

Exercise 2.2

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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,

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

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

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

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

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

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

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

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

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 = $2(\text{length} + \text{breadth})$

$$\Rightarrow 2(2x + 2 + x) = 154 \text{ m}$$

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

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

$$\Rightarrow 3x = 77 - 2$$

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

$$\Rightarrow x = 25 \text{ m}$$

$$\therefore \text{Breadth} = x = 25 \text{ m}$$

$$\text{Length} = 2x + 2$$

$$\begin{aligned} &= (2 \times 25) + 2 \\ &= 50 + 2 \\ &= 52 \text{ m} \end{aligned}$$

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:

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

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

Let the length of equal sides of triangle be x .

According to the question,

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

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

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

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

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

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

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

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,

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

$$\Rightarrow 8(x + x+1 + x+2) = 888 \quad (\text{Taking 8 as common})$$

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

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

$$\Rightarrow 3x + 3 = 111$$

$$\Rightarrow 3x = 111 - 3$$

$$\Rightarrow 3x = 108$$

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

$$\Rightarrow x = 36$$

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,

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

$$\Rightarrow 5x + 4 + 7x + 4 = 56$$

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

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

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

$$\Rightarrow x = 4$$

$$\therefore, \text{Present age of Rahul} = 5x = 5 \times 4 = 20$$

$$\text{And, present age of Haroon} = 7x = 7 \times 4 = 28$$

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,

$$7x = 5x + 8$$

$$\Rightarrow 7x - 5x = 8$$

$$\Rightarrow 2x = 8$$

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

$$\Rightarrow x = 4$$

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

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

$$\text{Total number of students} = 20 + 28 = 48$$

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,

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

$$\Rightarrow 3x + 26 - 29 = 135$$

$$\Rightarrow 3x - 3 = 135$$

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

$$\Rightarrow 3x = 138$$

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

$$\Rightarrow x = 46$$

$$\text{Age of Baichung's father} = x = 46$$

$$\text{Age of Baichung's grandfather} = (x+26) = 46 + 26 = 72$$

$$\text{Age of Baichung} = (x-29) = 46 - 29 = 17$$

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,

$$x + 15 = 4x$$

$$\Rightarrow 4x - x = 15$$

$$\Rightarrow 3x = 15$$

$$\Rightarrow x = \frac{15}{3}$$

$$\Rightarrow x = 5$$

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

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,

$$\begin{aligned} x \times \left(\frac{5}{2}\right) + \frac{2}{3} &= \frac{-7}{12} \\ \Rightarrow \frac{5x}{2} + \frac{2}{3} &= \frac{-7}{12} \\ \Rightarrow \frac{5x}{2} &= \frac{-7}{12} - \frac{2}{3} \\ \Rightarrow \frac{5x}{2} &= \frac{-7-8}{12} \\ \Rightarrow \frac{5x}{2} &= \frac{-15}{12} \\ \Rightarrow \frac{5x}{2} &= \frac{-5}{4} \\ \Rightarrow x &= \left(\frac{-5}{4}\right) \times \frac{2}{5} \\ \Rightarrow x &= \frac{-10}{20} \\ \Rightarrow x &= \frac{-1}{2} \end{aligned}$$

\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.

$$\text{Value of ₹100} = 2x \times 100 = 200x$$

$$\text{Value of ₹50} = 3x \times 50 = 150x$$

$$\text{Value of ₹10} = 5x \times 10 = 50x$$

According to the question,

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

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

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

$$\Rightarrow x = 1000$$

$$\text{Numbers of ₹100 notes} = 2x = 2000$$

$$\text{Numbers of ₹50 notes} = 3x = 3000$$

$$\text{Numbers of ₹10 notes} = 5x = 5000$$

- 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,

$$\text{number ₹2 coins} = 3x$$

and, $\text{number of ₹1 coins} = (160 - 4x)$

Now,

$$\text{Value of ₹5 coins} = x \times 5 = 5x$$

$$\text{Value of ₹2 coins} = 3x \times 2 = 6x$$

$$\text{Value of ₹1 coins} = (160 - 4x) \times 1 = (160 - 4x)$$

According to the question,

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

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

$$\Rightarrow 7x = 140$$

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

$$\Rightarrow x = 20$$

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

$$\text{Number of ₹2 coins} = 3x = 60$$

$$\text{Number of ₹1 coins} = (160 - 4x) = 160 - 80 = 80$$

- 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 = $x \times 100 = 100x$

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

According to the question,

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

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

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

$$\Rightarrow 75x = 1425$$

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

$$\Rightarrow x = 19$$

\therefore , the numbers of winners are 19.