Equation

Exercise

Solution 1(1):

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

$\therefore 4(2x+3)=1(x-2)$ (By cross multiplication)

$\therefore 8x+12=x-2$

$\therefore 8x-x=-2-12$

$\therefore 7x=-14$

$\therefore x=\frac{-14}{7}$

$\therefore x=-2$

Solution 1(2):

$$\frac{22x-7}{11x+3}=5$$

$\therefore 22x-7=5(11x+3)$ (By cross multiplication)

$\therefore 22x-7=55x+15$

$\therefore 22x-55x=15+7$

$\therefore -33x=22$

$\therefore x=\frac{-22}{33}$

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

Solution 1(3):

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

$\therefore 3\left(\frac{4x+1}{2x+5}\right)=2$ (Multiplying both sides by 4)

$\therefore \frac{12x+3}{2x+5}=2$ (By cross multiplication)

$\therefore 12x+3=2(2x+5)$

$\therefore 12x+3=4x+10$

$\therefore 12x-4x=10-3$

$\therefore 8x=7$

$\therefore x=\frac{7}{8}$

Solution 1(4):

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

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

$$\therefore \frac{3x+2-2x-3}{x-3}=\frac{-3+2}{6}$$

$$\therefore \frac{x-1}{x-3}=\frac{-1}{6}$$

$$\therefore 6(x-1)=-1(x-3) \quad \text{(By cross multiplication)}$$

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

$$\therefore 6x+x=3+6$$

$$\therefore 7x=9$$

$$\therefore x=\frac{9}{7}$$

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

Solution 1(5):

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

$$\therefore (2x-3)(3x+1)=(2x+5)(3x-1) \quad \text{(By cross multiplication)}$$

$$\therefore 6x^2+2x-9x-3=6x^2-2x+15x-5$$

$$\therefore 6x^2-7x-3=6x^2+13x-5$$

$$\therefore 6x^2-6x^2-7x-13x=-5+3$$

$$\therefore -20x=-2$$

$$\therefore 20x=2$$

$$\therefore x=\frac{2}{20}$$

$$\therefore x=\frac{1}{10}$$

Solution 2(1):

Let the present age of Alpa be 5x years.
Then, the present age of Jalpa will be 7x years.
After 5 years, the age of Alpa = (5x + 5) years
And, the age of Jalpa = (7x + 5) years
According to the given condition, we have

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

$$\therefore 4(5x+5)=3(7x+5) \quad \text{(By cross multiplication)}$$

$$\therefore 20x+20=21x+15$$

$$\therefore 20x-21x=15-20$$

$$\therefore -x=-5$$

$$\therefore x=5$$

$$\therefore 5x=5\times5=25 \text{ and } 7x=7\times5=35$$

Thus, the present age of Alpa is 25 years and that of Jalpa is 35 years.

Solution 2(2):

Let the two numbers in ratio 5 : 7 be 5x and 7x.
Sum of these numbers = 108 (Given)

$$\therefore 5x+7x=108$$

$$\therefore 12x=108$$

$$\therefore x=\frac{108}{12}$$

$$\therefore x=9$$

$$\therefore 5x=5\times9=45 \text{ and } 7x=7\times9=63$$

Thus, the two numbers are 45 and 63.

Solution 2(3):

Let the denominator of the original fraction be x.

$\therefore$ Its numerator = $3x - 2$

$\therefore$ The original fraction = $\frac{3x-2}{x}$

By adding 8 to its numerator, we get

$(3x - 2) + 8 = 3x + 6$

By adding 6 to its denominator, we get $(x+6)$

Hence, the new fraction = $\frac{3x+6}{x+6}$

Now, the new fraction = $\frac{5}{3}$ (Given)

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

$\therefore 3(3x + 6) = 5(x + 6)$ (By cross multiplication)

$\therefore 9x + 18 = 5x + 30$

$\therefore 9x - 5x = 30 - 18$

$\therefore 4x = 12$

$\therefore x = \frac{12}{4}$

$\therefore x = 3$

$\therefore \frac{3x-2}{x} = \frac{3 \times 3 - 2}{3} = \frac{9-2}{3} = \frac{7}{3}$

Thus, the original fraction is $\frac{7}{3}$.

Solution 2(4):

Let the amount with Tinu be Rs. 2x.

$\therefore$ The amount with Minu is Rs. 5x.

If both have Rs. 50 more, then

Tinu will have Rs. $(2x + 50)$ and

Minu will have Rs. $(5x + 50)$.

According to the given condition, we have

$\therefore \frac{2x+50}{5x+50} = \frac{4}{7}$

$\therefore 7(2x + 50) = 4(5x + 50)$ (By cross multiplication)

$\therefore 14x + 350 = 20x + 200$

$\therefore 14x - 20x = 200 - 350$

$\therefore -6x = -150$

$\therefore 6x = 150$

$\therefore x = \frac{150}{6}$

$\therefore x = 25$

$\therefore 2x = 2 \times 25 = 50$ and $5x = 5 \times 25 = 125$

Thus, Tinu has Rs. 50 and Minu has Rs. 125.

Practice 1

Solution 1:

$3x + 8 = -5x + 4$

$\therefore 3x + 5x = 4 - 8$

$\therefore 8x = -4$

$\therefore x = \frac{-4}{8}$

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

$\therefore$ The solution of the given equation is $x = -\frac{1}{2}$.

Solution 2:

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

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

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

$\therefore \frac{3x - 2x}{6} = 3$

$\therefore \frac{x}{6} = 3$

$\therefore x = 3 \times 6$

$\therefore x = 18$

$\therefore$ The solution of the given equation is $x = 18$.

Solution 3:

$5x + \frac{7}{2} = \frac{3x}{2} - 14$

$\therefore 5x - \frac{3x}{2} = -14 - \frac{7}{2}$

$\therefore \frac{2(5x) - 3x}{2} = \frac{2(-14) - 7}{2}$

$\therefore 2(5x) - 3x = 2(-14) - 7$ (Multiplying both sides by 2)

$\therefore 10x - 3x = -28 - 7$

$\therefore 7x = -35$

$\therefore x = \frac{-35}{7}$

$\therefore x = -5$

$\therefore$ The solution of the given eqution is $x = -5$.

Solution 4:

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

$\therefore 5x = 4(x + 10)$ (Multiplying both sides by 5)

$\therefore 5x = 4x + 40$

$\therefore 5x - 4x = 40$

$\therefore x = 40$

$\therefore$ The solution of the given equation is $x = 40$.

Solution 5:

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

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

$\therefore 3y = \frac{26 - 5}{3}$

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

$\therefore 3y = 7$

$\therefore y = \frac{7}{3}$ (Dividing both sides by 3)

$\therefore y = 2\frac{1}{3}$

$\therefore$ The solution of the given equation is $x = 2\frac{1}{3}$.

Solution 6:

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

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

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

$\therefore 15\left(\frac{2x}{3}\right) - 15\left(\frac{7x}{15}\right) = 2 \times 15$ (Multiplying both sides by 15)

$\therefore 5(2x) - 7x = 30$

$\therefore 10x - 7x = 30$

$\therefore 3x = 30$

$\therefore x = \frac{30}{3}$

$\therefore x = 10$

$\therefore$ The solution of the given equation is $x = 10$.

Solution 7:

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

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

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

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

$\therefore m = \frac{8}{5} \times \frac{1}{2}$

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

$\therefore$ The solution of the given equation is $x = \frac{4}{5}$.

Solution 8:

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

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

$\therefore 8x + 4 = 3x + 4$

$\therefore 8x - 3x = 4 - 4$

$\therefore 5x = 0$

$\therefore x = \frac{0}{5}$

$\therefore x = 0$

$\therefore$ The solution of the given equation is $x = 0$.

Solution 9:

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

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

$\therefore 4(2x - 1) - 3(2x + 1) = \frac{12}{12}(2x - 1)$ (Multiplyig both sides by 12)

$\therefore 8x - 4 - 6x - 3 = 2 - x$

$\therefore 2x - 7 = 2 - x$

$\therefore 2x + x = 2 + 7$

$\therefore 3x = 9$

$\therefore x = \frac{9}{3}$

$\therefore x = 3$

$\therefore$ The solution of the given eqution is $x = 3$.

Solution 10:

$9x - 4 - 3(x - 4) = 4(x - 1)$

$\therefore 9x - 4 - 3x + 12 = 4x - 4$

$\therefore 6x + 8 = 4x - 4$

$\therefore 6x - 4x = -4 - 8$

$\therefore 2x = -12$

$\therefore x = \frac{-12}{2}$

$\therefore x = -6$

$\therefore$ The solution of the given equation is $x = -6$.

Solution 11:

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

$\therefore 12\left(\frac{x}{2}\right) + 12\left(\frac{x+2}{3}\right) + 12\left(\frac{x+7}{4}\right) = 12x \times$ (Multiplying both sides by 12)

$\therefore 6x + 4(x+2) + 3(x+7) = 12x$

$\therefore 6x + 4x + 8 + 3x + 21 = 12x$

$\therefore 13x + 29 = 12x$

$\therefore 13x - 12x = -29$

$\therefore x = -29$

$\therefore$ The solution of the given equation is $x = -29$.

Solution 12:

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

$\therefore 2x - 6 - 7 = 6 - 5x - 5$

$\therefore 2x - 13 = 1 - 5x$

$\therefore 2x + 5x = 1 + 13$

$\therefore 7x = 14$

$\therefore x = \frac{14}{7}$

$\therefore x = 2$

$\therefore$ The solution of the given equation is $x = 2$.

Practice 2

Solution 1:

Let the present age of Vinodbhai's son be x years.

$\therefore$ Persent age of Vinodbhai = 3x years.

Then, ten years ago,

Age of Vinodbhai = $(3x - 10)$ years

Age of his son = $(x - 10)$ years

Also, ten years ago,

the age of Vinodbhai was five times the age of his son.

$\therefore (3x - 10) = 5(x - 10)$

$\therefore 3x - 10 = 5x - 50$

$\therefore 3x - 5x = -50 + 10$

$\therefore -2x = -40$

$\therefore 2x = 40$

$\therefore x = \frac{40}{2}$

$\therefore x = 20$

$\therefore 3x = 3 \times 20 = 60$

Thus, the present age of Viondbhai is 60 years and the present age of his son is 20 years.

Solution 2:

Let the total number of children in the garden be x.

$\therefore$ Number of children playing games $= \frac{x}{3}$.

Then, number of children not playing games $= x - \frac{x}{3} = \frac{3x - x}{3} = \frac{2}{3}x$.

Five more than half of the remaining children are eating breakfast.

$\therefore$ Number of childrean eating breakfast $= \frac{1}{2}\left(\frac{2}{3}x\right) + 5 = \frac{x}{3} + 5$

The remaining 4 children are a drawing picture of the garden.

Now, total number of children

= Number of childern playing games

+ Number of children taking breakfast

+ Number of children drawing picture

$\therefore x = \frac{x}{3} + \left(\frac{x}{3} + 5\right) + 4$

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

$\therefore x - \frac{x}{3} - \frac{x}{3} = 9$

$\therefore \frac{3x - x - x}{3} = 9$

$\therefore x = 3 \times 9$ (Multiplying both sides by 3)

$\therefore x = 27$

Thus, total number of children in the garden is 27.

Solution 3:

Let the present age of Salim's father b x years.

$\therefore$ His age before 5 years $= (x - 5)$ years.

Now, half his present age $= \left(\frac{x}{2}\right)$ years

And one-third of his age before 5 years $= \left(\frac{x-5}{3}\right)$ years.

Then, according to question, we have

$\left(\frac{x}{2}\right) + \left(\frac{x-5}{3}\right) = 20$

$\therefore 6\left(\frac{x}{2}\right) + 6\left(\frac{x-5}{3}\right) = 20 \times 6$ (Multiplying both sides by 6)

$\therefore 3x + 2(x - 5) = 120$

$\therefore 3x + 2x - 10 = 120$

$\therefore 5x = 120 + 10$

$\therefore 5x = 130$

$\therefore x = \frac{130}{5}$

$\therefore x = 26$

Thus, the present age of Salim's father is 26 years.

Solution 4:

Let the required number be x.

Subtracting 5 from eight times the number $= 8x - 5$

And 4 more than five times the number $= 5x + 4$

Now, according to question,

$8x - 5 = 5x + 4$

$\therefore 8x - 5x = 4 + 5$

$\therefore 3x = 9$

$\therefore x = \frac{9}{3}$

$\therefore x = 3$

Thus, the required number is 3.

Solution 5:

Let the required number be x.
Adding 5 to three times the number = $3x + 5$
And, subtracting 10 from four times the number = $4x - 10$.
According to question, we have
$3x + 5 = 4x - 10$
$\therefore 3x - 4x = -10 - 5$
$\therefore -x = -15$
$\therefore x = 15$
Thus, the required number is 15.

Solution 6:

Let the number of chocolates with Jiya be x.
$\therefore$ Number of chocolates distributed to Riya $= \frac{x}{5}$
Number of chocolates distributed to Vansh $= \frac{x}{4}$
Number of chocolates distributed to Dhruv $= \frac{x}{2}$
Number of chocolates with Jiya = 5
$\therefore \frac{x}{5} + \frac{x}{4} + \frac{x}{2} + 5 = x$
$\therefore 4x + 5x + 10x + 100 = 20x$ (Multiplying both sides by 20)
$\therefore 19x + 100 = 20x$
$\therefore 19x - 20x = -100$
$\therefore -x = -100$
$\therefore x = 100$
Thus, Jiya had 100 chocolates.

Solution 7:

Let the present age of Ravi be x years.
$\therefore$ Present age of his father = 4x years
After 10 years,
Ravi's age = (x + 10) years and
Age of his father = (4x + 10) years
At that time, the age of Ravi's father will be three times the age of Ravi.
$\therefore (4x + 10) = 3(x + 10)$
$\therefore 4x + 10 = 3x + 30$
$\therefore 4x - 3x = 30 - 10$
$\therefore x = 20$
Then, $4x = 4 \times 20 = 80$
Thus, Ravi's present age is 20 years and that of his father is 80 years.

Practice 3

Solution 1(1):

$4x + 13 = 3x + 15$
$\therefore 4x - 3x = 15 - 13$
$\therefore x = 2$
$\therefore$ The solution of the equation is x = 2.

Solution 1(2):

$9x - 15 = 7x + 1$

$\therefore 9x - 7x = 1 + 15$

$\therefore 2x = 16$

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

$\therefore x = 8$

$\therefore$ The solution of the equation is $x = 8$.

Solution 1(3):

$y + 18 = 2y - 7$

$\therefore y - 2y = -7 - 18$

$\therefore -y = -25$

$\therefore y = 25$

$\therefore$ The solution of the equation is $x = 25$.

Solution 1(4):

$17 - 3(m - 5) = 2 - 13m$

$\therefore 17 - 3m + 15 = 2 - 13m$

$\therefore 32 - 3m = 2 - 13m$

$\therefore -3m + 13m = 2 - 32$

$\therefore 10m = -30$

$\therefore m = \frac{-30}{10}$

$\therefore m = -3$

$\therefore$ The solution of the equation is $x = -3$.

Solution 1(5):

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

$\therefore 2(4x + 3) = 3(4x - 1) + 3$ (Multiplying both sides by 6)

$\therefore 8x + 6 = 12x - 3 + 3$

$\therefore 8x + 6 = 12x$

$\therefore 8x - 12x = -6$

$\therefore -4x = -6$

$\therefore 4x = 6$

$\therefore x = \frac{6}{4}$

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

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

$\therefore$ The solution of the equation is $x = 1\frac{1}{2}$.

Solution 1(6):

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

$\therefore 3(x - 2) - 4(x + 3) = 3 - 6x$ (Multiplying both sides by 6)

$\therefore 3x - 6 - 4x - 12 = 3 - 6x$

$\therefore -x - 18 = 3 - 6x$

$\therefore -x + 6x = 3 + 18$

$\therefore 5x = 21$

$\therefore x = \frac{21}{5}$

$\therefore x = 4\frac{1}{5}$

$\therefore$ The solution of the equation is $x = 4\frac{1}{5}$.

Solution 1(7):

$5(3-2x)-4(2-3x)=3-5(x+2)$

$\therefore 15-10x-8+12x=3-5x-10$

$\therefore 2x+7=-5x-7$

$\therefore 2x+5x=-7-7$

$\therefore 7x=-14$

$\therefore x=\frac{-14}{7}$

$\therefore x=-2$

$\therefore$ The solution of the equation is $x=-2$.

Solution 2(1):

Let Kiran's present age be x years.

Then, the present age of her mother will be 6x years.

After 5 years, Kiran's age = $(x+5)$ years.

At that time, the age of Kiran will be one-third of her mother's age at present.

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

$\therefore x+5=2x$

$\therefore x-2x=-5$

$\therefore -x=-5$

$\therefore x=5$

$\therefore 6x=6\times5=30$

Thus, Kiran's present age is 5 years and that of her mother is 30 years.

Solution 2(2):

Let the required number be x.

Adding 8 to seven times the number = $7x+8$

Subtracting 25 from ten times the number = $10x-25$

Both these results are given to be equal.

$\therefore 7x+8=10x-25$

$\therefore 7x-10x=-25-8$

$\therefore -3x=-33$

$\therefore 3x=33$

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

$\therefore x=11$

Thus, the required number is 11.

Solution 2(3):

Let the number of students in the class be x.

Number of chocolates received by each student = 7

$\therefore$ Number of chocolate = 7x

If there were 5 more students, then number of students = (x + 5)

Then, number of chocolates received by each student

= 7 – 1

= 6

Now, number of chocolates = 6(x + 5)

$\therefore$ 7x = 6(x + 5)

$\therefore$ 7x = 6x + 30

$\therefore$ 7x – 6x = 30

$\therefore$ x = 30

Thus, there are 30 students in the class.

Solution 2(4):

Let the original number be x.

Number obtained by subtracting 8 from the original number and dividing by $5 = \frac{x-8}{5}$

Number obtained by adding 13 to the original number and dividing by $8 = \frac{x+13}{8}$

Both these results are given to be equal.

$\therefore \frac{x-8}{5} = \frac{x+13}{8}$

$\therefore 8(x-8) = 5(x+13)$ (Multiplying both sides by 40)

$\therefore 8x - 64 = 5x + 65$

$\therefore 8x - 5x = 65 + 64$

$\therefore 3x = 129$

$\therefore x = \frac{129}{3}$

$\therefore x = 43$

Thus, the required number is 43.

Practice 4

Solution 1(1):

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

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

$\therefore 1(8x-3) = 3x(2)$ (By cross multiplication)

$\therefore 8x - 3 = 6x$

$\therefore 8x - 6x = 3$

$\therefore 2x = 3$

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

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

Solution 1(2):

$\frac{30x}{7-6x} = 30$

$\therefore \frac{x}{7-6x} = 1$ (Dividing both sides by 30)

$\therefore x = 1(7-6x)$ (By cross multiplication)

$\therefore x = 7 - 6x$

$\therefore x + 6x = 7$

$\therefore 7x = 7$

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

$\therefore x = 1$

Solution 1(3):

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

$\therefore 5(3a-4) = -2(2-6a)$ (By cross multiplication)

$\therefore 15a - 20 = -4 + 12a$

$\therefore 15a - 12a = -4 + 20$

$\therefore 3a = 16$

$\therefore a = \frac{16}{3}$

$\therefore a = 5\frac{1}{3}$

Solution 1(4):

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

$\therefore 9m = 4(m+15)$ (By cross multiplication)

$\therefore 9m = 4m + 60$

$\therefore 9m - 4m = 60$

$\therefore 5m = 60$

$\therefore m = \frac{60}{5}$

$\therefore m = 12$

Solution 1(5):

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

$\therefore 3(7n+4) = -4(n+2)$ (By cross multiplication)

$\therefore 21n + 12 = -4n - 8$

$\therefore 21n + 4n = -8 - 12$

$\therefore 25n = -20$

$\therefore n = \frac{-20}{25}$

$\therefore n = \frac{-4}{5}$

Solution 1(6):

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

$\therefore \frac{4x+1}{2x-5} = 1$ $\left(\text{Multiplying both sides by } \frac{2}{3}\right)$

$\therefore 4x + 1 = 2x - 5$ (By cross multiplication)

$\therefore 4x - 2x = -5 - 1$

$\therefore 2x = -6$

$\therefore x = \frac{-6}{2}$

$\therefore x = -3$

Solution 1(7):

$$\frac{4x-1}{2x+1} = \frac{6x-5}{3x+2}$$

$\therefore (4x-1)(3x+2) = (6x-5)(2x+1)$ (By cross multiplication)

$\therefore 12x^2 + 8x - 3x - 2 = 12x^2 + 6x - 10x - 5$

$\therefore 12x^2 + 5x - 2 = 12x^2 - 4x - 5$

$\therefore 12x^2 - 12x^2 + 5x + 4x = -5 + 2$

$\therefore 9x = -3$

$\therefore x = \frac{-3}{9}$

$\therefore x = \frac{-1}{3}$

Solution 1(8):

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

$\therefore (4x-1)(2x-1)=(2x+1)(4x+1)$ (By cross multiplication)

$\therefore 8x^2-4x-2x+1=8x^2+2x+4x+1$

$\therefore 8x^2-6x+1=8x^2+6x+1$

$\therefore 8x^2-8x^2-6x-6x=1-1$

$\therefore -12x=0$

$\therefore x=\frac{0}{-12}$

$\therefore x=0$

Solution 1(9):

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

$\therefore (3x+1)(x+1)=(x-1)(3x-4)$ (By cross multiplication)

$\therefore 3x^2+3x+x+1=3x^2-4x-3x+4$

$\therefore 3x^2+4x+1=3x^2-7x+4$

$\therefore 3x^2-3x^2+4x+7x=4-1$

$\therefore 11x=3$

$\therefore x=\frac{3}{11}$

Solution 1(10):

$$\frac{5x-6}{8}=\frac{3x-8}{5}+1$$

$\therefore 5(5x-6)=8(3x-8)+40(1)$ (Multiplying both sides by 40)

$\therefore 25x-30=24x-64+40$

$\therefore 25x-30=24x-24$

$\therefore 25x-24x=-24+30$

$\therefore x=6$

Solution 1(11):

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

$\therefore 5(5x-4)=4(3x-4)+20(5)$ (Multiplying both sides by 20)

$\therefore 25x-20=12x-16+100$

$\therefore 25x-20=12x+84$

$\therefore 25x-12x=84+20$

$\therefore 13x=104$

$\therefore x=\frac{104}{13}$

$\therefore x=8$

Solution 1(12):

$$\frac{x+10}{4}+\frac{x+3}{3}=\frac{x+4}{2}$$

$\therefore 3(x+10)+4(x+3)=6(x+4)$ (Multiplying both sides by 12)

$\therefore 3x+30+4x+12=6x+24$

$\therefore 7x+42=6x+24$

$\therefore 7x-6x=24-42$

$\therefore x=-18$

Practice 5

Solution 1:

Let Veena's present age be 2x years.
∴ Kinjal's present age = 3x years
After 4 years, Veena's age = (2x + 4) years
Before 4 years, Kinjal's age = (3x – 4) years
According to given condition, we have

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

∴ $1(2x+4)=4(3x-4)$ (By cross multiplication)
∴ $2x+4=12x-16$
∴ $2x-12x=-16-4$
∴ $-10x=-20$
∴ $10x=20$
∴ $x=\frac{20}{10}$
∴ $x=2$
∴ $2x=2\times2=4$ and $3x=3\times2=6$
Thus, Veena's present age is 4 years and that of Kinjal is 6 years.

Solution 2:

Let the present age of Ajay be 4x years.
∴ Vijay's present age = 5x years
After 8 years, the Ajay's age = (4x + 8) years
And the age of Vijay = (5x + 8) years
According to the given condition, we have

$$\frac{4x+8}{5x+8}=\frac{5}{6}$$

∴ $6(4x+8)=5(5x+8)$ (By cross multiplication)
∴ $24x+48=25x+40$
∴ $24x-25x=40-48$
∴ $-x=-8$
∴ $x=8$
∴ $4x=4\times8=32$ and $5x=5\times8=40$
Thus, the present age of Ajay is 32 years and that of Vijay is 40 years.

Solution 3:

The ratio of two number is 1 : 2.
Thus, let the required numbers be x and 2x.
Sum of both these numbers is given to be 45.
∴ $x+2x=45$
∴ $3x=45$
∴ $x=\frac{45}{3}$
∴ $x=15$
∴ $2x=2\times15=30$
Therefore, the two numbers are 15 and 30.

Solution 4:

Let the required numbers in ratio 3 : 2 be 3x and 2x.
Sum of the numbers is given to be 30.
∴ $3x+2x=30$
∴ $5x=30$
∴ $x=\frac{30}{5}$
∴ $x=6$
∴ $3x=3\times6=18$ and $2x=2\times6=12$
Thus, the required numbers are 18 and 12.

Solution 5:

Let the denominator of the original rational number be x.

$\therefore$ Its numerator $= (x-5)$

Hence, the original rational number $= \frac{x-5}{x}$

By subtracting 1 from the numerator, we get

$(x-5)-1 = x-6$

By adding 2 to the denominator, we get $(x+2)$

Hence, the new rational number $= \frac{x-6}{x+2}$

Now, the new rational number $= \frac{1}{5}$ (Given)

Thus, we have

$\frac{x-6}{x+2} = \frac{1}{5}$

$\therefore 5(x-6) = 1(x+2)$ (By cross multiplication)

$\therefore 5x-30 = x+2$

$\therefore 5x-x = 2+30$

$\therefore 4x = 32$

$\therefore x = \frac{32}{4}$

$\therefore x = 8$

$\therefore \frac{x-5}{x} = \frac{8-5}{8} = \frac{3}{8}$

Thus, the original rational number is $\frac{3}{8}$.

Solution 6:

Let the denominator of the original rational number be x.

$\therefore$ Its numerator $= x-3$

Hence, the original rational number $= \frac{x-3}{x}$

By taking numerator 3 times, we get $3(x-3)$

By adding 20 to denominator, we get $(x+20)$

Now, the new rational number $= \frac{1}{8}$ (Given)

$\therefore \frac{3(x-3)}{x+20} = \frac{1}{8}$

$\therefore \frac{3x-9}{x+20} = \frac{1}{8}$

$\therefore 8(3x-9) = 1(x+20)$

$\therefore 24x-72 = x+20$

$\therefore 24x-x = 20+72$

$\therefore 23x = 92$

$\therefore x = \frac{92}{23}$

$\therefore x = 4$

$\therefore \frac{x-3}{x} = \frac{4-3}{4} = \frac{1}{4}$

Thus, the original rational number is $\frac{1}{4}$.