Exercise 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 1:

Let the number be x.

According to the question, $\frac{1}{2}\left(x-\frac{1}{2}\right)=\frac{1}{8}$

$\Rightarrow \quad 2\times\frac{1}{2}\left(x-\frac{1}{2}\right)=\frac{1}{8}\times 2$ [Multiplying both sides by 2]

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

$\Rightarrow \quad x-\frac{1}{2}+\frac{1}{2}=\frac{1}{4}+\frac{1}{2}$ [Adding both sides $\frac{1}{2}$]

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

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

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

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 breadth?

Answer 2:

Let the breadth of the pool be x m.

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

Perimeter = $2(l+b)$

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

$\Rightarrow \quad \dfrac{154}{2} = \dfrac{2(2x+2+x)}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad 77 = 3x + 2$

$\Rightarrow \quad 77 - 2 = 3x + 2 - 2$ [Subtracting 2 from both sides]

$\Rightarrow \quad 75 = 3x$

$\Rightarrow \quad \dfrac{75}{3} = \dfrac{3x}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad 25 = x$

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

Length of the pool = $2x + 2$ = 2 x 25 + 2 = 50 + 2 = 52 m

Breadth of the pool = 25 m

Hence, the length of the pool is 52 m and breadth is 25 m.
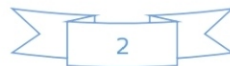
Question 3:

The base of an isosceles triangle is $\dfrac{4}{3}$ cm. The perimeter of the triangle is $4\dfrac{2}{15}$ cm. Wha is the length of either of the remaining equal sides?

Answer 3:

Let each of equal sides of an isosceles triangle be x cm.

Perimeter of a triangle = Sum of all three sides

$\Rightarrow \quad 4\dfrac{2}{15} = \dfrac{4}{3} + x + x$

$\Rightarrow \quad \dfrac{62}{15} = \dfrac{4}{3} + 2x$

$\Rightarrow \quad \dfrac{62}{15} - \dfrac{4}{3} = \dfrac{4}{3} - \dfrac{4}{3} + 2x$ [Subtracting $\dfrac{4}{3}$ from both the sides]

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

$\Rightarrow \quad \dfrac{42}{15} = 2x$

$\Rightarrow \quad \dfrac{42}{15 \times 2} = \dfrac{2x}{2}$ [Dividing both sides by 2]

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

$$\Rightarrow \quad x = 1\frac{2}{5} \text{ cm}$$

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

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

Answer 4:
Sum of two number = 95

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

According to the question,

$x + x + 15 = 95$

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

$\Rightarrow \quad 2x + 15 - 15 = 95 - 15$ [Subtracting 15 from both sides]

$\Rightarrow \quad 2x = 80$

$\Rightarrow \quad \dfrac{2x}{2} = \dfrac{80}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad x = 40$

So, the first number = 40 and another number = 40 + 15 = 55

Hence, the two 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 5:
Let the two numbers be $5x$ and $3x$.

According to question,

$5x - 3x = 18$

$\Rightarrow \quad 2x = 18$

$\Rightarrow \quad \dfrac{2x}{2} = \dfrac{18}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad x = 9$

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

Question 6:

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

Answer 6:

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

According to the question,

$x+x+1+x+2=51$

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

$\Rightarrow \qquad 3x+3-3=51-3$ [Subtracting 3 from both sides]

$\Rightarrow \qquad 3x=48$

$\Rightarrow \qquad \dfrac{3x}{3}=\dfrac{48}{3}$ [Dividing both sides by 3]

$\Rightarrow \qquad x=16$

Hence, first integer = 16, second integer = 16 + 1 = 17 and third integer = 16 + 2 = 1

Question 7:

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

Answer 7:

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

According to question, $\qquad x+x+8+x+16=888$

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

$\Rightarrow \qquad 3x+24-24=888-24$ [Subtracting 24 from both sides]

$\Rightarrow \qquad 3x=864$

$\Rightarrow \qquad \dfrac{3x}{3}=\dfrac{864}{3}$ [Dividing both sides by 3]

$\Rightarrow \qquad x=288$

Hence, first multiple of 8 = 288, second multiple of 8 = 288 + 8 = 296 and third mu of 8 = 288 + 16 = 304.

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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 8:

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

According to the question, $2x+3(x+1)+4(x+2)=74$

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

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

$\Rightarrow \quad 9x+11-11=74-11 \qquad$ [Subtracting 11 from both sides]

$\Rightarrow \quad 9x=63$

$\Rightarrow \quad \dfrac{9x}{9}=\dfrac{63}{9} \qquad$ [Dividing both sides by 9]

$\Rightarrow \quad x=7$

Hence first integer = 7, second integer = 7 + 1 = 8 and third integer = 7 + 2 = 9.

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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 9:

Let the present ages of Rahul and Haroon be $5x$ years and $7x$ years respectively.

According to condition, $(5x+4)+(7x+4)=56$

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

$\Rightarrow \quad 12x+8-8=56-8 \qquad$ [Subtracting 8 from both sides]

$\Rightarrow \quad 12x=48$

$\Rightarrow \quad \dfrac{12x}{12}=\dfrac{48}{12} \qquad$ [Dividing both sides by 12]

$\Rightarrow \quad x=4$

Hence, present age of Rahul = 5 x 4 = 20 years and present age of Haroon = 7 x 4 = 28 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 10:

Let the number of girls be x.

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

According to the question, $\dfrac{x+8}{x} = \dfrac{7}{5}$

$\Rightarrow \quad 5(x+8) = 7x$

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

$\Rightarrow \quad 5x-7x = -40$ [Transposing $7x$ to L.H.S. and 40 to R.H.S.]

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

$\Rightarrow \quad \dfrac{-2x}{-2} = \dfrac{-40}{-2}$ [Dividing both sides by -2]

$\Rightarrow \quad x = 20$

Hence the number of girls = 20 and number of boys = 20 + 8 = 28.

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 11:

Let Baichung's age be x years, then Baichung's father's age = $(x+29)$ years and

Baichung's granddaughter's age = $(x+29+26) = (x+55)$ years.

According to condition, $\qquad x+x+29+x+55 = 135$

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

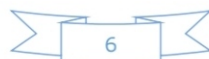$\Rightarrow \quad 3x+84-84 = 135-84$ [Subtracting 84 from both sides]

$\Rightarrow \quad 3x = 51$

$\Rightarrow \quad \dfrac{3x}{3} = \dfrac{51}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad x = 17$ years

Hence, Baichung's age = 17 years, Baichung's father's age = 17 + 29 = 46 years and Baichung's granddaughter's age = 17 + 29 + 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 12:

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 question, $\qquad 4x = x+15$

$\Rightarrow \qquad 4x - x = 15$ $\qquad\qquad$ [Transposing x to L.H.S.]

$\Rightarrow \qquad 3x = 15$

$\Rightarrow \qquad \dfrac{3x}{3} = \dfrac{15}{3}$ $\qquad\qquad$ [Dividing both sides by 3]

$\Rightarrow \qquad x = 5$ years

Hence, Ravi's present age be 5 years.

Question 13:

A rational number is such that when you multiply it by $\dfrac{5}{2}$ and add $\dfrac{2}{3}$ to the product, you get $\dfrac{-7}{12}$. What is the number?

Answer 13:

Let the rational number be x.

According to the question, $\qquad \dfrac{5}{2}x + \dfrac{2}{3} = \dfrac{-7}{12}$

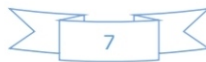$\Rightarrow \qquad \dfrac{5}{2}x + \dfrac{2}{3} - \dfrac{2}{3} = \dfrac{-7}{12} - \dfrac{2}{3}$ $\qquad\qquad$ [Subtracting $\dfrac{2}{3}$ from both sides]

$\Rightarrow \qquad \dfrac{5x}{2} = \dfrac{-7-8}{12}$

$\Rightarrow \qquad \dfrac{5x}{2} = \dfrac{-15}{12}$

$\Rightarrow \qquad 5x \times 12 = -15 \times 2$

$\Rightarrow \qquad 60x = -30$

$$\Rightarrow \quad \frac{60x}{60} = \frac{-30}{60} \qquad \text{[Dividing both sides by 60]}$$

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

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

Question 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?

Answer 14:

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

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

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

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

$$\Rightarrow \quad \frac{400x}{400} = \frac{4,00,000}{400} \qquad \text{[Dividing both sides by 400]}$$

$$\Rightarrow \quad x = 1000$$

Hence, number of denominations of ₹100 notes = 2 x 1000 = 2000
Number of denominations of ₹50 notes = 3 x 1000 = 3000
Number of denominations of ₹10 notes = 5 x 1000 = 5000

Therefore, required denominations of notes of ₹100, ₹50 and ₹10 are 2000, 3000 and 5000 respectively.
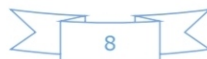
Question 15:

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?

Answer 15:

Total sum of money = ₹300

Let the number of ₹5 coins be x, number of ₹2 coins be $3x$ and number of ₹1 coins be $160 - (x + 3x) = 160 - 4x$.

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

$\Rightarrow \quad 5x + 6x + 160 - 4x = 300$

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

$\Rightarrow \quad 7x + 160 - 160 = 300 - 160 \qquad$ [Subtracting 160 from both sides]

$\Rightarrow \quad 7x = 140$

$\Rightarrow \quad \dfrac{7x}{7} = \dfrac{140}{7} \qquad$ [Dividing both sides by 7]

$\Rightarrow \quad x = 20$

Hence, the number of coins of ₹5 denomination = 20

Number of coins of ₹2 denomination = 3 x 20 = 60

Number of coins of ₹1 denomination = 160 – 4 x 20 = 160 – 80 = 80

Question 16:

The organizers 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 participants is 63.

Answer 16:

Total sum of money = ₹3000

Let the number of winners of ₹100 be x.

And those who are not winners = $63 - x$

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

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

$\Rightarrow \quad 75x + 1575 = 3000$

$\Rightarrow \quad 7x + 1575 - 1575 = 3000 - 1575 \qquad$ [Subtracting 1575 from both sides]

$\Rightarrow \quad 7x = 1425$

$\Rightarrow \quad \dfrac{7x}{7} = \dfrac{1425}{7} \qquad$ [Dividing both sides by 7]

$\Rightarrow \quad x = 19$

Hence the number of winner is 19.