Exercise 2.1

Question 1:

Solve: $x-2=7$

Answer:

$x - 2 = 7$

Transposing 2 to R.H.S, we obtain

$x = 7 + 2 = 9$

Question 2:

Solve: $y+3=10$

Answer:

$y + 3 = 10$

Transposing 3 to R.H.S, we obtain

$y = 10 - 3 = 7$

Question 3:

Solve: $6=z+2$

Answer:

$6 = z + 2$

Transposing 2 to L.H.S, we obtain

$6 - 2 = z$

$z = 4$

Question 4:

Solve: $\frac{3}{7}+x=\frac{17}{7}$

Answer:

$\frac{3}{7}+x=\frac{17}{7}$

Transposing $\frac{3}{7}$ to R.H.S, we obtain

$x = \frac{17}{7} - \frac{3}{7} = \frac{14}{7} = 2$

Question 5:

Solve: $6x = 12$

Answer:

6*x* = 12

Dividing both sides by 6, we obtain

$\frac{6x}{6} = \frac{12}{6}$

x = 2

Question 6:

Solve: $\frac{t}{5} = 10$

Answer:

$\frac{t}{5} = 10$

Multiplying both sides by 5, we obtain

$\frac{t}{5} \times 5 = 10 \times 5$

$t = 50$

Question 7:

Solve: $\frac{2x}{3} = 18$

Answer:

$\frac{2x}{3} = 18$

Multiplying both sides by $\frac{3}{2}$, we obtain

$$\frac{2x}{3}\times\frac{3}{2}=18\times\frac{3}{2}$$

$$x=27$$

Question 8:

Solve: $1.6=\frac{y}{1.5}$

Answer:

$$1.6=\frac{y}{1.5}$$

Multiplying both sides by 1.5, we obtain

$$1.6\times1.5=\frac{y}{1.5}\times1.5$$

$$2.4=y$$

Question 9:

Solve: $7x-9=16$

Answer:

$7x - 9 = 16$

Transposing 9 to R.H.S, we obtain

$7x = 16 + 9$

$7x = 25$

Dividing both sides by 7, we obtain

$$\frac{7x}{7}=\frac{25}{7}$$

$$x=\frac{25}{7}$$

Question 10:

Solve: $14y-8=13$

Answer:

$14y - 8 = 13$

Transposing 8 to R.H.S, we obtain

$14y = 13 + 8$

$14y = 21$

Dividing both sides by 14, we obtain

$$\frac{14y}{14} = \frac{21}{14}$$

$$y = \frac{3}{2}$$

Question 11:

Solve: $17 + 6p = 9$

Answer:

$17 + 6p = 9$

Transposing 17 to R.H.S, we obtain

$6p = 9 - 17$

$6p = -8$

Dividing both sides by 6, we obtain

$$\frac{6p}{6} = -\frac{8}{6}$$

$$p = -\frac{4}{3}$$

Question 12:

Solve: $\frac{x}{3} + 1 = \frac{7}{15}$

Answer:

$$\frac{x}{3} + 1 = \frac{7}{15}$$

Transposing 1 to R.H.S, we obtain

$$\frac{x}{3}=\frac{7}{15}-1$$
$$\frac{x}{3}=\frac{7-15}{15}$$
$$\frac{x}{3}=-\frac{8}{15}$$

Multiplying both sides by 3, we obtain

$$\frac{x}{3}\times 3=-\frac{8}{15}\times 3$$
$$x=-\frac{8}{5}$$

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:

Let the number be *x*. According to the question,

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

On multiplying both sides by 2, we obtain

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

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

On transposing $\frac{1}{2}$ to R.H.S, we obtain

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

$$=\frac{1+2}{4}=\frac{3}{4}$$

Therefore, the 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 the breadth of the pool?

Answer:

Let the breadth be *x* m. The length will be (2*x* + 2) m.

Perimeter of swimming pool = 2(*l* + *b*) = 154 m

2(2*x* + 2 + *x*) = 154

2(3*x* + 2) = 154

Dividing both sides by 2, we obtain

$$\frac{2(3x+2)}{2}=\frac{154}{2}$$

$3x + 2 = 77$

On transposing 2 to R.H.S, we obtain

$3x = 77 - 2$

$3x = 75$

On dividing both sides by 3, we obtain

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

$x = 25$

$2x + 2 = 2 \times 25 + 2 = 52$

Hence, the breadth and length of the pool are 25 m and 52 m respectively.

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:

Let the length of equal sides be x cm.

Perimeter = x cm + x cm + Base = $4\frac{2}{15}$ cm

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

On transposing $\frac{4}{3}$ to R.H.S, we obtain

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

$$2x = \frac{62 - 4 \times 5}{15} = \frac{62 - 20}{15}$$

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

On dividing both sides by 2, we obtain

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

$$x = \frac{7}{5} = 1\frac{2}{5}$$

Therefore, the length of equal sides 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:

Let one number be x. Therefore, the other number will be $x + 15$.

According to the question,

$x + x + 15 = 95$

$2x + 15 = 95$

On transposing 15 to R.H.S, we obtain

$2x = 95 - 15$

$2x = 80$

On dividing both sides by 2, we obtain

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

$x = 40$

$x + 15 = 40 + 15 = 55$

Hence, the 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:

Let the common ratio between these numbers be x. Therefore, the numbers will be $5x$ and $3x$ respectively.

Difference between these numbers = 18

$5x - 3x = 18$

$2x = 18$

Dividing both sides by 2,

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

$x = 9$

First number = $5x = 5 \times 9 = 45$

Second number = $3x = 3 \times 9 = 27$

Question 6:

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

Answer:

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

Sum of these numbers = $x + x + 1 + x + 2 = 51$

$3x + 3 = 51$

On transposing 3 to R.H.S, we obtain

$3x = 51 - 3$

$3x = 48$

On dividing both sides by 3, we obtain

$$\frac{3x}{3} = \frac{48}{3}$$

$x = 16$

$x + 1 = 17$

$x + 2 = 18$

Hence, the consecutive integers are 16, 17, and 18.

Question 7:

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

Answer:

Let the three consecutive multiples of 8 be $8x$, $8(x + 1)$, $8(x + 2)$.

Sum of these numbers = $8x + 8(x + 1) + 8(x + 2) = 888$

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

$8(3x + 3) = 888$

On dividing both sides by 8, we obtain

$$\frac{8(3x+3)}{8} = \frac{888}{8}$$

$3x + 3 = 111$

On transposing 3 to R.H.S, we obtain

$3x = 111 - 3$

$3x = 108$

On dividing both sides by 3, we obtain

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

$x = 36$

First multiple = $8x = 8 \times 36 = 288$

Second multiple = $8(x + 1) = 8 \times (36 + 1) = 8 \times 37 = 296$

Third multiple = $8(x + 2) = 8 \times (36 + 2) = 8 \times 38 = 304$

Hence, the required 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:

Let three consecutive integers be x, $x + 1$, $x + 2$. According to the question,

$2x + 3(x + 1) + 4(x + 2) = 74$

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

$9x + 11 = 74$

On transposing 11 to R.H.S, we obtain

$9x = 74 - 11$

$9x = 63$

On dividing both sides by 9, we obtain

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

$x = 7$

$x + 1 = 7 + 1 = 8$

$x + 2 = 7 + 2 = 9$

Hence, 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 common ratio between Rahul's age and Haroon's age be x.

Therefore, age of Rahul and Haroon will be $5x$ years and $7x$ years respectively. After 4 years, the age of Rahul and Haroon will be $(5x + 4)$ years and $(7x + 4)$ years respectively.

According to the given question, after 4 years, the sum of the ages of Rahul and Haroon is 56 years.

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

$12x + 8 = 56$

On transposing 8 to R.H.S, we obtain

$12x = 56 - 8$

$12x = 48$

On dividing both sides by 12, we obtain

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

$x = 4$

Rahul's age = $5x$ years = (5×4) years = 20 years

Haroon's age = 7x years = (7 × 4) years = 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:

Let the common ratio between the number of boys and numbers of girls be x.

Number of boys = 7x

Number of girls = 5x

According to the given question,

Number of boys = Number of girls + 8

$\therefore 7x = 5x + 8$

On transposing 5x to L.H.S, we obtain

$7x - 5x = 8$

$2x = 8$

On dividing both sides by 2, we obtain

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

$x = 4$

Number of boys = $7x = 7 \times 4 = 28$

Number of girls = $5x = 5 \times 4 = 20$

Hence, total class strength = 28 + 20 = 48 students

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's age be x years. Therefore, Baichung's age and Baichung's grandfather's age will be ($x - 29$) years and ($x + 26$) years respectively.

According to the given question, the sum of the ages of these 3 people is 135 years.

$\therefore x + x - 29 + x + 26 = 135$

$3x - 3 = 135$

On transposing 3 to R.H.S, we obtain

$3x = 135 + 3$

$3x = 138$

On dividing both sides by 3, we obtain

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

$x = 46$

Baichung's father's age = x years = 46 years

Baichung's age = $(x - 29)$ years = $(46 - 29)$ years = 17 years

Baichung's grandfather's age = $(x + 26)$ years = $(46 + 26)$ years = 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 Ravi's present age be x years.

Fifteen years later, Ravi's age = 4 × His present age

$x + 15 = 4x$

On transposing x to R.H.S, we obtain

$15 = 4x - x$

$15 = 3x$

On dividing both sides by 3, we obtain

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

$5 = x$

Hence, Ravi's present age = 5 years

Question 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?

Answer:

Let the number be *x*.

According to the given question,

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

On transposing $\frac{2}{3}$ to R.H.S, we obtain

$$\frac{5}{2}x=-\frac{7}{12}-\frac{2}{3}$$
$$\frac{5}{2}x=\frac{-7-(2\times 4)}{12}$$
$$\frac{5}{2}x=-\frac{15}{12}$$

On multiplying both sides by $\frac{2}{5}$, we obtain

$$x=-\frac{15}{12}\times\frac{2}{5}=-\frac{1}{2}$$

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

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 common ratio between the numbers of notes of different denominations be x.

Therefore, numbers of Rs 100 notes, Rs 50 notes, and Rs 10 notes will be$2x$, $3x$, and $5x$ respectively.

Amount of Rs 100 notes = Rs $(100 \times 2x)$ = Rs $200x$

Amount of Rs 50 notes = Rs $(50 \times 3x)$= Rs $150x$

Amount of Rs 10 notes = Rs $(10 \times 5x)$ = Rs $50x$

It is given that total amount is Rs 400000.

$\therefore 200x + 150x + 50x = 400000$

$\Rightarrow 400x = 400000$

On dividing both sides by 400, we obtain

$x = 1000$

Number of Rs 100 notes = $2x = 2 \times 1000 = 2000$

Number of Rs 50 notes = $3x = 3 \times 1000 = 3000$

Number of Rs 10 notes = $5x = 5 \times 1000 = 5000$

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 coins be x.

Number of Rs 2 coins = 3 × Number of Rs 5 coins = $3x$

Number of Re 1 coins = 160 − (Number of coins of Rs 5 and of Rs 2)

$= 160 - (3x + x) = 160 - 4x$

Amount of Re 1 coins = Rs $[1 \times (160 - 4x)]$ = Rs $(160 - 4x)$

Amount of Rs 2 coins = Rs $(2 \times 3x)$= Rs $6x$

Amount of Rs 5 coins = Rs $(5 \times x)$ = Rs $5x$

It is given that the total amount is Rs 300.

$\therefore 160 - 4x + 6x + 5x = 300$

$160 + 7x = 300$

On transposing 160 to R.H.S, we obtain

$7x = 300 - 160$

$7x = 140$

On dividing both sides by 7, we obtain

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

$x = 20$

Number of Re 1 coins = $160 - 4x = 160 - 4 \times 20 = 160 - 80 = 80$

Number of Rs 2 coins = $3x = 3 \times 20 = 60$

Number of Rs 5 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 3000. 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 will be $63 - x$.

Amount given to the winners = Rs $(100 \times x)$ = Rs $100x$

Amount given to the participants who did not win = Rs $[25(63 - x)]$

= Rs $(1575 - 25x)$

According to the given question,

$100x + 1575 - 25x = 3000$

On transposing 1575 to R.H.S, we obtain

$75x = 3000 - 1575$

$75x = 1425$

On dividing both sides by 75, we obtain

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

$x = 19$

Hence, number of winners = 19

Exercise 2.3

Question 1:

Solve and check result: $3x = 2x + 18$

Answer:

$3x = 2x + 18$

On transposing $2x$ to L.H.S, we obtain

$3x - 2x = 18$

$x = 18$

L.H.S = $3x = 3 \times 18 = 54$

R.H.S = $2x + 18 = 2 \times 18 + 18 = 36 + 18 = 54$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 2:

Solve and check result: $5t - 3 = 3t - 5$

Answer:

$5t - 3 = 3t - 5$

On transposing $3t$ to L.H.S and -3 to R.H.S, we obtain

$5t - 3t = -5 - (-3)$

$2t = -2$

On dividing both sides by 2, we obtain

$t = -1$

L.H.S = $5t - 3 = 5 \times (-1) - 3 = -8$

R.H.S = $3t - 5 = 3 \times (-1) - 5 = -3 - 5 = -8$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 3:

Solve and check result: $5x + 9 = 5 + 3x$

Answer:

$5x + 9 = 5 + 3x$

On transposing $3x$ to L.H.S and 9 to R.H.S, we obtain

$5x - 3x = 5 - 9$

$2x = -4$

On dividing both sides by 2, we obtain

$x = -2$

L.H.S = $5x + 9 = 5 \times (-2) + 9 = -10 + 9 = -1$

R.H.S = $5 + 3x = 5 + 3 \times (-2) = 5 - 6 = -1$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 4:

Solve and check result: $4z + 3 = 6 + 2z$

Answer:

$4z + 3 = 6 + 2z$

On transposing $2z$ to L.H.S and 3 to R.H.S, we obtain

$4z - 2z = 6 - 3$

$2z = 3$

Dividing both sides by 2, we obtain

$$z = \frac{3}{2}$$

L.H.S = $4z + 3 = 4 \times \left(\frac{3}{2}\right) + 3 = 6 + 3 = 9$

R.H.S = $6 + 2z = 6 + 2 \times \left(\frac{3}{2}\right) = 6 + 3 = 9$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 5:

Solve and check result: $2x - 1 = 14 - x$

Answer:

$2x - 1 = 14 - x$

Transposing x to L.H.S and 1 to R.H.S, we obtain

$2x + x = 14 + 1$

$3x = 15$

Dividing both sides by 3, we obtain

$x = 5$

L.H.S = $2x - 1 = 2 \times (5) - 1 = 10 - 1 = 9$

R.H.S = $14 - x = 14 - 5 = 9$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 6:

Solve and check result: $8x + 4 = 3(x - 1) + 7$

Answer:

$8x + 4 = 3(x - 1) + 7$

$8x + 4 = 3x - 3 + 7$

Transposing $3x$ to L.H.S and 4 to R.H.S, we obtain

$8x - 3x = -3 + 7 - 4$

$5x = -7 + 7$

$x = 0$

L.H.S = $8x + 4 = 8 \times (0) + 4 = 4$

R.H.S = $3(x - 1) + 7 = 3(0 - 1) + 7 = -3 + 7 = 4$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 7:

Solve and check result: $x = \frac{4}{5}(x + 10)$

Answer:

$x = \frac{4}{5}(x + 10)$

Multiplying both sides by 5, we obtain

$5x = 4(x + 10)$

$5x = 4x + 40$

Transposing $4x$ to L.H.S, we obtain

$5x - 4x = 40$

$x = 40$

L.H.S = $x = 40$

R.H.S = $\frac{4}{5}(x+10) = \frac{4}{5}(40+10) = \frac{4}{5} \times 50 = 40$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 8:

Solve and check result: $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Answer:

$$\frac{2x}{3} + 1 = \frac{7x}{15} + 3$$

Transposing $\frac{7x}{15}$ to L.H.S and 1 to R.H.S, we obtain

$$\frac{2x}{3} - \frac{7x}{15} = 3 - 1$$

$$\frac{5 \times 2x - 7x}{15} = 2$$

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

$$\frac{x}{5} = 2$$

Multiplying both sides by 5, we obtain

$x = 10$

L.H.S = $\frac{2x}{3} + 1 = \frac{2 \times 10}{3} + 1 = \frac{2 \times 10 + 1 \times 3}{3} = \frac{23}{3}$

R.H.S = $\frac{7x}{15} + 3 = \frac{7 \times 10}{15} + 3 = \frac{7 \times 2}{3} + 3 = \frac{14}{3} + 3 = \frac{14 + 3 \times 3}{3} = \frac{23}{3}$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 9:

Solve and check result: $2y+\frac{5}{3}=\frac{26}{3}-y$

Answer:

$2y+\frac{5}{3}=\frac{26}{3}-y$

Transposing *y* to L.H.S and $\frac{5}{3}$ to R.H.S, we obtain

$2y+y=\frac{26}{3}-\frac{5}{3}$

$3y=\frac{21}{3}=7$

Dividing both sides by 3, we obtain

$y=\frac{7}{3}$

L.H.S = $2y+\frac{5}{3}=2\times\frac{7}{3}+\frac{5}{3}=\frac{14}{3}+\frac{5}{3}=\frac{19}{3}$

R.H.S = $\frac{26}{3}-y=\frac{26}{3}-\frac{7}{3}=\frac{19}{3}$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Question 10:

Solve and check result: $3m=5m-\frac{8}{5}$

Answer:

$3m=5m-\frac{8}{5}$

Transposing 5*m* to L.H.S, we obtain

$$3m - 5m = -\frac{8}{5}$$

$$-2m = -\frac{8}{5}$$

Dividing both sides by −2, we obtain

$$m = \frac{4}{5}$$

L.H.S = $3m = 3 \times \frac{4}{5} = \frac{12}{5}$

R.H.S = $5m - \frac{8}{5} = 5 \times \frac{4}{5} - \frac{8}{5} = \frac{12}{5}$

L.H.S. = R.H.S.

Hence, the result obtained above is correct.

Exercise 2.4

Question 1:

Amina thinks of a number and subtracts $\frac{5}{2}$ 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,

$8\left(x-\frac{5}{2}\right) = 3x$

$8x - 20 = 3x$

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 $5x$. According to the 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 ones 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 = $10(9 - x) + x$

$= 90 - 10x + x$

$= 90 - 9x$

According to the given 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

$3 = x$ 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 $9x + 9 = 9 \times 3 + 9 = 36$

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 ones 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,

$$\text{After 5 years, Shobo's age} = \frac{\text{Shobo's mother's present age}}{3}$$

$$x+5=\frac{6x}{3}$$

$x + 5 = 2x$

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(Length + Breadth) $=\left[2\left(11x+4x\right)\right]\ \text{m}=30x\ \text{m}$

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

$\therefore$ 100 × Perimeter = 75000

$100 \times 30x = 75000$

$3000x = 75000$

Dividing both sides by 3000, we obtain

$x = 25$

Length = $11x$ m = (11 × 25) m = 275 m

Breadth = $4x$ m = (4 × 25) m = 100 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 = $\text{Rs}\left(90+\frac{90\times12}{100}\right)$ = Rs 100.80

Per metre selling price of shirt material = $\text{Rs}\left(50+\frac{50\times10}{100}\right)$ = Rs 55

Given that, total amount of selling = Rs 36660

100.80 × (2x) + 55 × (3x) = 36660

201.60x + 165x = 36660

366.60x = 36660

Dividing both sides by 366.60, we obtain

x = 100

Trouser material = 2x m = (2 × 100) m = 200 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 = $\frac{x}{2}$

$$\text{Number of deer playing nearby} = \frac{3}{4} \times \text{Number of remaining deer}$$

$$= \frac{3}{4} \times \left(x - \frac{x}{2} \right) = \frac{3}{4} \times \frac{x}{2} = \frac{3x}{8}$$

Number of deer drinking water from the pond = 9

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

$$x - \left(\frac{4x + 3x}{8} \right) = 9$$

$$x - \frac{7x}{8} = 9$$

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

Multiplying both sides by 8, we obtain

$x = 72$

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 was (x − 10) years and (3x − 10) years respectively.

According to the question,

10 years ago, Aman's age = 5 × 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

Exercise 2.5

Question 1:

Solve the linear equation $\frac{x}{2}-\frac{1}{5}=\frac{x}{3}+\frac{1}{4}$

Answer:

$\frac{x}{2}-\frac{1}{5}=\frac{x}{3}+\frac{1}{4}$

L.C.M. of the denominators, 2, 3, 4, and 5, is 60.

Multiplying both sides by 60, we obtain

$60\left(\frac{x}{2}-\frac{1}{5}\right)=60\left(\frac{x}{3}+\frac{1}{4}\right)$

$\Rightarrow 30x - 12 = 20x + 15$ (Opening the brackets)

$\Rightarrow 30x - 20x = 15 + 12$

$\Rightarrow 10x = 27$

$\Rightarrow x=\frac{27}{10}$

Question 2:

Solve the linear equation $\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$

Answer:

$\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$

L.C.M. of the denominators, 2, 4, and 6, is 12.

Multiplying both sides by 12, we obtain

$6n - 9n + 10n = 252$

$\Rightarrow 7n = 252$

$\Rightarrow n=\frac{252}{7}$

$\Rightarrow n=36$

Question 3:

Solve the linear equation $x+7-\frac{8x}{3}=\frac{17}{6}-\frac{5x}{2}$

Answer:

$x+7-\frac{8x}{3}=\frac{17}{6}-\frac{5x}{2}$

L.C.M. of the denominators, 2, 3, and 6, is 6.

Multiplying both sides by 6, we obtain

$6x + 42 - 16x = 17 - 15x$

$\Rightarrow 6x - 16x + 15x = 17 - 42$

$\Rightarrow 5x = -25$

$\Rightarrow x=\frac{-25}{5}$

$\Rightarrow x=-5$

Question 4:

Solve the linear equation $\frac{x-5}{3}=\frac{x-3}{5}$

Answer:

$\frac{x-5}{3}=\frac{x-3}{5}$

L.C.M. of the denominators, 3 and 5, is 15.

Multiplying both sides by 15, we obtain

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

$\Rightarrow 5x - 25 = 3x - 9$ (Opening the brackets)

$\Rightarrow 5x - 3x = 25 - 9$

$\Rightarrow 2x = 16$

$\Rightarrow x=\frac{16}{2}$

$\Rightarrow x=8$

Question 5:

Solve the linear equation $\frac{3t-2}{4}-\frac{2t+3}{3}=\frac{2}{3}-t$

Answer:

$\frac{3t-2}{4}-\frac{2t+3}{3}=\frac{2}{3}-t$

L.C.M. of the denominators, 3 and 4, is 12.

Multiplying both sides by 12, we obtain

$3(3t-2)-4(2t+3)=8-12t$

$\Rightarrow 9t-6-8t-12=8-12t$ (Opening the brackets)

$\Rightarrow 9t-8t+12t=8+6+12$

$\Rightarrow 13t=26$

$\Rightarrow t=\frac{26}{13}$

$\Rightarrow t=2$

Question 6:

Solve the linear equation $m-\frac{m-1}{2}=1-\frac{m-2}{3}$

Answer:

$m-\frac{m-1}{2}=1-\frac{m-2}{3}$

L.C.M. of the denominators, 2 and 3, is 6.

Multiplying both sides by 6, we obtain

$6m-3(m-1)=6-2(m-2)$

$\Rightarrow 6m-3m+3=6-2m+4$ (Opening the brackets)

$\Rightarrow 6m-3m+2m=6+4-3$

$\Rightarrow 5m=7$

$\Rightarrow m=\frac{7}{5}$

Question 7:

Simplify and solve the linear equation $3(t-3)=5(2t+1)$

Answer:

$3(t - 3) = 5(2t + 1)$

$\Rightarrow 3t - 9 = 10t + 5$ (Opening the brackets)

$\Rightarrow -9 - 5 = 10t - 3t$

☐ $-14 = 7t$

$\Rightarrow t = \frac{-14}{7}$

$\Rightarrow t = -2$

Question 8:

Simplify and solve the linear equation $15(y-4)-2(y-9)+5(y+6)=0$

Answer:

$15(y - 4) - 2(y - 9) + 5(y + 6) = 0$

☐ $15y - 60 - 2y + 18 + 5y + 30 = 0$ (Opening the brackets)

☐ $18y - 12 = 0$

☐ $18y = 12$

☐ $y = \frac{12}{18} = \frac{2}{3}$

Question 9:

Simplify and solve the linear equation $3(5z-7)-2(9z-11)=4(8z-13)-17$

Answer:

$3(5z - 7) - 2(9z - 11) = 4(8z - 13) - 17$

☐ $15z - 21 - 18z + 22 = 32z - 52 - 17$ (Opening the brackets)

☐ $-3z + 1 = 32z - 69$

☐ $-3z - 32z = -69 - 1$

☐ $-35z = -70$

☐ $z = \frac{70}{35} = 2$

Question 10:

Simplify and solve the linear equation $0.25(4f - 3) = 0.05(10f - 9)$

Answer:

$0.25(4f - 3) = 0.05(10f - 9)$

$\frac{1}{4}(4f - 3) = \frac{1}{20}(10f - 9)$

Multiplying both sides by 20, we obtain

$5(4f - 3) = 10f - 9$

☐ $20f - 15 = 10f - 9$ (Opening the brackets)

☐ $20f - 10f = -9 + 15$

☐ $10f = 6$

☐ $f = \frac{3}{5} = 0.6$

Exercise 2.6

Question 1:

Solve: $\frac{8x-3}{3x}=2$

Answer:

$\frac{8x-3}{3x}=2$

On multiplying both sides by $3x$, we obtain

$8x - 3 = 6x$

☐ $8x - 6x = 3$

☐ $2x = 3$

☐ $x=\frac{3}{2}$

Solve: $\frac{9x}{7-6x}=15$

Answer:

$\frac{9x}{7-6x}=15$

Onmultiplying both sides by $7 - 6x$, we obtain

$9x = 15(7 - 6x)$

☐ $9x = 105 - 90x$

☐ $9x + 90x = 105$

☐ $99x = 105$

☐ $x=\frac{105}{99}=\frac{35}{33}$

Question 3:

Solve: $\frac{z}{z+15}=\frac{4}{9}$

Answer:

$$\frac{z}{z+15}=\frac{4}{9}$$

On multiplying both sides by $9(z + 15)$, we obtain

$9z = 4(z + 15)$

☐ $9z = 4z + 60$

☐ $9z - 4z = 60$

☐ $5z = 60$

☐ $z = 12$

Question 4:

Solve: $\frac{3y+4}{2-6y}=\frac{-2}{5}$

Answer:

$$\frac{3y+4}{2-6y}=-\frac{2}{5}$$

On multiplying both sides by $5(2 - 6y)$, we obtain

$5(3y + 4) = -2(2 - 6y)$

☐ $15y + 20 = -4 + 12y$

☐ $15y - 12y = -4 - 20$

☐ $3y = -24$

☐ $y = -8$

Question 5:

Solve: $\frac{7y+4}{y+2}=\frac{-4}{3}$

Answer:

$$\frac{7y+4}{y+2}=-\frac{4}{3}$$

On multiplying both sides by $3(y + 2)$, we obtain

$3(7y + 4) = -4(y + 2)$

☐ $21y + 12 = -4y - 8$

☐ $21y + 4y = -8 - 12$

☐ $25y = -20$

☐ $y = -\frac{4}{5}$

Question 6:

The ages of Hari and Harry are in the ratio 5:7. Four years from now the ratio of their ages will be 3:4. Find their present ages.

Answer:

Let the common ratio between their ages be x. Therefore, Hari's age and Harry's age will be $5x$ years and $7x$ years respectively and four years later, their ages will be $(5x + 4)$ years and $(7x + 4)$ years respectively.

According to the situation given in the question,

$$\frac{5x+4}{7x+4} = \frac{3}{4}$$

$$\Rightarrow 4(5x+4) = 3(7x+4)$$

$$\Rightarrow 20x+16 = 21x+12$$

$$\Rightarrow 16-12 = 21x-20x$$

$$\Rightarrow 4 = x$$

Hari's age = $5x$ years = (5×4) years = 20 years

Harry's age = $7x$ years = (7×4) years = 28 years

Therefore, Hari's age and Harry's age are 20 years and 28 years respectively.

Question 7:

The denominator of a rational number is greater than its numerator by 8. If the numerator is increased by 17 and the denominator is decreased by 1, the number obtained is $\frac{3}{2}$. Find the rational number.

Answer:

Let the numerator of the rational number be x. Therefore, its denominator will be $x + 8$.

The rational number will be $\frac{x}{x+8}$. According to the question,

$$\frac{x+17}{x+8-1}=\frac{3}{2}$$

$$\Rightarrow \frac{x+17}{x+7}=\frac{3}{2}$$

☐ $2(x + 17) = 3(x + 7)$

☐ $2x + 34 = 3x + 21$

☐ $34 - 21 = 3x - 2x$

☐ $13 = x$

Numerator of the rational number = $x = 13$

Denominator of the rational number = $x + 8 = 13 + 8 = 21$

Rational number $=\frac{13}{21}$