = 3000

75 x = 3000 – 1575

75 x = 1425

Thus, the number of winners are 19.