

Linear Equations in One Variable

Ex 7B

Q1

Answer :

Let the number be x .

Then, we have :

$$\Rightarrow 2x - 7 = 45$$

$$\Rightarrow 2x = 45 + 7$$

$$\Rightarrow x = \frac{45+7}{2}$$

$$\Rightarrow x = \frac{52}{2}$$

$$\Rightarrow x = 26$$

\therefore The required number is 26.

Q2

Answer :

Let the number be x .

Then, we have:

$$\Rightarrow 3x + 5 = 44$$

$$\Rightarrow 3x = 44 - 5$$

$$\Rightarrow x = \frac{44-5}{3}$$

$$\Rightarrow x = \frac{39}{3}$$

$$\Rightarrow x = 13$$

\therefore The required number is 13

Q3

Answer :

Let the number be x .

Then, we have:

$$\Rightarrow 2x + 4 = \frac{26}{5}$$

$$\Rightarrow 2x = \frac{26}{5} - 4$$

$$\Rightarrow 2x = \frac{26-20}{5}$$

$$\Rightarrow x = \frac{6}{10}$$

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

\therefore The required fraction is $\frac{3}{5}$.

Q4

Answer :

Let the required number be x .

Then, we have:

$$\Rightarrow x + \frac{x}{2} = 72$$

$$\Rightarrow \frac{2x+x}{2} = 72$$

$$\Rightarrow \frac{3x}{2} = 72$$

$$\Rightarrow 3x = 72 \times 2$$

$$\Rightarrow x = \frac{72 \times 2}{3}$$

\therefore The required number is 48.

Q5

Answer :

Let the required number be x .

Then, we have:

$$\Rightarrow x + \frac{2x}{3} = 55$$

$$\Rightarrow \frac{3x+2x}{3} = 55$$

$$\Rightarrow 5x = 55 \times 3$$

$$\Rightarrow x = \frac{55 \times 3}{5}$$

\therefore The required number is 33.

Q6

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Answer :

Let the required number be x .

Then, we have:

$$\Rightarrow 4x - x = 45$$

$$\Rightarrow 3x = \frac{45}{3}$$

$$\Rightarrow x = 15$$

\therefore The required number is 15.

Q7

Answer :

Let the number be x .

Then, we have:

$$(x - 21) = (71 - x)$$

$$\Rightarrow x + x = 71 + 21$$

$$\Rightarrow 2x = 92$$

$$\Rightarrow x = \frac{92}{2} = 46$$

$$\Rightarrow x = 46$$

\therefore The required number is 46.

Q8

Answer :

Let the original number be x .

Then, we have:

$$\Rightarrow \frac{2}{3}x = x - 20$$

$$\Rightarrow \frac{2x}{3} - x = -20$$

$$\Rightarrow \frac{2x - 3x}{3} = -20$$

$$\Rightarrow -x = -20 \times 3$$

$$\Rightarrow x = 60$$

\therefore The original number is 60.

Q9

Answer :

Let the number be x .

Then, the other number will be $\frac{2x}{5}$.

Now, we have:

$$\Rightarrow x + \frac{2x}{5} = 70$$

$$\Rightarrow \frac{5x + 2x}{5} = 70$$

$$\Rightarrow \frac{7x}{5} = 70$$

$$\Rightarrow x = \frac{70 \times 5}{7} = 50$$

\therefore Other number = $50 \times \frac{2}{5} = 20$

Hence, the numbers are 50 and 20.

Q10

Answer :

Let the number be x .

Then, we have:

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

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

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

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

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

$$\Rightarrow -x = -9$$

\therefore The required number is 9.

Q11

Answer :

Let the number be x .

Then, we have:

$$\Rightarrow \frac{x}{5} + 5 = \frac{x}{4} - 5$$

$$\Rightarrow \frac{x}{5} - \frac{x}{4} = -5 - 5$$

$$\Rightarrow \frac{-x}{20} = -10$$

$$\Rightarrow x = 200$$

\therefore The required number is 200.

Q12

Answer :

Let the two consecutive natural number be x and $(x + 1)$.

Then, we have:

$$x + (x + 1) = 63$$

$$\Rightarrow x + x + 1 = 63$$

$$\Rightarrow 2x = 63 - 1$$

$$\Rightarrow x = \frac{63 - 1}{2}$$

$$\Rightarrow x = 31$$

\therefore The required numbers are 31 and 32 (i.e., 31+1).

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Q13

Answer :

Let the two consecutive odd integers whose sum is 76 be x and $(x + 2)$.

Then, $x + x + 2 = 76$

$$\Rightarrow 2x + 2 = 76$$

$$\Rightarrow 2x = 76 - 2$$

$$\Rightarrow x = 74 \div 2$$

$$\Rightarrow x = 37$$

\therefore The required integers are 37 and 39 (i.e., 37 + 2).

Q14

Answer :

Let the three consecutive positive even integers be x , $(x + 2)$ and $(x + 4)$.

Let x be the even number.

Then, $x + x + 2 + x + 4 = 90$

$$\Rightarrow 3x = 90 - 6$$

$$\Rightarrow 3x = 84$$

$$\Rightarrow x = \frac{84}{3} = 28$$

\therefore The required numbers are 28, 30 and 32.

Q15

Answer :

Let the two parts be x and $(184 - x)$.

Then, we have:

$$\frac{1}{3}x = \frac{1}{7}(184 - x) + 8$$

$$\Rightarrow \frac{1}{3}x - \frac{1}{7}(184 - x) = 8$$

$$\Rightarrow \frac{1}{3}x - \frac{184}{7} + \frac{x}{7} = 8$$

$$\Rightarrow \frac{1}{3}x + \frac{1}{7}x = \frac{184}{7} + 8$$

$$\Rightarrow \frac{7x+3x}{21} = 8 + \frac{184}{7}$$

$$\Rightarrow \frac{10x}{21} = \frac{56+184}{7}$$

$$\Rightarrow \frac{10x}{21} = \frac{240}{7}$$

$$\Rightarrow x = \frac{240 \times 21}{7 \times 10}$$

$$= 72$$

Now, other part = $184 - 72 = 112$

\therefore The two parts are 72 and 112.

Q16

Answer :

Let the number of five rupee notes be x .

Then, the number of ten rupee notes will be $(90 - x)$.

According to the question, we have :

$$5x + 10(90 - x) = 500$$

$$\Rightarrow 5x + 900 - 10x = 500$$

$$\Rightarrow -5x = -400$$

$$\Rightarrow x = 80$$

Number of ten rupee notes = $90 - 80 = 10$

\therefore There are 80 five rupee notes and 10 ten rupee notes.

Q17

Answer :

Let the numbers of 50 paise coins and 25 paise coins be x and $2x$, respectively.

Then, we have :

$$50x + 25 \times 2x = 3400$$

$$\Rightarrow 50x + 50x = 3400$$

$$\Rightarrow 100x = 3400$$

$$\Rightarrow x = 34$$

\therefore Number of 50 paise coins = 34

and number of 25 paise coins = 68

Q18

Answer :

Let the present ages of Raju and his cousin be $(x-19)$ yrs and x yrs.

According to the question, we have :

$$\frac{(x-19)+5}{x+5} = \frac{2}{3}$$

$$\Rightarrow 3(x - 14) = 2x + 10$$

$$\Rightarrow 3x - 42 = 2x + 10$$

$$\Rightarrow x = 52$$

\therefore Age of Raju's cousin = 52 yrs

and age of Raju = $52 - 19 = 33$ yrs

Q19

Answer :

Let the age of the son and the father be x yrs and $(x + 30)$ yrs, respectively.

According to the question, we have :

$$3 \times (x + 12) = x + 30 + 12$$

$$\Rightarrow 3x + 36 = x + 42$$

$$\Rightarrow 3x - x = 42 - 36$$

$$\Rightarrow 2x = 6$$

$$\Rightarrow x = 3$$

\therefore Son's age = 3 yrs

Father's age = $(x + 30)$ yrs = $(3 + 30)$ yrs = 33 yrs

Q20

Answer :

Given ratio of Sonal's and Manoj's ages = 7 : 5

Let the ages of Sonal and Manoj be $7x$ yrs and $5x$ yrs.

According to the question, we have :

$$\frac{7x+10}{5x+10} = \frac{9}{7}$$

$$\Rightarrow 7(7x + 10) = 9(5x + 10)$$

$$\Rightarrow 49x + 70 = 45x + 90$$

$$\Rightarrow 49x - 45x = 90 - 70$$

$$\Rightarrow 4x = 20$$

$$\Rightarrow x = 5$$

\therefore Sonal's present age is $7 \times 5 = 35$ yrs

Manoj's present age is $5 \times 5 = 25$ yrs

Q21

Answer :

Let x yrs be the present age of son.

Then, the age of the son 5 years ago would be $(x - 5)$ yrs

Then, Age of father = $7 \left(x - 5 \right)$ yrs

After 5 yrs, the age of the son will be $\left(x + 5 \right)$ yrs

Then, Age of father = $3 \left(x + 5 \right)$ yrs

Now, we have $3(x + 5) = 7(x - 5) + 10$

$$\Rightarrow 3x + 15 = 7x - 35 + 10$$

$$\Rightarrow 4x = 40$$

$$\Rightarrow x = 10$$

\therefore Present age of the father is = $3(x+5)-5$

$$= 3 \left(10 + 5 \right) - 5$$

$$= 40 \text{ yrs}$$

Q22

Answer :

Let x be the present age of Manoj.

According to the question, we have :

$$\Rightarrow x + 12 = 3(x - 4)$$

$$\Rightarrow x + 12 = 3x - 12$$

$$\Rightarrow 2x = 24$$

$$\Rightarrow x = 12$$

\therefore Manoj's present age is 12 years.

Q23

Answer :

Let x be the total marks.

According to the question, we have:

$$40\% \text{ of } x = 185 + 15$$

$$\Rightarrow \frac{40x}{100} = 200$$

$$\Rightarrow 40x = 200 \times 100$$

$$\Rightarrow 40x = 20000$$

$$\Rightarrow x = 500$$

\therefore Total marks = 500

Q24

Answer :

Let x be the digit in the units place.

Sum of the units and tens digits = 8

Then, tens digit = $(8 - x)$

\therefore The number is $10(8 - x) + x$.

Now, $10(8 - x) + x + 18 = 10x + (8 - x)$

$$\Rightarrow 80 - 10x + x + 18 = 10x + 8 - x$$

$$\Rightarrow 98 - 9x = 9x + 8$$

$$\Rightarrow 18x = 90$$

$$\Rightarrow x = 5$$

i.e., tens digit = $(8 - 5) = 3$

\therefore Required number = $10(8 - 5) + 5 = 10 \times 3 + 5 = 35$

Q25

Answer :

Let Rs x be the cost of the chair.

Then, the cost of the table is Rs $(x + 75)$.

Now, $3(x + 75) + 2x = 1850$

$$\Rightarrow 3x + 225 + 2x = 1850$$

$$\Rightarrow 5x = 1625$$

$$\Rightarrow x = \frac{1625}{5} = 325$$

\therefore Cost of the chair = Rs 325; cost of the table = $(325 + 75) =$ Rs 400

Q26

Answer :

Let the cost price of the article be Rs x .

According to the question, we have:

SP = Rs 495

$$\therefore \text{Gain \%} = \frac{\text{Gain}}{\text{CP}} \times 100$$

$$\Rightarrow 10 = \frac{\text{Gain}}{x} \times 100$$

$$\Rightarrow \text{Gain} = \frac{10x}{100} = \text{Rs } \frac{x}{10}$$

Now, CP + Gain = SP

$$\Rightarrow x + \frac{x}{10} = 495$$

$$\Rightarrow \frac{x + 10x}{10} = 495$$

$$\Rightarrow 11x = 495 \times 10$$

$$\Rightarrow x = \frac{495 \times 10}{11}$$

$$\Rightarrow x = \frac{4950}{11}$$

$$\Rightarrow x = 450$$

\therefore CP = Rs 450

Q27

Answer :

Let the length and breadth of the rectangular field be l m and b m, respectively.

According to the question, we have :

$$2(l + b) = 150 \quad \dots (i)$$

$$\Rightarrow l + b = 75$$

$$\text{Given that } l = 2b \quad \dots (ii)$$

Using (ii) in (i), we have:

$$2b + b = 75$$

$$\Rightarrow 3b = 75$$

$$\Rightarrow b = 25$$

$$\therefore l = 50 \text{ m and } b = 25 \text{ m}$$

Q28

Answer :

Let the length of third side be x m. Then, the length of the two equal sides will be $(2x - 5)$ m.

$$\therefore (2x - 5) + (2x - 5) + x = 55$$

$$\Rightarrow 2x - 5 + 2x - 5 + x = 55$$

$$\Rightarrow 5x - 10 = 55$$

$$\Rightarrow 5x = 65$$

$$\Rightarrow x = \frac{65}{5} = 13$$

$$\therefore \text{Length of the third side} = 13 \text{ m}$$

$$\text{And length of the other two equal sides} = (2 \times 13) - 5 = 21 \text{ m}$$

Q29

Answer :

Let the two complementary angles be x° and $(90 - x)^\circ$.

According to the question, we have :

$$x - (90 - x) = 8$$

$$\Rightarrow x - 90 + x = 8$$

$$\Rightarrow 2x = 98$$

$$\Rightarrow x = 49$$

$$\therefore \text{The measures of the complementary angles are } 49^\circ \text{ and } (90 - 49)^\circ = 41^\circ.$$

Q30

Answer :

Let the two supplementary angles be x° and $(180 - x)^\circ$.

$$\therefore x - (180 - x) = 44$$

$$\Rightarrow x - 180 + x = 44$$

$$\Rightarrow 2x = 224$$

$$\Rightarrow x = 112$$

$$\therefore \text{The measures of the supplementary angles are } 112^\circ \text{ and } (180 - 112)^\circ, \text{ i.e., } 68^\circ.$$

Q31

Answer :

Let the base angles of the isosceles triangle be x° each.

Then, the measure the vertex angle will be $(2x)^\circ$.

According to the question, we have :

$$x + x + 2x = 180 \quad (\text{Sum of three sides of a triangle})$$

$$\Rightarrow 4x = 180$$

$$\Rightarrow x = \frac{180}{4}$$

$$\Rightarrow x = 45$$

$$\therefore \text{Each base angle measures } 45^\circ \text{ and the vertex angle measures } (2 \times 45)^\circ, \text{ i.e., } 90^\circ.$$

Q32

Answer :

Let the length of the total journey be x km.

According to the question, we have:

$$\frac{3}{5}x + \frac{1}{4}x + \frac{1}{8}x + 2 = x$$

$$\Rightarrow \frac{24x + 10x + 5x + 80}{40} = x$$

$$\Rightarrow 39x + 80 = 40x$$

$$\Rightarrow x = 80$$

\therefore The length of his total journey is 80 km.

Q33

Answer :

Let x be the number of days of his absence.

\therefore Number of days of his presence = $(20 - x)$

Now, $(20 - x)120 - 10x = 1880$

$$\Rightarrow 2400 - 120x - 10x = 1880$$

$$\Rightarrow 2400 - 1880 = 130x$$

$$\Rightarrow 130x = 520$$

$$\Rightarrow x = 4$$

\therefore Number of days of his absence = 4

Q34

Answer :

Let the worth of Hari Babu's property be Rs x .

According to the question, we have:

$$\text{Son's share} = \frac{1}{4}x$$

$$\text{Daughter's share} = \frac{1}{3}x$$

$$\text{Wife's share} = \left\{ x - \left(\frac{1}{4}x + \frac{1}{3}x \right) \right\}$$

It is given that his wife's share is Rs 18000.

$$\text{i.e., } x - \left(\frac{1}{4}x + \frac{1}{3}x \right) = 18000$$

$$\Rightarrow x - \left(\frac{1}{3}x + \frac{1}{4}x \right) = 18000$$

$$\Rightarrow x - \frac{7x}{12} = 18000$$

$$\Rightarrow \frac{5x}{12} = 18000$$

$$\Rightarrow x = \frac{+88000 \times 12}{5}$$

$$\Rightarrow x = 43200$$

\therefore Hari Babu's total property is worth Rs 43200.

Q35

Answer :

Let the volume of the pure alcohol be x ml.

Initial concentration = 15%

So, initial amount of alcohol in the solution will be = $\frac{15}{100} \times 400 = 60$ ml

To make the strength of the solution 32%, we will keep the amount of water constant and add

On adding pure alcohol, the volume of the solution increases to $400 + x$.

According to the question, we have :

$$\frac{x+60}{400+x} = \frac{32}{100}$$

$$\Rightarrow 100x + 6000 = 12800 + 32x$$

$$\Rightarrow 100x - 32x = 12800 - 6000$$

$$\Rightarrow 68x = 6800$$

$$\Rightarrow x = 100$$

So, amount of pure alcohol to be added = 100 ml