Linear Equations in One Variable
Ex.A

Linear equation in one variable is an equation which can be written in the form of $ax + b = 0$, where a and b are real-number constants and $a \neq 0$.

Ex.

$x + 7 = 12$

Equation is a mathematical sentence indicating that two expressions are equal. The symbol "=" is used to indicate equality.

Ex.

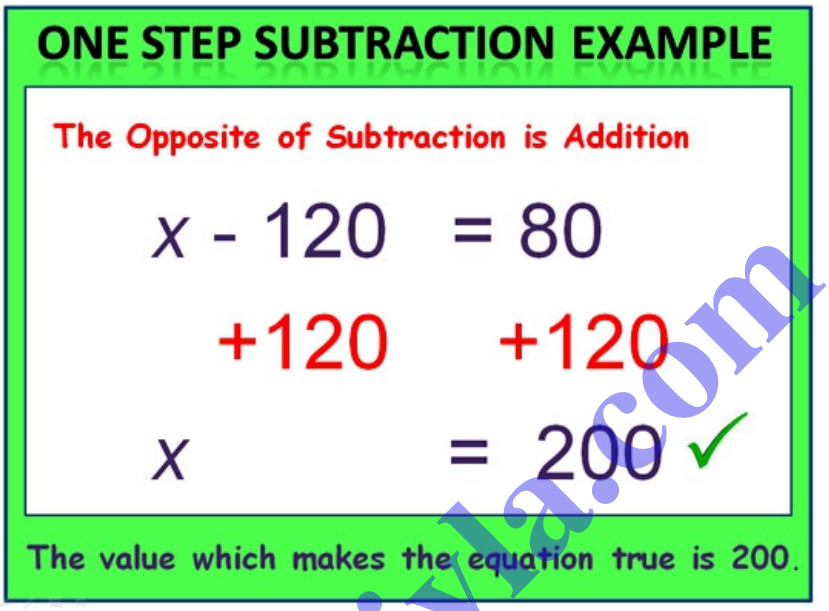
$2x + 5 = 9$ is a conditional equation since its truth or falsity depends on the value of x

$2 + 9 = 11$ is identity equation since both of its sides are identical to the same number 11.

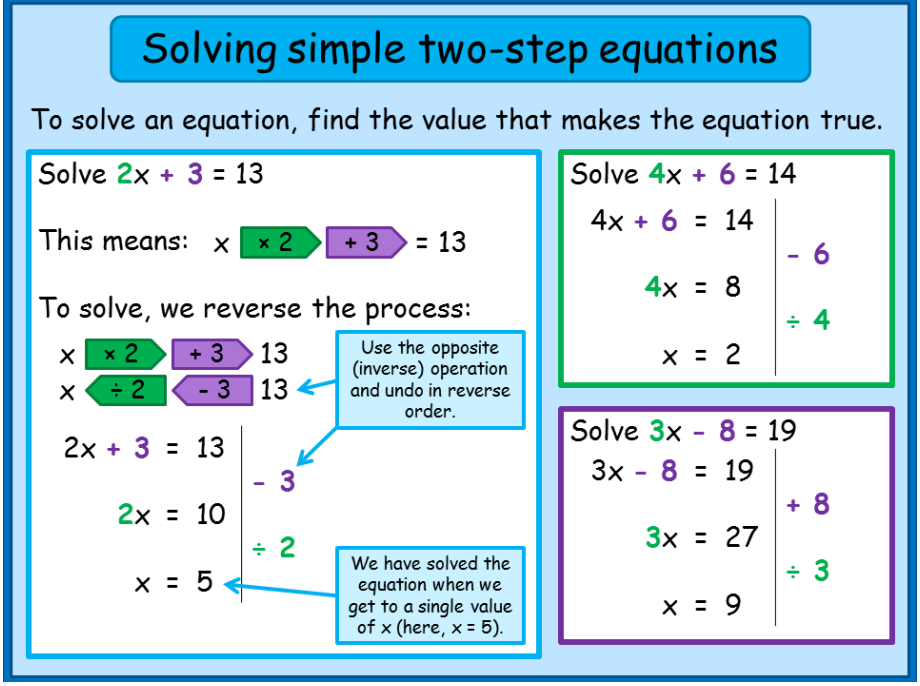
Solution Set of a Linear Equation

Example

$4x + 2 = 10$	this statement is either true of false
If $x = 1$, then $4x + 2 = 10$	is false because $4(1) + 2$ is $\neq 10$
If $x = 2$, then $4x + 2 = 10$	is true because $4(2) + 2 = 10$



$x - 4 = 7$	Original problem
$x - 4 = 7$	We want to remove the minus 4.
$x - 4 + 4 = 7 + 4$	The opposite of minus 4 is plus 4, so I added 4 to BOTH sides of the equation.
$x = 11$	-4+4 = 0, so x remains on the left and 7+4 = 11; therefore x = 11
Check: $x - 4 = 7$ $11 - 4 = 7$	This is a correct statement, so my answer is x = 11 is correct!



Q1

Answer :

$3x - 5 = 0$

$\Rightarrow 3x = 5 \qquad (\text{Transposing } -5 \text{ to RHS})$

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

CHECK : By substituting $x = \frac{5}{3}$ in the given equation, we get :

LHS $= 3\left(\frac{5}{3}\right) - 5 = 5 - 5 = 0$

RHS $= 0$

$\therefore$ LHS $=$ RHS

Hence checked.

Q2 **Answer :**

$8x - 3 = 9 - 2x$

$\Rightarrow 8x + 2x = 9 + 3 \qquad$ (By transposition)

$\Rightarrow 10x = 12$

$\Rightarrow x = \frac{12}{10} = \frac{6}{5}$

CHECK : By substituting $x = \frac{6}{5}$ in the given equation, we get :

LHS : $8\left(\frac{6}{5}\right) - 3 = \frac{48}{5} - 3 = \frac{48-15}{5} = \frac{33}{5}$

RHS : $9 - 2\left(\frac{6}{5}\right) = 9 - \frac{12}{5} = \frac{45-12}{5} = \frac{33}{5}$

$\therefore$ LHS $=$ RHS

Hence checked.

Q3

Answer :

We have:

$7 - 5x = 5 - 7x$

$\Rightarrow -5x + 7x = 5 - 7$ [transposing $-7x$ to LHS and 7 to RHS]

$\Rightarrow 2x = -2$

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

$\Rightarrow x = -1$

Thus, $x = -1$ is a solution to the given equation.

CHECK: Substituting $x = -1$ in the given equation, we get:

LHS: $= 7 - 5x$

$= 7 - 5 \times (-1)$

$= 7 + 5$

$= 12$

RHS:

$= 5 - 7x$

$= 5 - 7 \times (-1)$

$= 5 + 7$

$= 12$

$\therefore$ LHS $=$ RHS

Hence, $x = -1$ is a solution of the given equation.

Q4

Answer :

We have:

$3+2x = 1-x$

$\Rightarrow 2x + x + 3 - 1 = 0$ (By transposition)

$\Rightarrow 3x + 2 = 0$

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

CHECK: Substituting $x = -\frac{2}{3}$ in the given equation, we get:

LHS: $3+2x$

$=3+2\times\left(-\frac{2}{3}\right)$

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

$=\frac{9-4}{3}$

$=\frac{5}{3}$

RHS: $1-x$

$=1-\left(\frac{-2}{3}\right)$

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

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

$=\frac{5}{3}$

$\therefore$ LHS = RHS

Hence, $x = -\frac{2}{3}$ is a solution of the given equation.

Q5

Answer :

We have:

$2(x-2)+3(4x-1) = 0$

$\Rightarrow 2x - 4 + 12x - 3 = 0$

$\Rightarrow 14x - 7 = 0$

$\Rightarrow 14x = 7$ (By transposition)

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

CHECK: Substituting $x = \frac{1}{2}$ in the given equation, we get:

LHS: $2(x-2)+3(4x-1)$

$=2x-4+12x-3$

$=2\times\frac{1}{2}-4+12\times\frac{1}{2}-3$

$=1-4+6-3$

$=-7+7$

$=0$

RHS: 0

$\therefore$ LHS = RHS

Hence, $x = \frac{1}{2}$ is a solution of the given equation.

Q6

Answer :

We have:

$5(2x-3)-3(3x-7) = 5$

$\Rightarrow 10x - 15 - 9x + 21 = 5$

$\Rightarrow 10x - 9x = 5 + 15 - 21$ (By transposition)

$\Rightarrow x = 20 - 21$

$\Rightarrow x = -1$

CHECK: Substituting $x = -1$ in the given equation, we get:

LHS: $5(2x-3)-3(3x-7)$

$=10x-15-9x+21$

$=10\times(-1)-15-9\times(-1)+21$

$=-10-15+9+21$

$=-25+30$

$=5$

RHS: 5

$\therefore$ LHS = RHS

Hence, $x = -1$ is a solution of the given equation.

Q7

Answer :

We have:

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

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

$\Rightarrow 3x = \frac{3\times1+5\times1}{15}$

$\Rightarrow 3x = \frac{3+5}{15}$

$\Rightarrow 3x = \frac{8}{15}$

$\Rightarrow x = \frac{8}{15\times3}$

$\Rightarrow x = \frac{8}{45}$

CHECK: Substituting $x = \frac{8}{45}$ in the given equation, we get:

LHS: $2x - \frac{1}{3}$

$= 2 \times \frac{8}{45} - \frac{1}{3}$

$= \frac{16}{45} - \frac{1}{3}$

$= \frac{16\times1-15\times1}{45}$

$= \frac{16-15}{45}$

$= \frac{1}{45}$

RHS : $\frac{1}{5} - x$

$= \frac{1}{5} - \frac{8}{45}$

$= \frac{1\times9-1\times8}{45}$

$= \frac{9-8}{45}$

$= \frac{1}{45}$

$\therefore$ LHS=RHS

Hence, $x = \frac{8}{45}$ is a solution of the given equation.

Q8

Answer :

We have:

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

$\Rightarrow \frac{1}{2}x - \frac{1}{3}x = 5 + 3$ $\left(\text{transposing } \frac{1}{3}x \text{ to LHS and } -3 \text{ to RHS}\right)$

$\Rightarrow \left(\frac{1\times3-1\times2}{6}\right)x = 8$

$\Rightarrow \left(\frac{3-2}{6}\right)x = 8$

$\Rightarrow \frac{1}{6}x = 8$

$\Rightarrow x = 8 \times 6$

$\Rightarrow x = 48$

CHECK: Substituting $x = 48$ in the given equation, we get:

LHS: $\frac{1}{2}x - 3$

$= \frac{1}{\cancel{2}^{1}} \times \cancel{48}^{24} - 3$

$= 24 - 3$

$= 21$

RHS: $5 + \frac{1}{3}x$

$= 5 + \frac{1}{\cancel{3}^{1}} \times \cancel{48}^{16}$

$= 5 + 16$

$= 21$

$\therefore$ LHS=RHS

Hence, $x = 48$ is a solution of the given equation.

Q9

Answer :

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

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

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

$\Rightarrow \frac{3x}{4}=\frac{1}{8}$

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

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

$\Rightarrow x=\frac{1}{6}$

CHECK: Substituting $x=\frac{1}{6}$ in the given equation, we get:

LHS: $\frac{x}{2}+\frac{x}{4}$

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

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

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

$=\frac{\cancel{3}^{1}}{4}\times\frac{1}{\cancel{6}^{2}}$

$=\frac{1}{8}$

RHS: $\frac{1}{8}$

$\therefore$ LHS = RHS

Hence, $x=\frac{1}{3}$ is a solution of the given equation.

Q10

Answer :

We have:

$3x+2(x+2)=20-(2x-5)$

$\Rightarrow 3x+2x+4=20-2x+5$

$\Rightarrow 3x+2x+2x=20+5-4$ (Transposing $-2x$ to LHS and 4 to RHS)

$\Rightarrow 7x=21$

$\Rightarrow x=\frac{\cancel{21}^{3}}{\cancel{7}^{1}}$

$\Rightarrow x=3$

CHECK: Substituting $x=3$ in the given equation, we get:

LHS$=3x+2(x+2)$

$=3x+2x+4$

$=5x+4$

$=5\times 3+4$

$=15+4$

$=19$

RHS$=20-(2x-5)$

$=20-2x+5$

$=25-2\times 3$

$=25-6$

$=19$

$\therefore$ LHS = RHS

Hence, $x=3$ is a solution of the given equation.

Q11

Answer :

We have:
$13(y-4)-3(y-9)-5(y+4)=0$
$\Rightarrow 13y-52-3y+27-5y-20=0$
$\Rightarrow 13y-3y-5y=52+20-27$ (Transposing $-52,-20$ and 27 to RHS)
$\Longrightarrow 5y=45$
$\Rightarrow y=\frac{\cancel{45}^{9}}{\cancel{5}^{1}}$
$\Rightarrow y=9$

CHECK: Substituting $x=9$ in the given equation, we get:

$\begin{aligned}\text{LHS}&=13(y-4)-3(y-9)-5(y+4)\\&=13y-52-3y+27-5y-20\\&=13y-3y-5y-52+27-20\\&=5y-45\\&=5\times 9-45\\&=45-45\\&=0\end{aligned}$
RHS=0
$\therefore$ LHS=RHS
Hence, $x=9$ is a solution of the given equation.

Q12

Answer :

We have,
$\frac{2m+5}{3}=3m-10$
$\Rightarrow 2m+5=3(3m-10)$
$\Rightarrow 2m+5=9m-30$
$\Rightarrow 2m-9m=-30-5$ (Transposing $9m$ to LHS and 5 to RHS)
$\Rightarrow -7m=-35$
$\Rightarrow m=\frac{\cancel{-35}^{5}}{\cancel{-7}^{1}}$
$\Rightarrow m=5$

CHECK: Substituting $m=5$ in the given equation, we get:

$\begin{aligned}\text{LHS}&=\frac{2m+5}{3}\\&=\frac{2\times 5+5}{3}\\&=\frac{10+5}{3}\\&=\frac{\cancel{15}^{5}}{\cancel{3}^{1}}\\&=5\end{aligned}$

$\begin{aligned}\text{RHS}&=3m-10\\&=3\times 5-10\\&=15-10\\&=5\end{aligned}$
$\therefore$ LHS=RHS
Hence, $x=5$ is a solution of the given equation.

Q13

Answer :

We have:

$6(3x+2)-5(6x-1)=3(x-8)-5(7x-6)+9x$

$\Rightarrow 18x+12-30x+5=3x-24-35x+30+9x$

$\Rightarrow 18x-30x-3x+35x-9x=-24+30-12$

-5 (Transposing $3x, 9x$ and $-35x$ to LHS and 12 and 5 to RHS)

$\Rightarrow 53x-42x=30-41$

$\Rightarrow 11x=-11$

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

$\Rightarrow x=-1$

CHECK: Substituting $x=-1$ in the given equation, we get:

$\text{LHS}=6(3x+2)-5(6x-1)$

$=18x+12-30x+5$

$=-12x+17$

$=-12\times(-1)+17$

$=12+17$

$=29$

$\text{RHS}=3(x-8)-5(7x-6)+9x$

$=3x-24-35x+30+9x$

$=12x-35x-24+30$

$=-23x+6$

$=-23\times(-1)+6$

$=23+6$

$=29$

$\therefore \text{LHS}=\text{RHS}$

Hence, $x=-1$ is a solution of the given equation.

Q14

Answer :

We have:

$t-(2t+5)-5(1-2t)=2(3+4t)-3(t-4)$

$\Rightarrow t-2t-5-5+10t=6+8t-3t+12$

$\Rightarrow t-2t+10t-8t+3t=6+12+5+5$ (By transposition)

$\Rightarrow 14t-10t=28$

$\Rightarrow 4t=28$

$\Rightarrow x=\frac{28}{4}$

$\Rightarrow x=7$

CHECK: Substituting $x=7$ in the given equation, we get:

$\text{LHS}=t-(2t+5)-5(1-2t)$

$=t-2t-5-5+10t$

$=11t-2t-10$

$=9t-10$

$=9\times 7-10$

$=63-10$

$=53$

$\text{RHS}=2(3+4t)-3(t-4)$

$=6+8t-3t+12$

$=5t+18$

$=5\times 7+18$

$=35+18$

$=53$

$\therefore \text{LHS}=\text{RHS}$

Hence, $x=7$ is a solution of the given equation.

Q15

Answer :

We have:

$\frac{2}{3}x = \frac{3}{8}x + \frac{7}{12}$

$\Rightarrow \frac{2}{3}x - \frac{3}{8}x = \frac{7}{12}$ $\left(\text{Transposing } \frac{3}{8}x \text{ to LHS}\right)$

$\Rightarrow \left(\frac{2\times8-3\times3}{24}\right)x = \frac{7}{12}$

$\Rightarrow \left(\frac{16-9}{24}\right)x = \frac{7}{12}$

$\Rightarrow \frac{7}{24}x = \frac{7}{12}$

$\Rightarrow x = \frac{\cancel{7}^{1}}{\cancel{12}^{1}} \times \frac{\cancel{24}^{2}}{\cancel{7}^{1}}$

$\Rightarrow x = 2$

CHECK: Substituting $x=2$ in the given equation, we get:

$\text{LHS} = \frac{2}{3}x$

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

$= \frac{4}{3}$

$\text{RHS} = \frac{3}{8}x + \frac{7}{12}$

$= \frac{3}{8} \times 2 + \frac{7}{12}$

$= \frac{6}{8} + \frac{7}{12}$

$= \frac{6\times3+7\times2}{24}$

$= \frac{18+14}{24}$

$= \frac{\cancel{32}^{4}}{\cancel{24}^{3}}$

$= \frac{4}{3}$

$\therefore \text{LHS} = \text{RHS}$

Hence, $x=2$ is a solution of the given equation.

Q16

Answer :

We have:

$\frac{3x-1}{5} - \frac{x}{7} = 3$

$\Rightarrow \frac{7(3x-1)-5\times x}{35} = 3$

$\Rightarrow \left(\frac{21x-7-5x}{35}\right) = 3$

$\Rightarrow \left(\frac{16x-7}{35}\right) = 3$

$\Rightarrow 16x - 7 = 3 \times 35$ (Transposing 35 to RHS)

$\Rightarrow 16x - 7 = 105$

$\Rightarrow 16x = 105 + 7$

$\Rightarrow 16x = 112$

$\Rightarrow x = \frac{\cancel{112}^{7}}{\cancel{16}^{1}}$

$\Rightarrow x = 7$

CHECK: Substituting $x=7$ in the given equation, we get:

$$\text{LHS}=\frac{3x-1}{5}-\frac{x}{7}$$
$$=\frac{7(3x-1)-5\times x}{35}$$
$$=\left(\frac{21x-7-5x}{35}\right)$$
$$=\left(\frac{16x-7}{35}\right)$$
$$=\left(\frac{16\times 7-7}{35}\right)$$
$$=\frac{112-7}{35}$$
$$=\frac{\cancel{105}^{3}}{\cancel{35}^{1}}$$
$$=3$$

RHS=3
$\therefore$ LHS=RHS
Hence, $x=3$ is a solution of the given equation.

Q17

Answer :

We have:
$2x-3=\frac{3}{10}\left(5x-12\right)$
$\Rightarrow 10(2x-3)=3(5x-12)$
$\Rightarrow 20x-30=15x-36$
$\Rightarrow 20x-15x=-36+30$ (Transposing $15x$ to LHS and -30 to RHS)
$\Rightarrow 5x=-6$
$\Rightarrow x=\frac{-6}{5}$
CHECK: Substituting $x=\frac{-6}{5}$ in the given equation, we get:

$$\text{LHS}=2x-3$$
$$=2\times\left(\frac{-6}{5}\right)-3$$
$$=\frac{-12}{5}-3$$
$$=\frac{-12-(3\times 5)}{5}$$
$$=\frac{-12-15}{5}$$
$$=\frac{-27}{5}$$

$$\text{RHS}=\frac{3}{10}\left(5x-12\right)$$
$$=\frac{3}{10}\left(\cancel{5}^{1}\times\frac{-6}{\cancel{5}_{1}}-12\right)$$
$$=\frac{3}{10}\times\left(-18\right)$$
$$=\frac{3}{\cancel{10}^{5}}\times\frac{-\cancel{18}^{9}}{}$$
$$=\frac{-27}{5}$$
$\therefore$ LHS=RHS
Hence, $x=\frac{-6}{5}$ is a solution of the given equation.

Q18

Answer :

We have:
$\frac{y-1}{3}-\frac{y-2}{4}=1$
$\Rightarrow \frac{4(y-1)-3(y-2)}{12}=1$
$\Rightarrow \left(\frac{4y-4-3y+6}{12}\right)=1$
$\Rightarrow \left(\frac{y+2}{12}\right)=1$
$\Rightarrow y+2=1\times 12$
$\Rightarrow y=12-2$
$\Rightarrow y=10$
CHECK: Substituting y=10 in the given equation, we get:

$$\text{LHS}=\frac{y-1}{3}-\frac{y-2}{4}$$
$$=\frac{4(y-1)-3(y-2)}{12}$$
$$=\left(\frac{y+2}{12}\right)$$
$$=\left(\frac{10+2}{12}\right)$$
$$=\frac{\cancel{12}^{1}}{\cancel{12}^{1}}$$
$$=1$$

RHS=1
$\therefore$ LHS=RHS
Hence, y=10 is a solution of the given equation.

Q19

Answer :

We have:
$\frac{x-2}{4}+\frac{1}{3}=x-\frac{2x-1}{3}$
$\Rightarrow \frac{x-2}{4}+\frac{2x-1}{3}-x=-\frac{1}{3}$ (Transposing - $\frac{2x-1}{3}$ to LHS and $\frac{1}{3}$ to RHS)
$\Rightarrow \left(\frac{3(x-2)+4(2x-1)-12x}{12}\right)=-\frac{1}{3}$
$\Rightarrow \left(\frac{3x-6+8x-4-12x}{12}\right)=-\frac{1}{3}$
$\Rightarrow 11x-12x-10=-\frac{1}{\cancel{3}^{1}}\times\cancel{12}^{4}$
$\Rightarrow -x=-4+10$
$\Rightarrow -x=6$
$\Rightarrow x=-6$
CHECK: Substituting $x=-6$ in the given equation, we get:

$$\text{LHS}=\frac{x-2}{4}+\frac{1}{3}$$
$$=\frac{-6-2}{4}+\frac{1}{3}$$
$$=-2+\frac{1}{3}$$
$$=\frac{-5}{3}$$
$$\text{RHS}=x-\frac{2x-1}{3}$$
$$=-6-\frac{2\times(-6)-1}{3}$$
$$=-6-\frac{(-13)}{3}$$
$$=-6+\frac{13}{3}$$
$$=\frac{-5}{3}$$

$\therefore$ LHS=RHS
Hence, y=10 is a solution of the given equation.

Q20

Answer :

We have:
$\frac{2x-1}{3}-\frac{6x-2}{5}=\frac{1}{3}$
$\Rightarrow \frac{5(2x-1)-3(6x-2)}{15}=\frac{1}{3}$
$\Rightarrow \frac{10x-5-18x+6}{15}=\frac{1}{3}$
$\Rightarrow \frac{-8x+1}{15}=\frac{1}{3}$
$\Rightarrow -8x+1=\frac{1}{3}\times 15$
$\Rightarrow -8x=5-1$
$\Rightarrow -x=\frac{4}{8}$
$\Rightarrow x=-\frac{2}{4}=\frac{-1}{2}$
CHECK: Substituting $x=-\frac{1}{2}$ in the given equation, we get:

$\text{LHS}=\frac{2x-1}{3}-\frac{6x-2}{5}$

$=\frac{-8x+1}{15}$

$=\frac{-8\times\left(-\frac{1}{2}\right)+1}{15}$

$=\frac{5}{15}$

$=\frac{1}{3}$

$\text{RHS}=\frac{1}{3}$

$\therefore \text{LHS}=\text{RHS}$

Hence, $y=-\frac{1}{2}$ is a solution of the given equation.

Q21

Answer :

We have:

$\frac{y+7}{3}=1+\frac{3y-2}{5}$

$\Rightarrow \frac{y+7}{3}=\frac{5\times1+3y-2}{5}$

$\Rightarrow 5(y+7)=3(3+3y)$

$\Rightarrow 5y+35=9+9y$

$\Rightarrow 9y-5y=35-9$

$\Rightarrow 4y=26$

$\Rightarrow y=\frac{13}{2}$

CHECK: Substituting $x=\frac{13}{2}$ in the given equation, we get:

$\text{LHS}=\frac{y+7}{3}$

$=\frac{\frac{13}{2}+7}{3}$

$=\frac{1\times13+2\times7}{2}$

$=\frac{13+14}{6}$

$=\frac{27}{6}$

$=\frac{9}{2}$

$\text{RHS}=1+\frac{3\times\frac{13}{2}-2}{5}$

$=1+\frac{\frac{39-2\times2}{2}}{5}$

$=1+\frac{35}{10}$

$=\frac{45}{10}$

$=\frac{9}{2}$

$\therefore \text{LHS}=\text{RHS}$

Hence, $y=\frac{13}{2}$ is a solution of the given equation.

Q22

Answer :

We have:

$\Rightarrow \frac{2}{7}\left(x-9\right)+\frac{x}{3}=3$

$\Rightarrow \frac{2\times3(x-9)+7x}{21}=3$

$\Rightarrow 6(x-9)+7x=3\times21$

$\Rightarrow 6x-54+7x=63$

$\Rightarrow 13x=63+54$

$\Rightarrow 13x=117$

$\Rightarrow x=9$

CHECK: Substituting $x=9$ in the given equation we get.

$\text{LHS}=\frac{2}{7}\left(x-9\right)+\frac{x}{3}$

$=\frac{2}{7}\left(9-9\right)+\frac{x}{3}$

$=0+\frac{9}{3}$

$=\frac{9}{3}$

$=3$

RHS=3

$\therefore$ LHS = RHS

Hence, x=9 is a solution of the given equation.

Q23

Answer :

We have:

$\Rightarrow \frac{2x-3}{5}+\frac{x+3}{4}=\frac{4x+1}{7}$

$\Rightarrow \frac{4(2x-3)+5(x+3)}{20}=\frac{4x+1}{7}$

$\Rightarrow \frac{8x-12+5x+15}{20}=\frac{4x+1}{7}$

$\Rightarrow \frac{13x+3}{20}=\frac{4x+1}{7}$

$\Rightarrow 7(13x+3)=20(4x+1)$

$\Rightarrow 91x+21=80x+20$

$\Rightarrow 91x-80x=20-21$

$\Rightarrow 11x=-1$

$\Rightarrow x=\frac{-1}{11}$

CHECK: Substituting $x=-\frac{1}{11}$ in the given equation, we get:

LHS:

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

$=\frac{2\times\frac{1}{11}-3}{5}+\frac{-\frac{1}{11}+3}{4}$

$=\frac{-2-33}{55}+\frac{33-1}{44}$

$=-\frac{35}{55}+\frac{32}{44}$

$=\frac{-140+160}{220}$

$=\frac{20}{220}=\frac{1}{11}$

RHS$=\frac{4x+1}{7}$

$=\frac{4\times\left(-\frac{1}{11}\right)+1}{7}$

$=\frac{-4+11}{7\times11}$

$=\frac{7}{77}$

$=\frac{1}{11}$

$\therefore$ LHS = RHS

Hence, $x=\frac{-1}{11}$ is a solution of the given equation.

Q24

Answer :

We have:

$\frac{3}{4}\left(7x-1\right)-\left(2x-\frac{1-x}{2}\right)=x+\frac{3}{2}$

$\Rightarrow \frac{3}{4}\left(7x-1\right)-2x+\frac{1-x}{2}-x=\frac{3}{2}$

$\Rightarrow \frac{3\times7}{4}x-\frac{3}{4}-2x+\frac{1}{2}-\frac{x}{2}-x=\frac{3}{2}$

$\Rightarrow \frac{21}{4}x-2x-\frac{x}{2}-x=\frac{3}{2}+\frac{3}{4}-\frac{1}{2}$ $\left(\text{By transposition}\right)$

$\Rightarrow \frac{21x-8x-2\times x-4x}{4}=1+\frac{3}{4}$

$\Rightarrow \frac{21x-14x}{4}=\frac{7}{4}$

$\Rightarrow \frac{7x}{4}=\frac{7}{4}$

$\Rightarrow x=1$

CHECK: Substituting x=1 in the given equation, we get:

$\text{LHS} = \frac{3}{4}\left(7x-1\right) - \left(2x - \frac{1-x}{2}\right)$

$= \frac{3}{4}\left(7\times 1 - 1\right) - \left(2\times 1 - \frac{1-1}{2}\right)$

$= \frac{3}{4}\times 6 - 2$

$= \frac{9}{2} - 2$

$= \frac{9-4}{2}$

$= \frac{5}{2}$

$\text{RHS} = x + \frac{3}{2}$

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

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

$= \frac{5}{2}$

$\therefore$ LHS = RHS

Hence, $x = 1$ is a solution of the given equation.

Q25

Answer :

We have :

$\frac{x+2}{6} - \left(\frac{11-x}{3} - \frac{1}{4}\right) = \frac{3x-4}{12}$

$\Rightarrow \frac{x+2}{6} - \left(\frac{11-x}{3}\right) + \frac{1}{4} = \frac{3x-4}{12}$

$\Rightarrow \frac{x+2}{6} - \left(\frac{11-x}{3}\right) - \frac{3x-4}{12} = -\frac{1}{4}$ (By transposition)

$\Rightarrow \frac{2(x+2)-4(11-x)-1(3x-4)}{12} = -\frac{1}{4}$

$\Rightarrow \frac{2x+4-44+4x-3x+4}{12} = -\frac{1}{4}$

$\Rightarrow 3x - 36 = -\frac{1}{4}\times 12$

$\Rightarrow 3x = -3 + 36$

$\Rightarrow x = \frac{33}{3}$

$\Rightarrow x = 11$

CHECK: Substituting $x = 11$ in the given equation, we get:

$\text{LHS} = \frac{x+2}{6} - \left(\frac{11-x}{3} - \frac{1}{4}\right)$

$= \frac{11+2}{6} - \left(\frac{11-11}{3} - \frac{1}{4}\right)$

$= \frac{13}{6} - \left(-\frac{1}{4}\right)$

$= \frac{13}{6} + \frac{1}{4}$

$= \frac{13\times 2+3}{12}$

$= \frac{29}{12}$

$\text{RHS} = \frac{3x-4}{12}$

$= \frac{3\times 11-4}{12}$

$= \frac{33-4}{12}$

$= \frac{29}{2}$

$\therefore$ LHS=RHS

Hence, $x = 11$ is a solution of the given equation.

Verified.

Q26

Answer :

We have:

$\frac{9x+7}{2} - \left(x - \frac{x-2}{7}\right) = 36$

$\Rightarrow \frac{9x+7}{2} - x + \frac{x-2}{7} = 36$

$\Rightarrow \frac{7(9x+7) - 14 \times x + 2 \times (x-2)}{14} = 36$

$\Rightarrow \frac{63x+49-14x+2x-4}{14} = 36$

$\Rightarrow 51x + 45 = 36 \times 14$

$\Rightarrow 51x = 504 - 45$

$\Rightarrow x = \frac{459}{51}$

$\Rightarrow x = 9$

$\Rightarrow x = 9$

CHECK: Substituting $x = 9$ in the given equation, we get:

$\text{LHS} = \frac{9x+7}{2} - \left(x - \frac{x-2}{7}\right)$

$= \frac{9 \times 9 + 7}{2} - \left(9 - \frac{9-2}{7}\right)$

$= \frac{88}{2} - 9 + \frac{7}{7}$

$= 44 - 9 + 1$

$= 36$

$\text{RHS} = 36$

$\therefore \text{LHS} = \text{RHS}$

Hence, $x = 11$ is a solution of the given equation.

Verified.

Q27

Answer :

We have:

$0.5x + \frac{x}{3} = 0.25x + 7$

$\Rightarrow \frac{1}{2}x + \frac{x}{3} = \frac{x}{4} + 7$

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

$\Rightarrow \frac{6x+4x-3x}{12} = 7$

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

$\Rightarrow x = 12$

CHECK: Substituting $x = 9$ in the given equation, we get:

$\text{LHS} = 0.5x + \frac{x}{3}$

$= 0.5 \times 12 + \frac{12}{3}$

$= \frac{1}{2} \times 12 + 4$

$= 6 + 4$

$= 10$

$\text{RHS} = 0.25x + 7$

$= 0.25 \times 12 + 7$

$= 3 + 7$

$= 10$

$\therefore \text{LHS} = \text{RHS}$

Hence, $x = 12$ is a solution of the given equation.

Verified.

Q28

Answer :

We have:
$0.18(5x-4)=0.5x+0.8$
$\Rightarrow 100\times 0.18(5x-4)=100(0.5x+0.8)$ (Multipling both sides by 100)
$\Rightarrow 18(5x-4)=100\times 0.5x+100\times 0.8$
$\Rightarrow 90x-72=50x+80$
$\Rightarrow 90x-50x=80+72$
$\Rightarrow 40x=152$
$\Rightarrow x=\frac{152}{40}$
$\Rightarrow x=\frac{19}{5}=3.8$

CHECK: Substituting $x=3.8$ in the given equation, we get:

LHS$=0.18(5x-4)$
$=0.18(5\times 3.8-4)$
$=0.18\times 15$
$=2.7$

RHS$=0.5x+0.8$
$=0.5\times 3.8+0.8$
$=1.9+0.8$
$=2.7$
$\therefore$ LHS=RHS
Hence, $x=3.8$ is a solution of the given equation.
Verified.

Q29

Answer :

We have:
$\Rightarrow 2.4(3-x)-0.6(2x-3)=0$
$\Rightarrow 10\times 2.4(3-x)-10\times 0.6(2x-3)=0$ (Multiplying both sides by 10 to remove decimals)
$\Rightarrow 24(3-x)-6(2x-3)=0$
$\Rightarrow 6[4(3-x)-(2x-3)]=0$
$\Rightarrow 4(3-x)-(2x-3)=0$
$\Rightarrow 12-4x-2x+3=0$
$\Rightarrow 15-6x=0$
$\Rightarrow -6x=-15$
$\Rightarrow x=\frac{15}{6}$
$\Rightarrow x=\frac{5}{2}=2.5$

CHECK: Substituting $x=2.5$ in the given equation, we get:

LHS$=2.4(3-x)-0.6(2x-3)$
$=2.4(3-2.5)-0.6(2\times 2.5-3)$
$=2.4\times 0.5-0.6\times 2$
$=1.2-1.2$
$=0$
RHS$=0$
$\therefore$ LHS = RHS
Hence, $x=\frac{19}{5}$ is a solution of the given equation.
Verified.

Q30

Answer :

We have:
$0.5x-(0.8-0.2x)=0.2-0.3x$
$\Rightarrow 0.5x+0.3x-0.8+0.2x=0.2$ (By transposition)
$\Rightarrow (0.5+0.3+0.2)x=0.2+0.8$
$\Rightarrow 1x=1$
$\Rightarrow x=1$

CHECK: Substituting $x=1$ in the given equation, we get:

$\text{LHS}=0.5x-(0.8-0.2x)$
$=0.5\times 1-(0.8-0.2\times 1)$
$=0.5-0.8+0.2$
$=-0.1$
$\text{RHS}=0.2-0.3x$
$=0.2-0.3\times 1$
$=-0.1$
$\therefore$ LHS=RHS
Hence, $x=1$ is a solution of the given equation.
Verified.

Q31

Answer :

We have:
$\frac{x+2}{x-2}=\frac{7}{3}$
$\Rightarrow (x+2)\times 3=7\times (x-2)$ (Cross multiplication)
$\Rightarrow 3x+6=7x-14$
$\Rightarrow 4x=20$
$\Rightarrow x=\frac{20}{4}$
$\Rightarrow x=5$

CHECK: Substituting $x=5$ in the given equation, we get.

$\text{LHS}=\frac{x+2}{x-2}$
$=\frac{5+2}{5-2}$
$=\frac{7}{3}$
$\text{RHS}=\frac{7}{3}$

$\therefore$ LHS=RHS
Hence, $x=5$ is a solution of the given equation.
Verified.

Q32

Answer :

We have:
$\frac{2x+5}{3x+4}=3$
$\Rightarrow \frac{2x+5}{3x+4}=\frac{3}{1}$
$\Rightarrow 1\times (2x+5)=3\times (3x+4)$
$\Rightarrow 2x+5=9x+12$
$\Rightarrow 7x=-7$
$\Rightarrow x=-1$

CHECK: Substituting $x=-1$ in the given equation, we get:

$\text{LHS}:\ \frac{2x+5}{3x+4}$
$=\frac{2\times(-1)+5}{3\times(-1)+4}$
$=\frac{-2+5}{-3+4}$
$=\frac{3}{1}$
RHS =3

$\therefore$ LHS = RHS
Hence, $x=5$ is a solution of the given equation.
Verified.

Linear Equations in One Variable
Ex 7B

Linear equation in one variable is an equation which can be written in the form of $ax + b = 0$, where a and b are real-number constants and $a \neq 0$.

Ex.

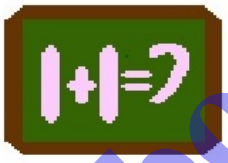
$x + 7 = 12$

Equation is a mathematical sentence indicating that two expressions are equal. The symbol "=" is used to indicate equality.

Ex.

$2x + 5 = 9$ is a conditional equation since its truth or falsity depends on the value of x.

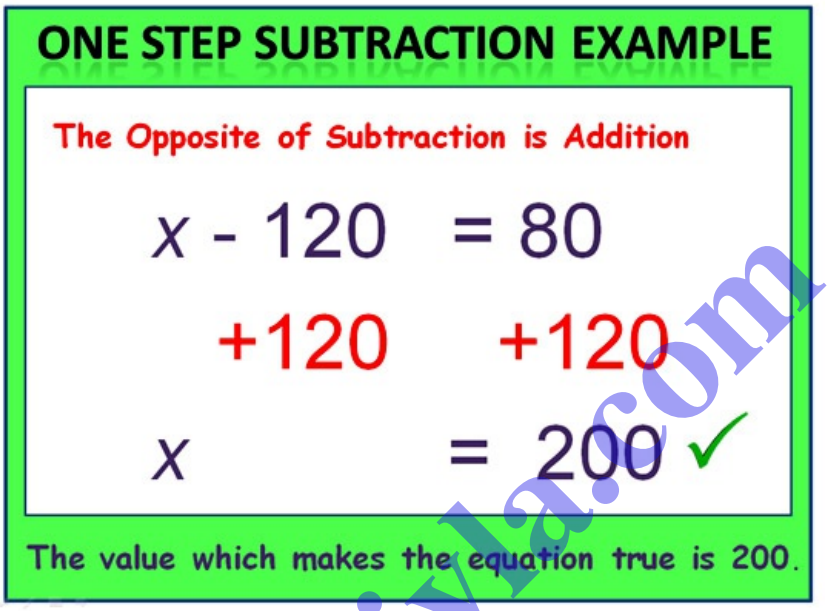
$2 + 9 = 11$ is identity equation since both of its sides are identical to the same number 11.



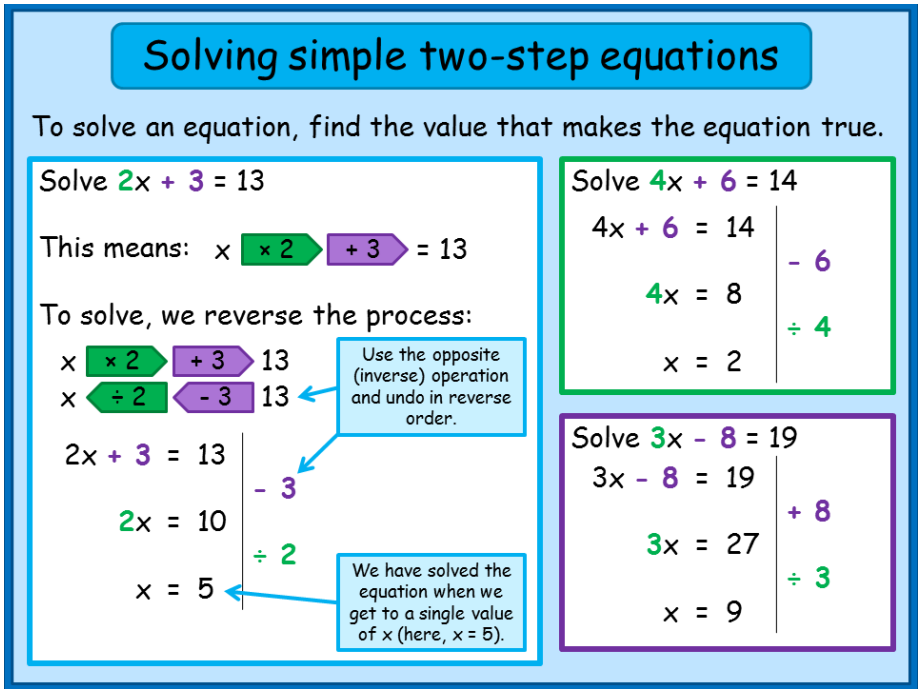
Solution Set of a Linear Equation

Example

$4x + 2 = 10$	this statement is either true of false
If $x = 1$, then $4x + 2 = 10$	is false because $4(1) + 2$ is $\neq 10$
If $x = 2$, then $4x + 2 = 10$	is true because $4(2) + 2 = 10$



$x - 4 = 7$	Original problem
$x - 4 = 7$	We want to remove the minus 4.
$x - 4 + 4 = 7 + 4$	The opposite of minus 4 is plus 4, so I added 4 to BOTH sides of the equation.
$x = 11$	-4+4 = 0, so x remains on the left and 7+4 = 11; therefore x = 11
Check: $x - 4 = 7$ $11 - 4 = 7$	This is a correct statement, so my answer is x = 11 is correct!



Q1

Answer :

Let the number be x.
Then, we have :

$\Rightarrow 2x - 7 = 45$

$\Rightarrow 2x = 45 + 7$

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

$\Rightarrow x = \frac{\cancel{5}\cdot\cancel{2}^{26}}{\cancel{2}_{1}}$

$\Rightarrow x = 26$

$\therefore$ The required number is 26.

Q2

Answer :

Let the number be x.
Then, we have:

$\Rightarrow 3x + 5 = 44$

$\Rightarrow 3x = 44 - 5$

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

$\Rightarrow x = \frac{\cancel{3}\cdot\cancel{9}^{13}}{\cancel{3}_{1}}$

$\Rightarrow x = 13$

$\therefore$ The required number is 13

Q3

Answer :

Let the number be x.
Then, we have:

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

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

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

$\Rightarrow x = \frac{6^{3}}{10_{5}}$

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

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

Q4

Answer :

Let the required number be x.
Then, we have:

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

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

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

$\Rightarrow 3x = 72 \times 2$

$\Rightarrow x = \frac{72^{24} \times 2}{3_{1}}$

$= 48$

$\therefore$ The required number is 48.

Q5

Answer :

Let the required number be x.
Then, we have:

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

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

$\Rightarrow 5x = 55 \times 3$

$\Rightarrow x = \frac{55^{11} \times 3}{5_{1}}$

$= 33$

$\therefore$ The required number is 33.

Q6

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:
$(x - 21) = (71 - x)$
$\Rightarrow x + x = 71 + 21$
$\Rightarrow 2x = 92$
$\Rightarrow x = \frac{\cancel{92}^{46}}{\cancel{2}_{1}}$
$\Rightarrow x = 46$
$\therefore$ 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:
$\Rightarrow x + \frac{2x}{5} = 70$
$\Rightarrow \frac{5x + 2x}{5} = 70$
$\Rightarrow \frac{7x}{5} = 70$
$\Rightarrow x = \frac{\cancel{70}^{10} \times 5}{\cancel{7}_{1}}$
$\therefore$ 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:
$x+(x+1)=63$
$\Rightarrow x+x+1=63$
$\Rightarrow 2x=63-1$
$\Rightarrow x=\frac{\cancel{6}\cdot\cancel{2}^{31}}{\cancel{2}_{1}}$
$\Rightarrow x=31$
$\therefore$ The required numbers are 31 and 32 (i.e., 31+1).

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:

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

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

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

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

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

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

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

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

$=72$

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 7×5=35 yrs
Manoj's present age is 5×5=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 $= 3(x+5)-5$

$= 3\left(10+5\right)-5$
$= 40$ 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% 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
$\therefore$ 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 :
$2(l+b)=150 \quad \ldots(\text{i})$
$\Rightarrow l+b=75$
Given that $l=2b \quad \ldots(\text{ii})$
Using (ii) in (i), we have:
$2b+b=75$
$\Rightarrow 3b=75$
$\Rightarrow b=25$
$\therefore\ l=50$ m and $b=25$ 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.
$\therefore (2x-5)+(2x-5)+x=55$
$\Rightarrow 2x-5+2x-5+x=55$
$\Rightarrow 5x-10=55$
$\Rightarrow 5x=65$
$\Rightarrow x=\frac{65}{5}=13$
$\therefore$ Length of the third side=13 m
And length of the other two equal sides=$(2\times 13)-5=21$ m

Q29

Answer :

Let the two complementary angles be x° and $(90-x)^\circ$.
According to the question, we have :
$x-(90-x)=8$
$\Rightarrow x-90+x=8$
$\Rightarrow 2x=98$
$\Rightarrow x=49$
$\therefore$ The measures of the complementary angles are 49° and $(90-49)^\circ=41^\circ$.

Q30

Answer :

Let the two supplementary angles be x° and $(180-x)^\circ$.
$\therefore\ x-(180-x)=44$
$\Rightarrow x-180+x=44^0$
$\Rightarrow 2x=224$
$\Rightarrow x=112$
$\therefore$ The measures of the supplementary angles are 112° and $(180-112)^\circ$, i.e., 68°.

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 :
$x+x+2x=180$ (Sum of three sides of a triangle)
$\Rightarrow\ 4x=180$
$\Rightarrow x=\frac{180}{4}$
$\Rightarrow x=45$

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

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:
Son's share $= \frac{1}{4}x$
Daughter's share$= \frac{1}{3}x$
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.
i.e., $x - \left(\frac{1}{4}x + \frac{1}{3}x\right) = 18000$
$\Rightarrow x - \left(\frac{1}{3}x + \frac{1}{4}x\right) = 18000$
$\Rightarrow x - \frac{7x}{12} = 18000$
$\Rightarrow \frac{5x}{12} = 18000$
$\Rightarrow x = \frac{\cancel{1800}^{3600} \times 12}{\cancel{5}}$
$\Rightarrow x = 43200$
$\therefore$ 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 ad
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

Linear Equations in One Variable
Ex 7C

Q1

Answer :

(d) $\frac{1}{36}$

We have:

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

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

$\Rightarrow 3x = \frac{-8+9}{12}$

$\Rightarrow x = \frac{1}{12 \times 3}$

$\Rightarrow x = \frac{1}{36}$

Q2

Answer :

(d) $\frac{4}{3}$

We have:

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

$\Rightarrow 2z - \frac{1}{4}z = 5 - \frac{8}{3}$

$\Rightarrow \frac{8z - z}{4} = \frac{15 - 8}{3}$

$\Rightarrow \frac{7z}{4} = \frac{7}{3}$

$\Rightarrow z = \frac{\cancel{7}^{1} \times 4}{3 \times \cancel{7}_{1}}$

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

Q3

Answer :

(a) 5

We have:

$(2n + 5) = 3(3n - 10)$

$\Rightarrow 2n + 5 = 9n - 30$

$\Rightarrow 2n - 9n = -30 - 5$

$\Rightarrow \not{-}7n = \not{-}35$

$\Rightarrow n = \frac{\cancel{-3} \cancel{-5}^{5}}{\cancel{-7}_{1}}$

$\Rightarrow n = 5$

Q4

Answer :

(c) 8

We have:

$\frac{x-1}{x+1} = \frac{7}{9}$

$\Rightarrow 9(x - 1) = 7(x + 1)$

$\Rightarrow 9x - 9 = 7x + 7$

$\Rightarrow 9x - 7x = 7 + 9$

$\Rightarrow 2x = 16$

$\Rightarrow x = \frac{\cancel{+16}^{8}}{\cancel{2}_{1}}$

$\Rightarrow x = 8$

Q5

Answer :

(c) $\frac{1}{2}$

We have:

$8(2x - 5) - 6(3x - 7) = 1$

$\Rightarrow 16x - 40 - 18x + 42 = 1$

$\Rightarrow -2x + 2 = 1$

$\Rightarrow -2x = 1 - 2$

$\Rightarrow \not{-}x = \not{-}\frac{1}{2}$

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

Q6

Answer :

(d) 30

We have:

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

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

$\Rightarrow 3(x-2)=2(x+12)$

$\Rightarrow 3x-6=2x+24$

$\Rightarrow 3x-2x=24+6$

$\Rightarrow x=30$

Q7

Answer :

(a) 2

We have:

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

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

$\Rightarrow 3(2x-1)=3(x+1)$

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

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

$\Rightarrow 3x=6$

$\Rightarrow x=\frac{\cancel{6}^{2}}{\cancel{3}_{1}}$

$=2$

Q8

Answer :

(b) 26

Let the consecutive whole numbers be x and $(x+1)$.

Then, $x+(x+1)=53$

$\Rightarrow 2x+1=53$

$\Rightarrow 2x=53-1$

$\Rightarrow x=\frac{\cancel{5}\cancel{2}^{26}}{\cancel{2}_{1}}$

$\Rightarrow x=26$

Q9

Answer :

(d) 44

Let the two consecutive even numbers be x and $(x+2)$.

Then, $x+(x+2)=86$

$\Rightarrow 2x+2=86$

$\Rightarrow 2x=86-2$

$\Rightarrow x=\frac{\cancel{8}\cancel{4}^{42}}{\cancel{2}_{1}}$

$\Rightarrow x=42$

$\therefore$ The required numbers are 42 and $(42+2)$, i.e., 44.

Q10

Answer :

(b) 17

Let the two consecutive odd numbers be $(x+1)$ and $(x+3)$.

Then, $(x+1)+(x+3)=36$

$\Rightarrow 2x+4=36$

$\Rightarrow 2x=36-4$

$\Rightarrow x=\frac{\cancel{3}\cancel{2}^{16}}{\cancel{2}_{1}}$

$\Rightarrow x=16$

$\therefore$ The smaller number is 17.

Q11

Answer :

(d)11

Let the whole number be x.

Then, $2x+9=31$

$\Rightarrow 2x=31-9$

$\Rightarrow 2x=22$

$\Rightarrow x=\frac{\cancel{2}\cancel{2}^{11}}{\cancel{2}_{1}}$

$\Rightarrow x=11$

Q12

Answer :

(a) 6

Let the whole number be x.

Then, $3x+6=24$

$\Rightarrow 3x=24-6$

$\Rightarrow 3x=18$

$\Rightarrow x=\frac{\cancel{1}\cancel{8}^{6}}{\cancel{3}_{1}}$

$\Rightarrow x=6$

Q13

Answer :

(a) 30

Let the original number be x.

Then, $\frac{2}{3}x = x - 10$

$\Rightarrow 2x = 3x - 30$

$\Rightarrow 2x - 3x = -30$

$\Rightarrow \cancel{-}x = \cancel{-}30$

$\Rightarrow x = 30$

$\therefore$ The required number is 30.

Q14

Answer :

$(b)\ 50^\circ$

Let the angle be x°.

Then, complementary of $x = 90^\circ - x^\circ$

According to the question, we have :

$x - 90 - x = 10$

$\Rightarrow 2x = 90 + 10$

$\Rightarrow 2x = 100$

$\Rightarrow x = 50$

So, the larger angle is 50°.

Q15

Answer :

$(b)\ 80^0$

Let the angle be x°.

Then, complementary angle of $x = 180^\circ - x^\circ$

According to the question, we have :

$x - (180 - x) = 20$

$\Rightarrow x - 180 + x = 20$

$\Rightarrow 2x = 10 + 180$

$\Rightarrow 2x = 200$

$\Rightarrow x = 100$

Hence, the smaller angle is 80°.

Q16

Answer :

(c)15 years

Let the present ages of A and B be $5x$ and $3x$, respectively.

According to the question, we have :

$\frac{5x+6}{3x+6} = \frac{7}{5}$

$\Rightarrow 25x + 30 = 21x + 42$

$\Rightarrow 25x - 21x = 42 - 30$

$\Rightarrow 4x = 12$

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

$\Rightarrow x = 3$

$\therefore$ A's present age=5 × 3 years=15 years

Q17

Answer :

(b) 20

Let the number be x.

Then, $5x = x + 80$

$\Rightarrow 5x - x = 80$

$\Rightarrow 4x = 80$

$\Rightarrow x = \frac{\cancel{80}^{20}}{\cancel{4}_{1}}$

$\Rightarrow x = 20$

$\therefore$ The required number is 20.

Q18 **Answer :**

(c) 32 m

Let the width of the rectangle be x. Then, its length will be $3x$.

Perimeter of the rectangle = 96 m

Now, $2(l + b) = 96$

$\Rightarrow 2(3x + x) = 96$

$\Rightarrow 2 \times 4x = 96$

$\Rightarrow 8x = 96$

$\Rightarrow x = \frac{\cancel{96}^{12}}{\cancel{8}_{1}}$

$\Rightarrow x = 12$

$\therefore$ Length of the rectangle = 3 × 12 m = 36 m