



WHAT WE HAVE LEARNT....

1. Write equations for the following statements :

- (a) 4 added to a number gives 2 less than twice the number.
- (b) Three-fourths of a number plus five gives 23.
- (c) If 6 more than a number is multiplied by 3, the result is 24.

Sol. (a) let the number be x .

$$x + 4 = 2x - 2$$

$$(b) \quad \frac{3}{4}x + 5 = 23$$

$$(c) \quad 3(x + 6) = 24$$

2. Write the following equations in statement form :

- (a) $3a - 7 = 8$
- (b) $\frac{5x}{3} + 2 = x + 6$
- (c) $2(p - 3) + 7 = 9$

Sol. (a) Seven less than three times a number gives eight.

(b) Two more than five-thirds of a number is six more than the number.

(c) Three less than a number multiplied by two and seven is added to the result, gives nine.

3. Solve :

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

$$(b) \frac{3}{2}(a-2) + 2(a+3) = 24$$

Sol. (a) $2(x-3) = 4(x-5)$

$$\Rightarrow 2x - 6 = 4x - 20$$

$$\Rightarrow 2x - 4x = -20 + 6$$

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

$$\Rightarrow x = 7.$$

(b) $\frac{3}{2}(a-2) + 2(a+3) = 24$

$$\Rightarrow \frac{3}{2}a - 3 + 2a + 6 = 24$$

$$\Rightarrow \frac{7}{2}a + 3 = 24$$

$$\Rightarrow \frac{7}{2}a = 21$$

$$\Rightarrow a = \frac{21 \times 2}{7} = 6$$

$$\Rightarrow a = 6.$$

4. The sum of two odd natural numbers is 48. Find the numbers.

Sol. let the two odd numbers are x and $x+2$.

$$\Rightarrow x + x + 2 = 48$$

$$\Rightarrow 2x = 48 - 2 = 46 \Rightarrow x = 23$$

Thus, two odd numbers are 23 and 25.



EXERCISE 8.1

Solve the following equations :

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

[HOTS]

2. $5y - \frac{1}{3}(y+1) = \frac{2y+8}{3} + 5$

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

4. $\frac{x-1}{3} - \frac{4x+1}{4} = \frac{1}{12}$

5. $\frac{4}{5}\left(y + \frac{5}{6}\right) - \frac{2}{3}\left(y - \frac{1}{4}\right) = \frac{7}{6}$

[HOTS]

6. $\frac{z-2}{4} + \frac{1}{3} = z - \frac{2z-1}{3}$

7. $\frac{2y-3}{5} + \frac{y+3}{4} = \frac{4y+1}{7}$

8. $\frac{x}{7} - \frac{x}{14} = \frac{x}{28} + \frac{1}{4}$

9. $2x + 3(x+2) + 4(x-4) = -37$

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

11. $2(3x+2) + \frac{1}{4} = 5x - \frac{2}{3}$

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

13. $6(3m-1) + 3(2m+3) = 1 - 7m$

14. $\frac{(6x-2)}{4} + \frac{1}{3}(2x-1) = 4x$

15. $1 + \frac{x}{3} + 6(4x-2) = 5$

16. $\frac{3x+5}{5} - \frac{x-2}{3} = \frac{5x-7}{6}$

17. $x - \left(\frac{2x+8}{3}\right) - \frac{x}{4} + \left(\frac{2-x}{24}\right) + 3 = 0$ [HOTS]

18. $10 - \left(\frac{x-1}{2}\right) - \left(\frac{x-2}{3}\right) = \frac{x-3}{4}$ [HOTS]

19. $0.3x + 0.5 = 0.4x - 0.2$

20. $1.2x + \frac{18}{25} = 5x - \frac{39}{25}$

21. $\frac{(0.25+x)}{3} = x + \frac{1}{2}$

22. $0.12x + \frac{(0.5+x)}{2} = \frac{x}{3} + 1.5$ [HOTS]

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

On cross multiplying we get :

$$\Rightarrow (3x+4)(2x+4) = (6x-2)(x+6)$$

$$\Rightarrow 6x^2 + 12x + 8x + 16 = 6x^2 + 36x - 2x - 12$$

$$\Rightarrow 20x + 16 = 34x - 12$$

$$\Rightarrow 20x - 34x = -12 - 16$$

$$\Rightarrow -14x = -28$$

$$\Rightarrow x = 2$$

$$2. \quad 5y - \frac{1}{3}(y+1) = \frac{2y+8}{3} + 5$$

$$\Rightarrow \frac{15y - (y+1)}{3} = \frac{2y+8+15}{3}$$

Multiplying both sides by 3, we get

$$\Rightarrow 15y - y - 1 = 2y + 23 \Rightarrow 14y - 1 = 2y + 23$$

$$\Rightarrow 14y - 2y = 23 + 1 \Rightarrow 12y = 24 \Rightarrow y = 2$$

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

$$\Rightarrow \frac{9x + 2x}{12} = -2x + 5 \Rightarrow 11x = 12(-2x + 5)$$

$$\Rightarrow 11x = -24x + 60 \Rightarrow 11x + 24x = 60$$

$$\Rightarrow 35x = 60 \Rightarrow x = \frac{60}{35} = \frac{12}{7}$$

$$4. \quad \frac{x-1}{3} - \frac{4x+1}{4} = \frac{1}{12}$$

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

Multiplying both sides by 12, we get.

$$\Rightarrow 4x - 4 - 12x - 3 = 1 \Rightarrow -8x = 1 + 7$$

$$\Rightarrow x = -1$$

$$\underline{5.} \quad \frac{4}{5} \left(y + \frac{5}{6} \right) - \frac{2}{3} \left(\frac{y}{1} - \frac{1}{4} \right) = \frac{7}{6}$$

$$\Rightarrow \frac{4}{5} \left(\frac{6y+5}{6} \right) - \frac{2}{3} \left(\frac{4y-1}{4} \right) = \frac{7}{6}$$

$$\Rightarrow \frac{2}{15} (6y+5) - \frac{1}{6} (4y-1) = \frac{7}{6}$$

Multiplying both sides by 30, we get:

$$\Rightarrow 4(6y+5) - 5(4y-1) = 35$$

$$\Rightarrow 24y + 20 - 20y + 5 = 35$$

$$\Rightarrow 4y = 35 - 25 \Rightarrow 4y = 10$$

$$\Rightarrow y = \frac{10}{4} = \frac{5}{2}$$

$$\underline{6.} \quad \frac{z-2}{4} + \frac{1}{3} = \frac{z}{1} - \frac{2z-1}{3}$$

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

$$\Rightarrow \frac{(3z-2)}{12} = \frac{(z+1)}{3}$$

Multiplying both sides by 12, we get:

$$\Rightarrow 3z-2 = 4z+4 \Rightarrow 3z-4z = 4+2$$

$$\Rightarrow -z = 6 \Rightarrow z = -6$$

$$\underline{7.} \quad \frac{2y-3}{5} + \frac{y+3}{4} = \frac{4y+1}{7}$$

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

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

On cross multiplying we get:

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

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

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

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

$$\underline{8.} \quad \frac{x}{7} - \frac{x}{14} = \frac{x}{28} + \frac{1}{4}$$

$$\Rightarrow \frac{2x-x}{14} = \frac{x+7}{28} \Rightarrow \frac{x}{14} = \frac{x+7}{28}$$

Multiplying both sides ^{by 28}, we get:

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

$$\Rightarrow x = 7$$

9. $2x + 3(x+2) + 4(x-4) = -37$

$$\Rightarrow 2x + 3x + 6 + 4x - 16 = -37$$

$$\Rightarrow 9x - 10 = -37 \Rightarrow 9x = -37 + 10$$

$$\Rightarrow 9x = -27 \Rightarrow x = -3.$$

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

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

$$\Rightarrow \frac{1}{4} = \frac{6y+5}{4}$$

Multiplying both sides by 4, we get:

$$\Rightarrow 1 = 6y + 5 \Rightarrow 6y = 1 - 5$$

$$\Rightarrow 6y = -4 \Rightarrow y = \frac{-4}{6}$$

$$\Rightarrow y = \frac{-2}{3}.$$

11. $2(3x+2) + \frac{1}{4} = 5x - \frac{2}{3}$

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

$$\Rightarrow x = \frac{-8-3-48}{12} = \frac{-59}{12}$$

$$\Rightarrow x = \frac{-59}{12}$$

$$\underline{12.} \quad \frac{(2x-5)}{3} + \frac{(5x-4)}{4} = 1$$

$$\Rightarrow \frac{4(2x-5) + 3(5x-4)}{12} = 1$$

on cross multiplying ~~12~~ we get:

$$\Rightarrow 8x - 20 + 15x - 12 = 12$$

$$\Rightarrow 23x = 12 + 12 + 20 \Rightarrow 23x = 44$$

$$\Rightarrow x = \frac{44}{23}$$

$$\underline{13.} \quad 6(3m-1) + 3(2m+3) = 1-7m$$

$$\Rightarrow 18m - 6 + 6m + 9 = 1 - 7m$$

$$\Rightarrow 24m + 7m = 1 - 3 = -2$$

$$\Rightarrow 31m = -2$$

$$\Rightarrow m = \frac{-2}{31}$$

$$\underline{14.} \quad \frac{(6x-2)}{4} + \frac{1}{3}(2x-1) = 4x$$

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

on cross multiplying we get:

$$\Rightarrow 18x - 6 + 8x - 4 = 48x \Rightarrow 26x - 48x = 10$$

$$\Rightarrow -22x = 10 \Rightarrow x = \frac{-10}{22} = \frac{-5}{11}$$

15. $1 + \frac{x}{3} + 6(4x-2) = 5$

Multiplying both sides by 3, we get:

$$\Rightarrow 3 + x + 18(4x-2) = 15$$

$$\Rightarrow 3 + x + 72x - 36 = 15 \Rightarrow 73x = 15 + 36 - 3$$

$$\Rightarrow 73x = 48 \Rightarrow x = \frac{48}{73}$$

16. $\frac{3x+5}{5} - \frac{x-2}{3} = \frac{5x-7}{6}$

$$\Rightarrow \frac{3(3x+5) - 5(x-2)}{15} = \frac{5x-7}{6} \Rightarrow \frac{9x+15-5x+10}{15} = \frac{5x-7}{6}$$

$$\Rightarrow \frac{4x+25}{15} = \frac{5x-7}{6}$$

On cross multiplying we get.

$$\Rightarrow 6(4x+25) = 15(5x-7)$$

$$\Rightarrow 24x + 150 = 75x - 105$$

$$\Rightarrow 24x - 75x = -105 - 150 \Rightarrow -51x = -255$$

$$\Rightarrow x = \frac{-255}{-51} = 5$$

$$\Rightarrow x = 5$$

17. $x - \left(\frac{2x+8}{3}\right) - \frac{x}{4} + \left(\frac{2-x}{24}\right) + 3 = 0$

Multiplying both sides by 24, we get:

$$\Rightarrow 24x - 8(2x+8) - 6x + (2-x) + 72 = 0$$

$$\Rightarrow 24x - 16x - 64 - 6x + 2 - x + 72 = 0$$

$$\Rightarrow x + 10 = 0 \Rightarrow x = -10.$$

18. $10 - \left(\frac{x-1}{2}\right) - \left(\frac{x-2}{3}\right) = \frac{x-3}{4}$

Multiplying both sides by 12, we get.

$$\Rightarrow 120 - 6(x-1) - 4(x-2) = 3(x-3)$$

$$\Rightarrow 120 - 6x + 6 - 4x + 8 = 3x - 9$$

$$\Rightarrow -10x - 3x = -143$$

$$\Rightarrow -13x = -143$$

$$\Rightarrow x = 11$$

19. $0.3x + 0.5 = 0.4x - 0.2$

$$\Rightarrow 0.3x - 0.4x = 0.2 - 0.5$$

$$\Rightarrow -0.1x = -0.7$$

$$\Rightarrow x = \frac{-0.7}{-0.1} = 7. \Rightarrow x = 7.$$

$$\underline{20.} \quad 1.2x + \frac{18}{25} = 5x - \frac{39}{25}$$

$$\Rightarrow 1.2x - 5x = -\frac{39}{25} - \frac{18}{25}$$

$$\Rightarrow -3.8x = \frac{-57}{25} \Rightarrow x = \frac{57}{25 \times 3.8}$$

$$\Rightarrow x = \frac{3 \cdot 57 \times 10^5}{25 \times 38 \cdot 2} = \frac{3}{5}$$

$$\Rightarrow x = \frac{3}{5} = 0.6$$

$$\underline{21.} \quad \frac{(0.25+x)}{3} = x + \frac{1}{2}$$

Multiplying both sides by 6 we get

$$\Rightarrow 2(0.25+x) = 6x + 3$$

$$\Rightarrow 0.50 + 2x = 6x + 3$$

$$\Rightarrow 2x - 6x = 3 - 0.50 \Rightarrow -4x = 2.50$$

$$\Rightarrow x = \frac{2.50}{-4} = -0.625$$

$$\Rightarrow x = -0.625$$

$$\underline{22.} \quad 0.12x + \frac{(0.5+x)}{2} = \frac{x}{3} + 1.5$$

Multiplying both sides by 6, we get:

$$\Rightarrow 6 \times 0.12x + 3(0.5+x) = 2x + 1.5 \times 6$$

$$\Rightarrow 0.72x + 1.5 + 3x = 2x + 9.0$$

$$\Rightarrow 3x - 2x + 0.72x = 9 - 1.5$$

$$\Rightarrow 1.72x = 7.5$$

$$\Rightarrow x = \frac{7.5}{1.72} = \frac{750}{172} = 4.36$$

EXERCISE 8.2.

1. Two thirds of 9 subtracted from a number gives 9. Find the number.

Sol. let the number be x .

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

$$\Rightarrow x - 6 = 9$$

$$\Rightarrow x = 9 + 6 = 15$$

$$\Rightarrow x = 15$$

Therefore, the number = 15.

2. One number is three times another. If the larger number is subtracted from 60, the result is two times the smaller number. Find the numbers.

Sol.

Let one number be x , and
another number be $3x$.

$$\Rightarrow 60 - 3x = 2x$$

$$\Rightarrow 5x = 60 \Rightarrow x = 12$$

Hence, numbers = 12 and 36.

3. The ratio of two numbers is 8 : 7. If 2 is subtracted from both the numbers, the ratio changes to 7 : 6. Find the numbers.

Sol.

Let the two numbers be $8x$ and $7x$.

$$\Rightarrow \frac{8x-2}{7x-2} = \frac{7}{6} \Rightarrow 6(8x-2) = 7(7x-2)$$

$$\Rightarrow 48x - 12 = 49x - 14$$

$$\Rightarrow 48x - 49x = -14 + 12$$

$$\Rightarrow -x = -2$$

$$\Rightarrow x = 2$$

Hence, the numbers are 16 and 14.

4. Divide 32 into two parts such that 5 times one part added to 6 times the other part gives 164.

Sol. Let one part of the number be x .

and another part of the number be $(32-x)$.

$$\Rightarrow 5x + 6(32-x) = 164$$

$$\Rightarrow 5x + 192 - 6x = 164$$

$$\Rightarrow -x = 164 - 192 = -28$$

$$\Rightarrow x = 28$$

Hence, the numbers = 28 and 4

5. The one's digit of a two digit number is double the digit in the tens place. If the sum of the digits is 9, find the number.

Sol. Let the ten's place digit of two digit number be x .

and ones place digit be $2x$.

$$\Rightarrow x + 2x = 9$$

$$\Rightarrow 3x = 9$$

$$\Rightarrow x = 3$$

$$\text{Number} = 10 \times 3 + 2 \times 3 = 30 + 6 = 36$$

Hence, number = 36.

6. The sum of the digits of a two digit number is 9. The number obtained by reversing the digits is 9 less than the original number. Find the number.

Sol. Let one's digit be x and tens digit be $(9-x)$

$$\text{Original number} = 10(9-x) + x$$

$$\Rightarrow 10x + (9-x) + 9 = 10(9-x) + x$$

$$\Rightarrow 10x + 9 - x + 9 = 90 - 10x + x$$

$$\Rightarrow 9x = 90 - 9x - 18$$

$$\Rightarrow 18x = 90 - 18 = 72$$

$$\Rightarrow x = 4$$

Hence, the original number = $10(9-4) + 4$

$$= 54$$

7. The digit in the tens place of a two digit number is 6 more than the digit in the units place. The sum of the number and the number obtained by reversing the digits is 66. Find the number.

Sol. Let the units place digit be x , then
tens place digit be $(6+x)$

$$\text{Two digit number} = 10(6+x) + x$$

$$\Rightarrow 10(6+x) + x + 10x + (6+x) = 66$$

$$\Rightarrow 60 + 10x + x + 10x + 6 + x = 66$$

$$\Rightarrow 22x = 66 - 66 = 0$$

$$\Rightarrow x = 0$$

Hence, Number = $10(6+0) + 0 = 60$

8. The sum of the digits of a two digit number is 12. The number obtained by reversing the digits is 36 greater than the original number. Find the number.

Sol. let the units digit of two digit number be x ,
tens digit of two digit number be $(12-x)$.

$$\text{Number} = 10(12-x) + x$$

$$\text{Number obtained by reversing the digits} = 10x + (12-x)$$

$$\Rightarrow 10x + (12-x) = 10(12-x) + x + 36$$

$$\Rightarrow 10x + 12 - x = 120 - 10x + x + 36$$

$$\Rightarrow 9x + 9x = 144$$

$$\Rightarrow 18x = 144$$

$$\Rightarrow x = 8$$

$$\text{Number} = 10(12-8) + 8 = 48$$

9. The denominator of a rational number is 4 more than the numerator. If 5 is added to the numerator and 2 is subtracted from the denominator, the number becomes $\frac{8}{5}$. Find the original number.

Sol. let the numerator of a rational number be x ,
and the denominator be $(x+4)$.

$$\Rightarrow \frac{x+5}{(x+4)-2} = \frac{8}{5} \Rightarrow \frac{x+5}{x+2} = \frac{8}{5}$$

$$\Rightarrow 5(x+5) = 8(x+2) \Rightarrow 5x+25 = 8x+16$$

$$\Rightarrow 5x-8x = 16-25 \Rightarrow -3x = -9$$

$$\Rightarrow x = 3, \text{ Hence, number} = \frac{3}{3+4} = \frac{3}{7}$$

10. The denominator of a rational number is 1 less than twice the numerator. If 6 is added to both the numerator and the denominator, the number becomes $\frac{12}{17}$. Find the rational number.

Sol. let the numerator of a rational number be x .

and the denominator be $(2x-1)$,

$$\Rightarrow \frac{x+6}{(2x-1)+6} = \frac{12}{17} \Rightarrow \frac{x+6}{2x+5} = \frac{12}{17}$$

$$\Rightarrow 17(x+6) = 12(2x+5)$$

$$\Rightarrow 17x + 102 = 24x + 60$$

$$\Rightarrow 17x - 24x = 60 - 102$$

$$\Rightarrow -7x = -42 \Rightarrow x = 6$$

$$\text{Hence, number} = \frac{6}{6 \times 2 - 1} = \frac{6}{11}$$

11. The length of a rectangle exceeds the breadth by 8 cm. Find the area of the rectangle, if its perimeter is 180 cm.

Sol. let the breadth of a rectangle be x cm.

and the length be $(x+8)$ cm.

$$\text{Perimeter} = 180 \text{ cm}$$

$$\Rightarrow 2(x+8+x) = 180 \Rightarrow 2x+8 = 90$$

$$\Rightarrow 2x = 82 \Rightarrow x = 41$$

$$\text{length} = 41+8 = 49 \text{ and breadth} = 41$$

$$\therefore \text{Area} = l \times b = 49 \times 41 = 2009 \text{ cm}^2$$

12. The breadth of a rectangle is 3 less than the length. If both length and breadth are reduced by 3 units, the area of the rectangle reduces by 176 sq. units. Find the dimensions of the original rectangle. [HOTS]

Sol. Let the length of a rectangle be x ,
and the breadth be $(x-3)$

$$\Rightarrow (x-3) \times (x-3-3) = x \times (x-3) - 90$$

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

$$\Rightarrow x^2 - 3x - 6x + 18 = x^2 - 3x - 90$$

$$\Rightarrow -6x = -90 - 18$$

$$\Rightarrow 6x = 108 \Rightarrow x = 18.$$

Hence, length = 18 and breadth = 15.

13. The length of a rectangle is 3 more than twice the breadth of the rectangle. If the length is reduced by 5 units and the breadth is increased by 3 units, the area remains the same. Find the dimensions of the original rectangle and also the area.

Sol. Let the breadth of a rectangle be x .

and length of a rectangle be $(2x+3)$

$$\Rightarrow (2x+3-5) \times (x+3) = (2x+3) \times x$$

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

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

$$\Rightarrow 4x - 3x = 6 \Rightarrow x = 6$$

$$\therefore \text{Length} = 2 \times 6 + 3 = 15 \text{ and breadth} = 6$$

$$\therefore \text{Area} = l \times b = 15 \times 6 = 90 \text{ sq. units}$$

14. Karan is 2 years older to Teja now. After 4 years, their ages will be in the ratio 11 : 10. Find their present ages.

Sol. let the Teja's age be x .

Karan's age be $(x+2)$.

After 4 years, Teja's age $(x+4)$,

Karan's age $(x+2+4)$

$$\Rightarrow \frac{x+6}{x+4} = \frac{11}{10} \Rightarrow 10(x+6) = 11(x+4)$$

$$\Rightarrow 10x + 60 = 11x + 44 \Rightarrow 10x - 11x = 44 - 60$$

$$\Rightarrow -x = -16 \Rightarrow x = 16.$$

Hence, Teja's age = 16 years and
Karan's age = 18 years.

15. Five years ago, Ananya's mother was 5 times as old as Ananya. If her mother is now three times as old as Ananya, find their present ages. [HOTS]

Sol. let Ananya's age be x years.

and her mother's age be $3x$ years.

Five years ago,

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

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

$$\Rightarrow -2x = -20 \Rightarrow x = 10$$

Hence, present age of Ananya = 10 years and
her mother's age = 30 years.

16. Reema's mother is now three times as old as Reema's present age. After 2 years, her mother will be 10 years more than twice Reema's age. Find their present ages. [100RS]

Sol. let the present age of Reema be x years.

and the present age of Reema's mother be $3x$ years.

After 2 years,

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

$$\Rightarrow 3x-2x = 10+4-2$$

$$\Rightarrow x = 12$$

Hence, the present age of Reema = 12 years.

and Her mother's age = $3 \times 12 = 36$ years.

17. Five years ago, Raju was twice as old as Peter. Five years later, his age will be 5 more than Peter's age. Find their present ages.

Sol. let the present age of Raju be x years.

and the present age of Peter be y years.

Five years ago, $(x-5) = 2(y-5)$

$$x-5 = 2y-10$$

$$\Rightarrow x-2y = -5 \text{ --- (1)}$$

Five years later,

$$(x+5) = (y+5) + 5$$

$$x+5 = y+10$$

$$\Rightarrow x = y+5 \text{ --- (2)}$$

from (1) and (2), we get. $y = 10$ and $x = 15$

Hence, Raju's age = 15 years and Peter's age = 10 years.

18. A steamer goes downstream and covers the distance between two ports in 4 hours and covers the same distance upstream in 5 hours. Find the speed of the steamer, if the water is flowing at a speed of 1.5 kmph. [HOTS]

Sol. let the speed of the steamer be x kmph.

$$\text{Distance for downstream} = (x + 1.5) \times 4$$

$$\text{Distance for upstream} = (x - 1.5) \times 5$$

$$\Rightarrow (x - 1.5) \times 5 = (x + 1.5) \times 4$$

$$\Rightarrow 5x - 4x = 6.0 + 7.5$$

$$\Rightarrow x = 13.5$$

Hence, the speed of the steamer 13.5 kmph.

19. A boat takes thrice as much time to cover 40 km up the stream as in going 40 km down the stream. If the speed of the boat is 6 kmph, find the speed at which water is flowing. [HOTS]

Sol. let the speed of water is flowing be x kmph.

$$\text{Time (for upstream)} = 3 \text{Time (for down stream)}$$

$$\Rightarrow \frac{40}{(6-x)} = 3 \times \frac{40}{(6+x)}$$

$$\Rightarrow 6+x = 18 - 3x \Rightarrow 4x = 12$$

$$\Rightarrow x = 3$$

Hence, speed of water is flowing = 3 kmph.

20. A man leaves half of his property to his wife, one-third to his son and the remaining to his daughter. If the daughter's share is ₹ 40,000, find how much money did the man leave. How much did his wife get? What is his son's share?

Sol. let the amount leave by a man be x .

$$\text{His wife's part} = \frac{x}{2}$$

$$\text{His son's part} = \frac{x}{3}$$

$$\begin{aligned}\text{His daughter's part} &= x - \left(\frac{x}{2} + \frac{x}{3}\right) \\ &= x - \frac{5x}{6} = \frac{x}{6}\end{aligned}$$

$$\Rightarrow \frac{x}{6} = ₹ 40,000 \Rightarrow x = ₹ 240,000$$

Therefore, Total money of the man = ₹ 240,000.

$$\begin{aligned}\text{His wife money} &= \frac{₹ 240,000}{2} \\ &= ₹ 120,000\end{aligned}$$

$$\begin{aligned}\text{His Son's share} &= \frac{1}{3} \times ₹ 240,000 \\ &= ₹ 80,000\end{aligned}$$

21. Shipra has three boxes A, B and C. Box A weighs $3\frac{1}{4}$ kg more than box B and box C weighs $2\frac{3}{4}$ kg more than box B. If the total weight of the three boxes is 72 kg, find the weight of box C.

Sol. Let the weight of box B be x kg.

$$\text{Box C weight} = (x + 2\frac{3}{4}) \text{ kg}$$

$$\text{Box A weight} = (x + 3\frac{1}{4}) \text{ kg}$$

$$\therefore x + 3\frac{1}{4} + x + x + 2\frac{3}{4} = 72$$

$$\Rightarrow 3x + \frac{13}{4} + \frac{11}{4} = 72$$

$$\Rightarrow 3x + \frac{24}{4} = 72 \Rightarrow 3x = 72 - 6$$

$$\Rightarrow 3x = 66 \quad \Rightarrow x = 22 \text{ kg.}$$

$$\text{Then, Weight of box C} = (x + 2\frac{3}{4}) \text{ kg}$$

$$= (22 + 2\frac{3}{4}) \text{ kg}$$

$$= 24\frac{3}{4} \text{ kg.}$$

22. A purse has some ₹ 2 coins and ₹ 5 coins. The total value of the coins is ₹ 165. If the number of ₹ 5 coins are 5 more than the ₹ 2 coins, find how many coins of each are there in the purse.

Sol. Let the number of coins ₹ 2 be x .

The number of coins ₹ 5 be $(x+5)$.

$$\Rightarrow 2x + 5(x+5) = 165$$

$$\Rightarrow 2x + 5x + 25 = 165$$

$$\Rightarrow 7x = 165 - 25 \Rightarrow 7x = 140$$

$$\Rightarrow x = 20$$

Therefore, the number of coins of ₹ 2 = 20

and the number of coins of ₹ 5 = 25.



MULTIPLE CHOICE QUESTIONS.

Tick (✓) the correct option :

- If $x - \frac{x}{2} = \frac{7}{2}$, then the value of x is :
 (a) 5 (b) 6 (c) 7 (d) 8
- If $y - \frac{15}{2} = 6$, then the value of y is :
 (a) 27 (b) $\frac{27}{2}$ (c) 13 (d) $\frac{13}{2}$
- The root of the equation $2x + \frac{3}{10} = \frac{-5}{2}$ is :
 (a) $x = \frac{2}{5}$ (b) $x = \frac{5}{2}$ (c) $x = \frac{-5}{5}$ (d) $x = \frac{-7}{5}$
- Solution to the equation $a + 3 = 2(a - 2)$ is :
 (a) $a = -6$ (b) $a = 6$ (c) $a = 7$ (d) $a = 8$
- If $2x - \frac{1}{3} = x - \frac{1}{3}$, then the value of x is :
 (a) 1 (b) -1 (c) 0 (d) 2
- Solution to the equation $5(x - 3) - 4(x - 2) = 0$ is :
 (a) $x = 7$ (b) $x = -7$ (c) $x = 8$ (d) $x = -8$
- If $4m + 3 = 3m - 4$, then the value of m is :
 (a) -7 (b) 7 (c) 8 (d) -8
- If $2x + \frac{3}{4} = \frac{x}{2} + 1$, then the value of x is :
 (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{7}$
- Solution to the equation $\frac{1+x}{1-x} = \frac{3}{2}$, is :
 (a) $x = \frac{1}{5}$ (b) $x = \frac{2}{3}$ (c) $x = -\frac{1}{5}$ (d) $x = -\frac{2}{3}$
- A number whose seventh part exceeds its eighth part by 2, is :
 (a) 58 (b) 56 (c) 64 (d) 68



VALUE BASED QUESTIONS.

- In an examination, a student requires 40% marks to pass
 - If Kishore gets 302 marks and fails by 18 marks, find the total marks.
 - If Sudha gets 85% marks, how many marks does she get?
 - Which qualities does Sudha have?
 - Which qualities are missing in Kishore?

Sol. (a) let the total marks got by Kishore be x .

$$x \times 40\% - 18 = 302$$

$$\Rightarrow \frac{x \times 40}{100} = 302 + 18 = 320$$

$$\Rightarrow x = \frac{320 \times 100}{40} = 800$$

Therefore, Kishore gets 800 marks.

(b) Sudha gets 85% marks

$$\text{Sudha's marks} = \frac{800 \times 85}{100} = 680$$

(c) Sudha is intelligent girl.

(d) Kishore is missing quality to get passing marks.

2. Mukul Raj is a social worker. In his village there was no school building. Mukul donated a rectangular plot of land for school building. The dimensions of the plot are in the ratio 10 : 3. He also donated ₹ 15,600 to fence the plot at ₹ 50 per m.

- What are the dimensions of the plot?
- Find the area of the plot.
- Which value does Mukul Raj depict?

Sol. (a) Let the length of a rectangular plot be x m,
and breadth of a rectangular plot be $3x$

$$\text{Perimeter} = 2(10x + 3x) = 26x \text{ m}$$

$$1 \text{ m fence the plot cost} = ₹ 50$$

$$26x \text{ m fence the plot cost} = ₹ 15600$$

$$x = \frac{15600}{26 \times 50} = 12$$

$$\therefore \text{length} = 10 \times 12 = 120 \text{ m and breadth} = 36 \text{ m}$$

(b) Area = $l \times b = 120 \times 36 = 4320 \text{ m}^2$

MENTAL MATHS

Write T for true and F for false statements :

1. On multiplying both sides of an equation, by a non-zero integer, the equation remains unchanged. T
2. $a^2 - 5a + 4 = 0$ is a linear equation F
3. $4x - 3y + 5$ is a linear equation in two variables. F
4. We can transpose any term of an equation from one side to another. T
5. The root of the equation $7x + 12 = 10x$ is $x = 3$. F
6. If $mx + n = 0$, then $x = -\frac{n}{m}$. T
7. The value of the variable which satisfies the equation is called the root of the equation. T
8. Solution to the equation $\frac{2x}{1+x} = 3$ is $x = 3$. F
9. If $\frac{x}{6} = 2.5$, then, $x = 150$ F
10. If $\frac{x}{2} + 1 = 3 - \frac{x}{2}$, then the value of x is 2. T