Question 1.
Three more than twice a number is equal to four less than the number. Find the number.
Solution:
Let the number = x
Twice the number = 2x
According to problem, $3 + 2x = x - 4$
$\Rightarrow 3 + 2x + 4 = x$
$\Rightarrow 7 = x - 2x$
$\Rightarrow 7 = -x$
$\Rightarrow -x = 7$
$\Rightarrow x = -7$
Hence, the number = -7

Question 2.
When four consecutive integers are added, the sum is 46. Find the integers.
Solution:
Let x be the first integer, then the next three consecutive integers are x + 1, x + 2 and x + 3
According to problem,
$x + (x + 1) + (x + 2) + (x + 3) = 46$
$\Rightarrow x + x + 1 + x + 2 + x + 3 = 46$
$\Rightarrow 4x + 6 = 46$
$\Rightarrow 4x = 46 - 6$
$\Rightarrow 4x = 40$
$\Rightarrow x = \frac{40}{4} = 10$
Hence four consecutive integers are 10, (10 + 1), (10 + 2) and (10 + 3)
i.e. 10, 11, 12 and 13

Question 3.

Manjula thinks a number and subtracts $\frac{7}{3}$ from it. She multiplies the result by 6. The result now obtained is 2 less than twice the same number she thought of. What is the number?

Solution:

Let a number thought by Manjula = x

According to the condition,

$\left(x - \frac{7}{3}\right) \times 6 = 2x - 2$

$\Rightarrow 6x - 14 = 2x - 2$

$\Rightarrow 6x - 2x = -2 + 14 = 12$

$\Rightarrow 4x = 12$

$\Rightarrow x = \frac{12}{4} = 3$

Flence required number = 3

Question 4.

A positive number is 7 times another number. If 15 is added to both the numbers, then one of the new number becomes $\frac{5}{2}$ times the other new number. What are the numbers?

Solution:

Let the required number = x

Then another number = $\frac{x}{7}$

According to the condition,

$$x + 15 = \frac{5}{2}\left(\frac{x}{7} + 15\right)$$

$$2x + 30 = \frac{5x}{7} + 75$$

$$2x - \frac{5}{7}x = 75 - 30 \Rightarrow \frac{9x}{7} = 45$$

$$\Rightarrow x = 45 \times \frac{7}{9} = 35$$

∴ **One number** = 35

$$\text{and other number} = \frac{35}{7} = 5$$

Hence the numbers are 35 and 5

Question 5.
When three consecutive even integers are added, the sum is zero. Find the integers.
Solution:
Let the first even integer be x,
then next two consecutive even integers are (x + 2)
and (x + 4)
According to given problem,
x + (x +2) + (x + 4) = 0
$\Rightarrow$ x + x + 2 + x + 4 =0
$\Rightarrow$ 3x + 6 = 0
$\Rightarrow$ 3x = − 6
$\Rightarrow x = \frac{-6}{3}$
$\Rightarrow$ x = − 2
Hence three consecutive integers are −2, − 2 + 2, − 2
+ 4 i.e. − 2, 0, 2

Question 6.
Find two consecutive odd integers such that two-fifth of the smaller exceeds two-ninth of the greater by 4.

Solution:

Let the first odd integer be x,

then next consecutive odd integers is (x + 2)

According to given problem,

$$\frac{2}{5}(x) = \frac{2}{9}(x+2) + 4$$

$$\Rightarrow \frac{2x}{5} = \frac{2(x+2)}{9} + 4$$

$$\Rightarrow \frac{2x}{5} - \frac{2(x+2)}{9} = 4$$

$$\Rightarrow \frac{18x - 10(x+2)}{45} = 4$$

$$\Rightarrow \frac{18x - 10x - 20}{45} = 4$$

$$\Rightarrow \frac{8x - 20}{45} = 4$$

$$\Rightarrow 8x - 20 = 4 \times 45$$

$$\Rightarrow 8x - 20 = 180$$

$$\Rightarrow 8x = 180 + 20$$

$$\Rightarrow 8x = 200$$

$$\Rightarrow x = \frac{200}{8}$$

$$\Rightarrow x = 25$$

Hence two consecutive odd integers are

25 and (x + 2) = (25 + 2) = 27

Question 7.

The denominator of a fraction is 1 more than twice its numerator. If the numerator and denominator are both increased by 5, it becomes $\frac{3}{5}$. Find the original fraction.

Solution:

Let the numerator of the original fraction be x

Then, its denominator = 2x + 1

∴ The fraction = $\frac{x}{2x+1}$

According to given problem,

$$= \frac{x+5}{(2x+1)+5} = \frac{3}{5}$$

$$\Rightarrow \frac{x+5}{2x+1+5} = \frac{3}{5}$$

⇒ 5 (x + 5) = 3 (2x + 6)

⇒ 5x + 25 = 6x + 18

⇒ 5x − 6x = 18 − 25

⇒ −x = −7

⇒ x = 7

Hence, the original fraction = $\frac{x}{2x+1} = \frac{7}{2 \times 7+1} = \frac{7}{15}$

Question 8.

Find two positive numbers in the ratio 2 : 5 such that their difference is 15.

Solution:

Let the two numbers be 2x and 5x

[∵ ratio of these two numbers = $\frac{2x}{5x} = \frac{2}{5}$ = 2 : 5]

According to given problem,

5x − 2x = 15

⇒ 3x = 15

⇒ x = $\frac{15}{3}$

$\Rightarrow x = 5$

Hence the numbers are 2 × 5 and 5 × 5 i.e. 10 and 25

Question 9.

What number should be added to each of the numbers 12, 22, 42 and 72 so that the resulting numbers may be in proportion ?

Solution:

Let the required number be x

Then according to given problem,

12 + x, 22 + x, 42 + x and 72 + x are in proportion

$\Rightarrow \frac{12+x}{22+x} = \frac{42+x}{72+x}$

$\Rightarrow (12 + x) (72 + x) = (42 + x) (22 + x)$

$\Rightarrow 12 (72 + x) + x (72 + x) = 42 (22 + x) + x (22 + x)$

$\Rightarrow 864 + 12x + 72x + x^2 = 924 + 42x + 22x + x^2$

$\Rightarrow 864 + 84x + x^2 = 924 + 64x + x^2$

$\Rightarrow 864 + 84x + x^2 - 924 - 64x - x^2 = 0$

$\Rightarrow 864 + 84x - 64x - 924 = 0$

$\Rightarrow 84x - 64x = 924 - 864$

$\Rightarrow 20x = 60$

$\Rightarrow x = \frac{60}{20}$

$\Rightarrow x = 3$

Hence, the required number is 3.

Question 10.

The digits of a two–digit number differ by 3. If the digits are interchanged and the resulting number is added to the original number, we get 143. What can be the original number?

Solution:

Let one's digit of a 2-digit number = x

Then ten's digit = x + 3

∴ Number = x + 10(x + 3) = x + 10x + 30 = 11x + 30

By interchanging the digits,

One's digit of new number = x + 3

and ten's digit = x

∴ Number = x + 3 + 10x = 11x + 3

According to the condition,

11x + 30+ 11x + 3 = 143

⇒ 22x + 33 = 143

⇒ 22x = 143−33 = 110

⇒ x = $\frac{110}{22}$ = 5

∴ Original number = 11x+ 30 = 11 × 5 + 30 = 55 + 30

= 85

Question 11.

Sum of the digits of a two-digit number is 11. When we interchange the digits, it is found that the resulting new number is greater than the original number by 63. Find the two-digit number.

Solution:

Sum of two digits of a 2-digit number = 11

Let unit's digit of a 2-digit number = x

Then ten's digit = 11 − x

∴ Number = x + 10(11 − x) = x + 110 − 10x = 110 −9x

By interchanging the digit,

One's digit of new number = 11 − x

and ten's digit = x

∴ Number = 11 − x + 10x = 11 + 9x

According to the condition,

$11 + 9x - (110 - 9x) = 63$

$11 + 9x - 110 + 9x = 63$

$18x = 63 - 11 + 110 = 162$

$x = \frac{162}{18} = 9$

∴ Original number = $110 - 9x = 110 - 9 \times 9 = 110 - 81 = 29$

Question 12.

Ritu is now four times as old as his brother Raju. In 4 years time, her age will be twice of Raju's age. What are their present ages?

Solution:

Let the age of Raju = x years

then the age of Ritu = 4 × x years = 4x years

In 4 years time,

age of Raju = (x +4) years

age of Ritu = (4x + 4) years

According to given problem,

$4x + 4 = 2 (x + 4)$

$\Rightarrow 4x + 4 = 2x + 8$

$\Rightarrow 4x - 2x = 8 - 4$

$\Rightarrow 2x = 4 \Rightarrow x = \frac{4}{2}$

$\Rightarrow x = 2$

Hence, the age of Raju = 2 years

and the age of Ritu = 4 × 2 years = 8 years.

Question 13.

A father is 7 times as old as his son. Two years ago, the father was 13 times as old as his son. How old are they now?

Solution:

Let the present age of son = x years

Then, age of his father = 7 × x years = 7x years

Two years ago age of son = (x − 2) years

Two years ago age of his father = (7x − 2) years

According to given problem,

7x − 2 = 13 (x − 2)

$\Rightarrow$ 7x − 2 = 13x − 26

$\Rightarrow$ 7x − 13x = −26 + 2

$\Rightarrow$ −6x = −24

$\Rightarrow$ x = $\frac{-24}{-6}$

$\Rightarrow$ x = 4

Hence, age of son = 4 years

and age of his father = 7 × 4 years = 28 years.

Question 14.

The ages of Sona and Sonali are in the ratio 5 : 3. Five years hence, the ratio of their ages will be 10 : 7. Find their present ages.

Solution:

Given ratio of ages of Sona and Sonali = 5 : 3

let the present ages of Sona and Sonali is 5x and 3x years

five years hence, the age of Sona = 5x + 5

and five years to hence the age of Sonali = 3x + 5

According to given problem,

$\frac{5x+5}{3x+5} = \frac{10}{7}$

$\Rightarrow$ 7(5x + 5) = 10(3x + 5)

$\Rightarrow$ 35x + 35 = 30x + 50

$\Rightarrow$ 35x − 30x = 50 − 35

$\Rightarrow$ 5x = 15 $\Rightarrow$ x = $\frac{15}{5}$

⇒ x = 3

Hence, the present age of Sona and Sonali is 5 × 3

and 3 × 3 years

i.e. 15 and 9 years.

Question 15.

An employee works in a company on a contract of 30

days on the condition that he will receive ₹200 for

each day he works and he will be fined ₹20 for each

day he is absent. If he receives ₹3800 in all, for how

many days did he remain absent?

Solution:

Period of contract = 30 days

If an employees works a day, he will get ₹200

If he is absent, he will be fined ₹20 per day

At the end of contract period, he get ₹3800

Let he remained absent for x days

Then he worked for = (30 − x) days

According to the condition,

$(30 − x) × 200 − x × 20 = 3800$

⇒ $6000 − 200x − 20x = 3800$

⇒ $220x = 6000 − 3800 = 2200$

⇒ $x = \frac{2200}{220} = 10$

He remained absent for 10 days.

Question 16.

I have a total of ₹300 in coins of denomination ₹1, ₹2

and ₹5. The number of 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:

Amount of coins = ₹300

and total coins = 160

Let number of coins of ₹5 = x

Then number of coins of ₹2 = 3x

and number of coins of ₹1 = 150 − (x + 3x) = 150 − 4x

According to the condition,

(160 − 4x) × 1 + 3x × 2 + x × 5 = 300

$\Rightarrow$ 160 − 4x + 6x + 5x = 300 $\Rightarrow$ 160 + 7x = 300

$\Rightarrow$ 7x = 300 − 160 = 140

$\Rightarrow$ x = $\frac{140}{7}$ = 20

∴ 5 rupee coins = 20

2 rupee coins = 3 × 20 = 60

and 1 rupee coins = 160 − 60 − 20 = 80

Question 17.

A local bus is carrying 40 passengers, some with ₹5 tickets and the remaining with ₹7.50 tickets. If the total receipts from these passengers is ₹230, find the number of passengers with ₹5 tickets.

Solution:

Let the number of passengers with ₹5 tickets = x

Then, the number of passengers with ₹7.50 tickets = (40 − x)

According to given problem,

5 × x + (40 − x) × 7.50 = 230

$\Rightarrow$ 5x + 300 − 7.5x = 230

$\Rightarrow$ 5x − 7.5x = 230 − 300

$\Rightarrow$ −2.5x = −70

$\Rightarrow$ x = $\frac{70}{2.5}$ = 28

Hence, the number of passengers with ₹5 tickets = 28.

Question 18.

On a school picnic, a group of students agree to pay equally for the use of a full boat and pay ₹10 each. If there had been 3 more students in the group, each would have paid ₹2 less. How many students were there in the group ?

Solution:

Let, the number of students in a group = x

when 3 students are more then,

the total number of students in the group = x + 3

According to given problem,

$\Rightarrow 10 \times x = (x + 3) \times (10 - 2)$

$\Rightarrow 10x = (x + 3) \times 8$

$\Rightarrow 10x = 8 (x + 3)$

$\Rightarrow 10x = 8x + 24$

$\Rightarrow 10x - 8x = 24$

$\Rightarrow 2x = 24$

$\Rightarrow x = \frac{24}{2}$

$\Rightarrow x = 12$

Hence, the number of students in the group = 12

Question 19.

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.

Solution:

Let total deer in the herd = x

Number of deer grazing in the field = $\frac{x}{2}$

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

$\frac{3}{4}$ of the remaining deer playing

$= \frac{3}{4} \times \frac{1}{2}x = \frac{3}{8}x$

Rest of deer = $\frac{x}{2} - \frac{3}{8}x = \frac{1}{8}x$

$\therefore \frac{1}{8}x = 9$

$\Rightarrow x = 9 \times 8 = 72$

$\therefore$ Total number of deer = 72

Question 20.

Sakshi takes some flowers in a basket and visits three temples one by one. At each temple, she offers one half of the flowers from the basket. If she is left with 6 flowers at the end, find the number of flowers she had in the beginning.

Solution:

Let total flowers in a basket = x

Flowers offered in the first temple = $\frac{x}{2}$

Remaining flowers = $x - x - \frac{x}{2} = \frac{x}{2}$

Flowers offered in the second temple

$\frac{x}{2} \times \frac{1}{2} = \frac{x}{4}$

Remaining flower = $\frac{x}{2} - \frac{x}{4} = \frac{x}{4}$

Flowers offered in the third temple = $\frac{x}{4} \times \frac{1}{2} = \frac{x}{8}$

Remaining flowers = $\frac{x}{4} - \frac{x}{8} = \frac{x}{8}$

$\therefore$ Total , number of flowers = 48

Question 21.

Two supplementary angles differ by 50°. Find the measure of each angle.

Solution:

Let the angle be x

Then, its supplementary angle = 180° − x

According to given problem,

x − (180° − x) = 50°

⇒ x − 180° + x = 50°

⇒ 2x − 180° = 50°

⇒ 2x = 180° + 50°

⇒ 2x = 230°

⇒ x = $\frac{230°}{2}$

⇒ x = 115°

Hence, the measurement of each angle be 115° and
(180° − 115°)

i.e. 115° and 65°.

Question 22.

If the angles of a triangle are in the ratio 5 : 6 : 7, find
the angles.

Solution:

Let the angles of a triangle are 5x, 6x, and 7x

Then, we know that,

5x + 6x + 7x = 180°

⇒ 18x = 180°

⇒ x = $\frac{180°}{18}$

⇒ x= 10°

Hence, the angle of a triangle are 5 × 10°, 6 × 10°,
and 7 × 10° i.e. 50°, 60° and 70°.

Question 23.

Two equal sides of an isosceles triangle are 3x − 1 and 2x + 2 units. The third side is 2x units. Find x and the perimeter of the triangle.

Solution:

Two equal sides of an isosceles triangle are 3x − 1 and 2x + 2

i. e. 3x − 1 = 2x + 2

⇒ 3x − 2x = 2 + 1

⇒ x = 3

Third side of triangle = 2x = 2 × 3 = 6 units

equal sides of an triangle = 3 × 3 − 1 = 9 − 1 = 8 units

∴ Perimeter of the triangle = (8 + 8 + 6) units = 22 units

Question 24.

If each side of a triangle is increased by 4 cm, the ratio of the perimeters of the new triangle and the given triangle is 7 : 5. Find the perimeter of the given triangle.

Solution:

Let the perimeter of original triangle = x cm

By increasing each side by 4 cm The perimeter will be

= x + 4 × 3 = (x + 12) cm

Now Ratio of perimeter of new triangle and given triangle = 7 : 5

⇒ $\frac{x+12}{x} = \frac{7}{5}$

⇒ 5x + 60 = 7x (By corss multiplication)

⇒ 7x − 5x = 60

⇒ 2x = 60

$\Rightarrow x = \frac{60}{2} = 30$

$\therefore$ Perimeter of given triangle = 30 cm

Question 25.

The length of a rectangle is 5 cm less than twice its breadth. If the length is decreased by 3 cm and breadth increased by 2 cm, the perimeter of the resulting rectangle is 72 cm. Find the area of the original rectangle.

Solution:

Let, the breath of the original rectangle = x cm

Then, length of the original rectangle = (2x − 5) cm

When, length is decreased by 3 cm then new length

= [(2x − 5) − 3)] cm = (2x − 8) cm

When breadth is increased by 2 cm,

then new length = (x + 2) cm

New perimeter=2(new length + new breadth)

= 2 [(2x − 8) + (x + 2)]

= 2 [2x − 8 + x + 2]

= 2 (3x − 6) = 6x − 12

According to the given problem,

6x − 12 = 72

$\Rightarrow$ 6x = 72 + 12

$\Rightarrow$ 6x = 84

$\Rightarrow x = \frac{84}{6}$

$\Rightarrow$ x = 14

Breadth of the original rectangle = 14 cm

and length of the original rectangle = (2 × 14 − 5) cm

= 23 cm

Area of the original rectangle = Length × Breadth

= 23 × 14 cm^2 = 322 cm^2

Question 26.

A rectangle is 10 cm long and 8 cm wide. When each side of the rectangle is increased by x cm, its perimeter is doubled. Find the equation in x and hence find the area of the new rectangle.

Solution:

Length of rectangle (l) = 10 cm

and width (b) = 8 cm

Perimeter = 2(l + b) = 2(10 + 8) cm = 2 × 18 = 36 cm

By increasing each side by x cm

Then perimeter = 2[10 + x + 8 + x]

= 2(18 + 2x) = (36 + 4x) cm

According to the condition,

36 + 4x = 2(36)

⇒ 36 + 4x = 72

⇒ 4x = 72 − 36 = 36

⇒ x = $\frac{36}{4}$

⇒ x = 9

Length of new rectanlge = l + x = 10 + 9 = 19 cm

and breadth = b + x = 8 + 9 = 17 cm

Area = Length x Breadth = 19 × 17 cm^2 = 323 cm^2

Question 27.

A steamer travels 90 km downstream in the same time as it takes to travel 60 km upstream. If the speed of the stream is 5 km/hr, find the speed of the streamer in still water.

Solution:

Let, the speed of the streamer in still water be x km/hr,

Then, the speed downstream = (x + 5) km/hr

And, the speed upstream = $(x - 5)$ km/r.

According to given problem

$$\frac{90}{x+5} = \frac{60}{x-5}$$

$\Rightarrow 90(x - 5) = 60(x + 5)$

$\Rightarrow 90x - 450 = 60x + 300$

$\Rightarrow 90x - 60x = 300 + 450$

$\Rightarrow 30x = 750$

$\Rightarrow x = \frac{750}{30}$

$\Rightarrow x = 25$

Hence, the speed of the streamer in still water be 25 km/hr.

Question 28.

A steamer goes downstream and covers the distance between two ports in 5 hours while it covers the same distance upstream in 6 hours. If the speed of the stream is 1 km/h, find the speed of the streamer in still water and the distance between two ports.

Solution:

Speed of the stream in still water = 1 km/h

Let speed of streamer = x km/h

∴ It down speed = $(x + 1)$ km/h

and up speed = $(x - 1)$ km/h

According to the condition,

$(x + 1) \times 5 = (x - 1) \times 6$

$\Rightarrow 5x + 5 = 6x - 6$

$\Rightarrow 6x - 5x = 5 + 6$

$\Rightarrow x = 11$

∴ Speed of streamer in still water = 11 km/h

and distance between two points = (11 + 1) × 5 = 60 km/h

Question 29.
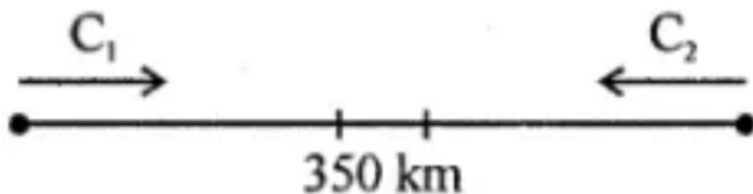
Distance between two places A and B is 350 km. Two cars start simultaneously from A and B towards each other and the distance between them after 4 hours is 62 km. If the speed of one car is 8 km/h less than the speed of other cars, find the speed of each car.

Solution:

Distance between two places A and B = 350 km

Let speed of car C_1 = x km/h

The speed of car C_2 = (x − 8) km/h

350 km

In 4 hours, there will be 62 km distance between these two cars.

∴ x × 4 + (x − 8) × 4 = 350 − 62

⇒ 4x + 4x − 32 = 288

⇒ 8x = 288 + 32 = 320

⇒ x = $\frac{320}{8}$ = 40

Speed of one car C_1 = 40 km/h

and speed of car C_2 = 40 − 8 = 32 km/h