

# Equation

Ex-24(1)

1) Solve the following equations:

a)  $2x = 8$

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

∴  $x = 4$

b)  $3x - 1 = 5$

or,  $3x = 5 + 1$

or,  $3x = 6$

or,  $x = \frac{6}{3}$

∴  $x = 2$

c)  $2x - 3 = 9$

or,  $2x = 9 + 3$

or,  $2x = 12$

or,  $x = \frac{12}{2}$  ∴  $x = 6$

d)  $4x - 5 = 15$   
or,  $4x = 15 + 5 = 20$   
or,  $x = \frac{20}{4}$

$\therefore x = 5$

e)  $\frac{x}{2} + 3 = 2$

or,  $\frac{x}{2} = 2 - 3 = -1$

or,  $x = -1 \times 2 = -2$

$\therefore x = -2$

f)  $\frac{x}{3} - 1 = \frac{4}{3}$

or,  $\frac{x}{3} - \frac{4}{3} = 1$

or,  $\frac{x - 4}{3} = 1$

or,  $x - 4 = 1 \times 3 = 3$

or,  $x = 3 + 4 = 7$

$\therefore x = 7$  #

$$g) \frac{x+4}{3} = 2$$

$$\text{or, } x+4 = 2 \times 3$$

$$\text{or, } x = 2 \times 3 - 4$$

$$\therefore x = 2$$

$$h) \frac{4x-1}{7} = 5$$

$$\text{or, } 4x-1 = 5 \times 7$$

$$\text{or, } 4x-1 = 35$$

$$\text{or, } 4x = 35+1$$

$$\text{or, } 4x = 36$$

$$\text{or, } x = \frac{36}{4} = 9$$

$$\therefore x = 9$$

2. Solve the following equation:

$$a) 3x-2 = x+1$$

$$\text{or, } 3x-x-2 = 1$$

$$\text{or, } 2x = 1+2$$

$$\text{or, } 2x = 3 \quad \text{or, } x = \frac{3}{2} \neq$$

$$b) 2x - 5 = 4 - x$$

$$\rightarrow 2x + \overset{x}{5} = 4 + 5$$

$$\text{or, } 3x = 9$$

$$\text{or, } x = \frac{9}{3}$$

$$\therefore x = 3$$

$$c) 8x + 15 = 5x - 3$$

$$\text{or, } 8x - 5x = -15 - 3$$

$$\text{or, } 3x = -18$$

$$\text{or, } x = \frac{-18}{3}$$

$$\therefore x = -6$$

$$d) 16 - 7x = 20 - 3x$$

$$\text{or, } -7x + 3x = 20 - 16$$

$$\text{or, } -4x = 4$$

$$\text{or, } x = \frac{4 - 1}{-4}$$

$$\therefore x = -1$$

$$\begin{aligned} g) \quad & 5(x-1) = 2(x+2) \\ \text{or,} \quad & 5x - 5 = 2x + 4 \\ \text{or,} \quad & 5x - 2x = 4 + 5 \\ \text{or,} \quad & 3x = 9 \\ \text{or,} \quad & x = \frac{9}{3} \end{aligned}$$

$$\therefore x = 3$$

$$\begin{aligned} h) \quad & 3(3x+5) = 4(2x+3) \\ \rightarrow \quad & 9x + 15 = 8x + 12 \\ \text{or,} \quad & 9x - 8x = 12 - 15 \\ \text{or,} \quad & x = -3 \\ \therefore \quad & x = -3 \end{aligned}$$

$$\begin{aligned} i) \quad & \frac{x+1}{2} = \frac{x-2}{3} \\ \text{or,} \quad & (x+1) \times 3 = 2(x-2) \\ \text{or,} \quad & 3x + 3 = 2x - 4 \\ \text{or,} \quad & 3x - 2x = -4 - 3 \\ \text{or,} \quad & x = -7 \\ \therefore \quad & x = -7 \end{aligned}$$

$$\frac{8x+5}{3} = \frac{16-x}{2}$$

$$2(8x+5) = 3(16-x)$$

$$16x+10 = 48-3x$$

$$16x+3x = 48-10$$

$$19x = 38$$

$$x = \frac{38}{19}$$

$$x = 2$$

$$\begin{array}{r} 1 \\ 16 \\ \times 3 \\ \hline 48 \\ 19 \\ \times 2 \\ \hline 38 \end{array}$$

Solve the following questions equations:

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

$$2(x+2) = 5(x-1)$$

$$2x+4 = 5x-5$$

$$2x-5x = -5-4$$

$$-3x = -9$$

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

$$x = 3$$

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

$$\text{or, } 4(x-4) = 1(x+2)$$

$$\text{or, } 4x-16 = x+2$$

$$\text{or, } 4x-x = 2+16$$

$$\text{or, } 3x = 18$$

$$\text{or, } x = \frac{18}{3}$$

$$\therefore x = 6$$

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

$$\text{or, } 3x-1 = 2(2x-3)$$

$$\text{or, } 3x-1 = 4x-6$$

$$\text{or, } 3x-4x = -6+1$$

$$\text{or, } -x = -5$$

$$\therefore x = 5$$

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

$$\text{or, } 5(5x-2) = 3(2+7x)$$

$$\text{or, } 25x-10 = 6+21x$$

$$\text{or, } 25x-21x = 6+10$$

$$\text{or, } 4x = 16 \quad \text{or, } x = \frac{16}{4} \therefore x = 4$$

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

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

$$6x-3 = 4x+6$$

$$6x-4x = 6+3$$

$$\therefore, 2x = 9$$

$$x = 9/2$$

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

$$\frac{5x+9}{3x+5} = \frac{7}{4}$$

$$4(5x+9) = 7(3x+5)$$

$$20x+36 = 21x+35$$

$$20x-21x = 35-36$$

$$-x = -1$$

$$x = 1$$

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

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

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

$$\text{or, } \frac{2x}{3} - \frac{x}{2} = 6$$

$$\text{or, } \frac{4x - 3x}{6} = 6$$

$$\text{or, } x = 6 \times 6$$

$$\therefore x = 36$$

$$h) \frac{x}{1} + \frac{5x}{12} = \frac{x}{6} + \frac{2x}{3} + 14$$

$$\text{or, } \frac{12x + 5x}{12} = \frac{x + 4x}{6} + 14$$

$$\text{or, } \frac{17x}{12} = \frac{5x}{6} + 14$$

$$\text{or, } \frac{17x}{12} - \frac{5x}{6} = 14$$

$$\text{or, } \frac{17x - 10x}{12} = 14$$

$$\text{or, } 7x = 14 \times 12$$

$$\text{or, } x = \frac{14 \times 12}{7}$$

$$\therefore x = 24 \#$$

$$\begin{array}{r} 3 \overline{) 6} \\ 2 \overline{) 2} \\ 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 12} \\ 2 \overline{) 6} \\ 3 \overline{) 3} \\ 1 \end{array}$$

4. (a) If one no. is greater than the other by 5 and their sum is 41, find the two numbers.

→ Soln

Let the numbers be  $x$  &  $y$ .

$$y = x + 5 \quad \text{--- eqn(I)}$$

$$x + y = 41 \quad \text{--- eqn(II)}$$

$$x + x + 5 = 41$$

Substituting the value of  $y$  in eqn(II),

$$x + (x + 5) = 41$$

$$\text{or, } x + x + 5 = 41$$

$$\text{or, } 2x = 41 - 5$$

$$\text{or, } 2x = 36$$

$$\text{or, } x = \frac{36}{2} = 18$$

Substituting the value of  $x$  in eqn(I),

$$y = 18 + 5 = 23$$

$$\therefore x = 18 \text{ and } y = 23 \#$$

b) If one number is less than the other by 4 and their sum is 20, find the two numbers.

→ Sol<sup>n</sup>,

Let the numbers be  $x$  and  $y$ .

$$y = x - 4 \text{ ————— eqn(I)}$$

$$x + y = 20 \text{ ————— eqn(II)}$$

Substituting the value of  $y$  in eqn(II),

$$x + (x - 4) = 20$$

$$\text{or, } x + x - 4 = 20$$

$$\text{or, } 2x = 20 + 4$$

$$\text{or, } x = \frac{20+4}{2} = \frac{24}{2} = 12$$

Substituting the value of  $x$  in eqn(I),

$$y = 12 - 4 = 8$$

$$\therefore x = 12 \text{ and } y = 8$$

c) There are 32 students in class VIII. If the number of boys is greater than the number of girls by 6, find the no. of boys in class VIII.

→ Soln

Let the no. of boys be  $x$  and that of girls be  $y$ .

$$x + y = 32 \text{ — eqn(I)}$$

$$x = 6 + y \text{ — eqn(II)}$$

Substituting the value of  $x$  in eqn(I),

$$2(6 + y) + y = 32$$

$$\text{or, } 6 + y + y = 32$$

$$\text{or, } 2y = 32 - 6$$

$$\text{or, } y = \frac{26}{2} = 13$$

$$\text{or, } y = 13$$

Substituting the value of  $x$  in eqn(II),

$$x = 6 + 13 = 19$$

$$\therefore x = 19 \text{ and } y = 12$$

18  
12  
28

- d) Priti purchased a gel pen and a copy. The price of the copy is higher than that of a gel pen by Rs. 25. If the bill of the pen and the copy amounts to Rs. 165, find the price rate of the pen and the copy.

→ Soln,

Let the price of gel pen be  $x$  and that of copy be  $y$ .

$$y = x + 25 \text{ — eqn(I)}$$

$$x + y = \text{Rs. } 165 \text{ — eqn(II)}$$

Substituting the value of  $y$  in eqn(II),

$$x + (x + 25) = 165$$

$$\text{or, } 2x + 25 = 165$$

$$\text{or, } 2x = 165 - 25$$

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$$\text{or, } x = \frac{740 \times 70}{21} = 70$$

Substituting the value of  $x$  in eqn.(1).

$$y = 70 + 25 = 95$$

$$\therefore x = \text{Rs. } 70 \text{ \& } y = \text{Rs. } 95.$$

In an examination of class VIII, 92% of the students passed. But 4 students failed, how many students are there in the class.

Soln,

Let the total no. of students be  $x$ .

$$\begin{aligned} \text{No. of students who passed} &= 92\% \text{ of } x \\ &= \frac{92}{100} \times x \\ &= \frac{23x}{25} \end{aligned}$$

$$\begin{aligned}
 \text{Total no. of students} &= \frac{23x}{25} + \frac{4}{1} \\
 &= \frac{23x + 100}{25} \\
 &= \frac{123x}{25}
 \end{aligned}$$

Now,

$$\frac{x}{1} - \frac{23x}{25} = 4$$

$$\text{or, } \frac{25x - 23x}{25} = 4$$

$$\text{or, } 2x = 4 \times 25$$

$$\text{or, } 2x = 100$$

$$\text{or, } x = \frac{100}{2}$$

$$\therefore x = 50.$$

$\therefore$  50 students were in the class.

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- b. The breadth of a rectangular garden is less than its length by 20m. If the perimeter of the garden is 200m, find the length and the breadth of the garden.

→ Soln,

~~Per~~

Let the length & breadth be  $l$  &  $b$  respectively.

$$l = b + 20 \quad \text{--- eqn(I)}$$

$$2(l + b) = 200 \text{m} \quad \text{--- eqn(II)}$$

Now,

$$2(l + b) = 200$$

$$\text{or, } l + b = \frac{200}{2} = 100$$

$$\text{or, } l(l - 20) = 100$$

$$\text{or, } 2l - 20 = 100$$

$$\text{or, } 2l = 120$$

$$\text{or, } l = \frac{120}{2} = 60$$

$$\therefore l = 60 \text{m}$$

$$\therefore b = l - 20 = 60 - 20 = 40 \text{m}$$

g) The length and the breadth of the tennis court is in the ratio 5:3. If its perimeter is 128m. Find the length and the breadth.

→ Soln,

Let  $5x$  &  $3x$  be the length & breadth of the room respectively.

$$P = 2(l+b)$$

$$\text{or, } \frac{64}{2} = \frac{128}{2} = \frac{2(5x+3x)}{2}$$

$$\text{or, } 64\text{m} = 8x$$

$$\text{or, } \frac{64\text{m}}{8} = \frac{8x}{8}$$

$$\therefore x = 8\text{m}$$

$$\therefore \text{length} = 5x = 5 \times 8 = 40\text{m}$$

$$\therefore \text{breadth} = 3x = 3 \times 8 = 24\text{m} \quad \#$$

h)  $\frac{1}{5}$  of the length of the stick is painted

red & the rest white. What is the length of the stick if the length of the stick

which is painted white is 48cm?

→ Soln,

Here,

Let the length of stick be  $x$ .

$$\text{Red} = \frac{1}{5} \text{ of } x = \frac{x}{5}$$

$$\text{White} = 48 \text{ cm}$$

Now,

$$\frac{x}{1} - \frac{x}{5} = 48 \text{ cm}$$

$$\text{or, } \frac{5x - x}{5} = 48 \text{ cm}$$

$$\text{or, } \frac{4x}{5} = 48 \text{ cm}$$

$$\text{or, } 4x = 48 \times 5 \text{ cm}$$

$$\text{or, } x = \frac{48 \times 5}{4} \text{ cm}$$

$$\therefore x = 60 \text{ cm}$$

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i) The sum of the ages of the mother and her daughter is 36 years. If the mother is 24 years older than her daughter, find their present ages.

→ Soln

Here,

Let the ages of mother and daughter be  $x$  and  $y$  respectively.

$$x + y = 36 \text{ years} \text{ --- eqn (I)}$$

$$x = y + 24 \text{ --- eqn (II)}$$

Now,

$$\cancel{x} + y + 24 + y = 36 \text{ years}$$

$$\text{or, } 2y = 36 - 24$$

$$\text{or, } 2y = 12$$

$$\text{or, } y = \frac{12}{2} = 6$$

$$\therefore \cancel{x} = 6$$

Substituting the value of  $y$  in eqn(11)

$$x = 6 + 24 = 30$$

∴  $x = 30$  years &  $y = 6$  years.

5 years ago, the age of the father is three times the age of his son. The sum of their present ages is 58 years, what are their present ages?

Soln

Here,

If age of the son 5 years ago =  $x$  years  
Then the age of the ~~mother~~ father 5 years ago =  $3x$

Present age of son =  $(x+5)$  years

Present age of father =  $(3x+5)$  years

By given,

$$x+5 + 3x+5 = 58$$

$$\text{or, } 4x + 10 = 58$$

$$\text{or, } 4x = 58 - 10 = 48$$

$$\text{or, } x = \frac{48}{4} = 12 \quad \therefore x = 12$$

Now,

$$\begin{aligned}\text{present age of the father} &= 3x + 5 \\ &= 3 \times 12 + 5 \\ &= 41 \text{ years}\end{aligned}$$

$$\begin{aligned}\text{Present age of the son} &= x + 5 \\ &= 12 + 5 = 17 \text{ years.}\end{aligned}$$

B

k) The present age of the father is twice ~~and~~ the age of his daughter. Ten years ago, the difference of their ages was 20 years, find their present ages.

→ Sol<sup>n</sup>,

$$\text{If The present age of the father} = 3x + 10$$

$$\text{then the present age of the daughter} = x + 10$$

$$\text{the age of the father ten years ago} = 3x - 10$$

$$\text{the age of the daughter ten years ago} = x - 10$$

Now,

$$(3x - 10) - (x - 10) = 20$$

$$\text{or, } 3x - 10 - x + 10 = 20$$

$$\text{or, } 2x = 20$$

$$\text{or, } x = \frac{20}{2} = 10$$

The present age of the daughter ~~son~~ =  $x+10$   
 $= 10+10$

$= 20$  years

The present age of the father =  $3x+10$

$$= 3 \times 10 + 10$$

$$= 30 + 10$$

$$= 40 \text{ years.}$$

2. The difference of the ages of the father & his son is 26 years. 5 years later, the age of the father will be three times that of his son. Find their present ages.

→ Soln, Here,

If the ages of the <sup>son</sup> ~~father~~ 5 years later =  $x+5$

then the age of the father 5 years later =  $3x$

If the age of the son [present] =  $x-5$

then the present age of the father =  $3x-5$

Now,

$$(3x-5) - (x-5) = 26$$

$$\text{or, } 3x - 5 - x + 5 = 26$$

$$\text{or, } 2x = 26$$

$$\text{or, } x = \frac{26}{2} = 13$$

$$\begin{aligned} \therefore \text{Present age of son} &= x-5 \\ &= 13-5 \\ &= 8 \text{ years} \end{aligned}$$

$$\begin{aligned} \therefore \text{Present age of father} &= 3x-5 \\ &= 3 \times 13-5 \\ &= 39-5 \\ &= 34 \text{ years} \end{aligned}$$

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