Chapter -2

First Degree Equation in One Variable

V7T5P7

2.1 Teacher asked students to give examples of some algebraic expression. Let us see what are the examples given by the students.

x, $y + 3$, $3y - 11$,

$x^2 + 3$, $2m - \frac{11}{6}$, $3x + 4y$,

$x^2 - 5x + 6$, $p^3 + 3p^2 - 8$, $5l + 7m - 11$,

$3x^2 - 7y + 8z$, $ax + b$, $px^3 + qy + 4$,

$6x - 7y + 5z$

The teacher prepares two tables from the expressions

Table- 1	Table- 2
x, $y + 3$, $3y - 11$, $x^2 + 3$	$3x + 4y$, $5l + 7m - 11$
$2m - \frac{11}{6}$, $x^2 - 5x + 6$,	$3x^2 - 7y + 8z$, $px^3 + qy + 4$
$p^3 + 3p^2 - 8$, $ax + b$	$6x - 7y + 5z$

The teacher asks the students to pay attention to these tables and asks the following questions-

Teacher : Are there any similarity among the expressions given in Table-1?

Ramen : The number of variables in each expression is 1.

Teacher : Can you say what are the variables used?

Nisha : x, y, m and p

Teacher : Can there be any other variable ?

Rubina : Yes Sir, For example, z and t are two variables in the algebraic expressions $5z - 8$ and $9t - 17$ respectively.

Teacher : Is there any difference between Table - 1 and Table-2 ?

Nafisa : Expressions in Table -2 have two variables.

Teacher : Are there two variables in each expressions?

Jeni : No Sir, some expressions have more than two variables.

Teacher : Good. Expressions in Table-1 are algebraic expressions consisting of one variable Expressions in Table-2 are algebraic expressions consisting of more than one variable i.e algebraic expressions may have one or more than one variable.

Then the teacher asks the students to look into the powers of algebraic expressions. In expression $x^2 - 5x + 6$, x is the base and 2 is the power in the term x^2. We read x^2 as second degree in x. In p^3, p is the base and 3 is the power. We read p^3 as third degree in p etc.

x^{2} → powers
↓
base

Teacher : Can you say the highest powers of the variables of the algebraic expressions in Table-1.

Rumi : The highest power of x is 1
The highest power of y in $y + 3$ is 1
The highest power of x in $x^2 - 5x + 6$ is 2
The highest power of p in $p^3 + 3p^2 - 8$ is 3

Teacher : The highest power of the variable of an algebric expression is called the **Degree** of the expression. Can you select the algebraic expressions of first degree from table-1?

Dixita : Yes Sir, x, $y + 3$, $2m - \frac{11}{6}$, $ax + b$

Teacher : Such expressions are called algebraic expressions of first degree in one variable. Can you select the algebraic expressions of first degree in one variable from Table-2?

Nisha : No Sir, because here numbers of variables in each expression is more than one.

Teacher : You are right. We cannot find algebraic expressions of first degree in one variable here. But, we can find here algebraic expressions of first degree in two or more variables. For example $3x + 4y$, $5l + 7m - 11$, $6x - 7y + 5z$

Activity : You form groups of 3-4 students. Each group should write 10 examples of algebraic expressions. Try to select algebraic expressions of first degree in one variable from these examples.

2.2 First degree equation in one variable

An algebraic representation of a problem is called an **equation**. Already you have got $3x–7 = 9$, $y–9 = 16$, $4z + 7 = 27$ in your previous class. These are all equations

$3x - 7 = 9$ — x ↑ variable, $=$ ↑ equality

$4z + 7 = 27$ — z ↑ variable, $=$ ↑ equality

Such equations are the examples of equation of first degree in one variable. For example–

(i) $2x = 12$

(ii) $3x = x+5$

(iii) $ax + b = c$, where a, b, c are constants

(iv) $5m = p^2$, where p is a constant

(v) $2y - 7 = 8y$ etc.

Try yourself

Select equations of first degree in one variable from the following equations (a,b,c,p and q are constants).

(i) $5x + 3y - 7 = 9$ (ii) $5m - 8 = 0$ (iii) $5 = 3l$

(iv) $x^2 - 9y + 11 = 9$ (v) $ax^2 + bx + c = 0$ (vi) $px + q = 10$

(vii) $a^2x + b = 0$ (viii) $ax^2 + b = 0$ (ix) $y = 0$

(x) $z = p^3$ (xi) $3y + 8 = 3y - 2$ (xii) $5z = -z + 6$

2.3 Solution of equations of first degree in one variable

Already you have learnt that for a definite value of the variable, left hand side of an equation of first degree becomes equal to right hand side of the equation. That value of the variable is known as the **solution** of the equation.

The act of finding that value of the variable is termed as solving the equation.

Moreover, in class VII you have learnt that in solving an equation, terms containing the variable are kept in left hand side and the other terms are kept in right hand side by method of transposition. For this, we apply the following processes (if necessary)

(i) Addition of same number to both sides

(ii) Subtraction of same number from both sides

(iii) Multiplication of both sides by same number

(iv) Division of both sides by same non-zero number

Observe the following examples :

Example 1 : Solve $x - 3 = 6$

Solution : $x - 3 = 6$

or, $x - 3 + 3 = 6+3$ [Adding 3 to both sides]

or, $x = 9$

Required solution : $x = 9$

Example 2 : Solve $\frac{y}{7} = 2$

Solution : Multiplying both sides by 7

$$\frac{y}{7} \times 7 = 2 \times 7$$

or, $y = 14$

Example 3 : Solve $\frac{3x}{4} + 3 = 5$

Solution : $\frac{3x}{4} + 3 - 3 = 5 - 3$ [Subtracting 3 from both sides]

or, $\frac{3x}{4} = 2$

or, $\frac{3x}{4} \times 4 = 2 \times 4$ [Multiplying both sides by 4]

or, $3x = 8$

or, $\frac{3x}{3} = \frac{8}{3}$ [Dividing both sides by 3]

or, $x = \frac{8}{3}$

Example 4 : Solve $3x + 4 = 22$

Solution : To keep the unknown quantity in the left hand side and to maintain the equality of the equation, we subtract 4 from both sides

$$3x + 4 - 4 = 22 - 4$$

or, $3x = 18$

The unknown quantity x in the left hand side is multiplied with 3. So, to find the value of x, we divide both sides by 3.

$$\frac{3x}{3} = \frac{18}{3}$$

or, $x = 6$

Example 5 : Solve $6x - 8 = 20$

Solution : Adding 8 to both sides

$$6x - 8 + 8 = 20 + 8$$

or, $6x = 28$

$$\text{or, } \frac{6x}{6} = \frac{28}{6} \qquad \text{[Dividing both sides by 6]}$$

$$\text{or, } x = \frac{28}{6}$$

$$\text{or, } x = \frac{28 \div 2}{6 \div 2} \qquad \text{[2 is the HCF of 28 and 6]}$$

$$= \frac{14}{3}$$

Uptill now, you come across five examples and in each of these examples the value of the unknown quantity has been obtained.

Example 6 : Let us check the correctness of the solution of Example : 4.

Solution : Putting 6 for x in the left hand side of the given equation, we get

$$\begin{aligned} \text{LHS} &= 3x + 4 \\ &= 3 \times 6 + 4 \\ &= 18 + 4 \\ &= 22 \\ &= \text{RHS} \end{aligned}$$

$\therefore$ 6 is the solution of $3x + 4 = 22$

Example 7 : Is $\frac{14}{3}$ the solution of $6x - 8 = 20$?

Solution : Putting $\frac{14}{3}$ for x in the left hand side of the given equation, we get

$$\begin{aligned} \text{LHS} &= 6x - 8 \\ &= 6 \times \frac{14}{3} - 8 \\ &= 2 \times 14 - 8 \\ &= 28 - 8 = 20 = \text{RHS} \end{aligned}$$

$\therefore$ $\frac{14}{3}$ is the solution of $6x - 8 = 20$

Example 8 : Is 9 the solution of $2x - 3 = x + 6$

Solution : Putting $x = 9$ in LHS and RHS of the given equation, we get

$\text{LHS} = 2x - 3$	$\text{RHS} = x + 6$
$= 2 \times 9 - 3$	$= 9 + 6$
$= 18 - 3$	$= 15$
$= 15$	

It is seen that LHS = RHS

$\therefore$ $x = 9$ is the solution of $2x - 3 = x + 6$

Example 9 : Is 3 the solution of $2x - 3 = 5 - x$?

Solve : Putting $x = 3$ in the LHS and RHS of given equation, we get

LHS $= 2x - 3$		RHS $= 5 - x$
$= 2 \times 3 - 3$		$= 5 - 3$
$= 6 - 3$		$= 2$
$= 3$		

$\because$ LHS $\neq$ RHS.

$\therefore$ 3 is not the solution of $2x - 3 = 5 - x$.

You find the correct solution of the equation and verify it.

Example 10 : Solve $\frac{3}{4}x + 5 = 15 - 3x$

Solution : $\frac{3}{4}x + 5 = 15 - 3x$

or, $\frac{3}{4}x + 3x + 5 = 15$

[Notice that when $-3x$ in RHS is transfered to LHS, it become $+3x$ i.e when a term on one side of '=' sign is transfered to the other side, the positive term becomes negative and negative term becomes positive]

or, $\left(\frac{3}{4} + 3\right)x + 5 = 15$

or, $\left(\frac{3+12}{4}\right)x + 5 = 15$

or, $\frac{15x}{4} + 5 = 15$

or, $\frac{15x}{4} = 15 - 5$ [5 in LHS when transfered to RHS becomes –5]

or, $\frac{15x}{4} = 10$

or, $15x = 10 \times 4$ [Multiplying both sides by 4]

or, $15x = 40$

or, $x = \frac{40}{15}$ [Dividing both sides by 15]

or, $x = \frac{8}{3}$

In this solution, it is seen that,

> When a term of one side is transfered to other side of '=' sign, then the term changes its sign i.e '+' sign becomes '–' sign and '–' sign becomes '+' sign.
>
> Thus, the process of solving an equation by transferring a term or expression from one side to another side by changing its sign is known as the **process of transposition**.

Let us understand the process of transposition with the help of some examples.

Example 11 : Solve $2(x-3)=\frac{3}{5}(x+4)$

Solution : $2(x-3)=\frac{3}{5}(x+4)$

or, $5\times 2\ (x-3)=3\ (x+4)$

or, $10\ (x-3)=3(x+4)$

or, $10x-30=3x+12$

or, $10x-3x=12+30$

or, $7x=42$

or, $x=\frac{42}{7}$

or, $x=6$

$\therefore$ Required solution is $x=6$

Verification :

LHS $=2(x-3)$	RHS $=\frac{3}{5}(x+4)$
$=2(6-3)$	$=\frac{3}{5}(6+4)$
$=2\times 3$	$=\frac{3}{5}\times 10=3\times 2=6$
$=6$	

$\because$ LHS $=$ RHS

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

Example 12 : Solve $\frac{y}{5}+\frac{y-2}{3}=2$

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

or, $\frac{3\times y}{3\times 5}+\frac{5\times(y-2)}{5\times 3}=2$

or, $3y + 5(y - 2) = 2 \times 15$

or, $3y + 5y - 10 = 30$

or, $8y - 10 = 30$

or, $8y = 30 + 10$

or, $y=\frac{40}{8}$

or, $y = 5$

Activity Verify the above example

Example 13 : Solve $\frac{2}{3}a = \frac{3}{8}a + \frac{7}{12}$

Solution : Multiplying both sides by 24

or, $24 \times \frac{2}{3}a = 24 \times \frac{3}{8}a + 24 \times \frac{7}{12}$ [24 is the LCM of 3, 8 and 12]

or, $8 \times 2a = 3 \times 3a + 2 \times 7$

or, $16a = 9a + 14$

or, $16a - 9a = 14$

or, $7a = 14$

or, $a=\frac{14}{7}$

or, $a = 2$

Example 14 : Solve $2-\frac{1}{3}\left[3x-3-\frac{1}{4}\{7x+7-(5x-5)\}\right]=11-2x$

Solution : $2-\frac{1}{3}\left[3x-3-\frac{1}{4}\{7x+7-(5x-5)\}\right]=11-2x$

or, $2-\frac{1}{3}\left[3x-3-\frac{1}{4}\{7x+7-5x+5\}\right]=11-2x$

or, $2-\frac{1}{3}\left[3x-3-\frac{1}{4}\{2x+12\}\right]=11-2x$

or, $2-\frac{1}{3}\left[3x-3-\frac{1}{2}x-3\right]=11-2x$

or, $2-\frac{1}{3}\left[3x-\frac{1}{2}x-3-3\right]=11-2x$

or, $2-\frac{1}{3}\left[\frac{5}{2}x-6\right]=11-2x$

or, $2-\frac{5}{6}x+2=11-2x$

or, $-\frac{5}{6}x+4=11-2x$

or, $-\frac{5}{6}x+2x=11-4$

or, $(-\frac{5}{6}+2)x=7$

or, $(\frac{-5+12}{6})x=7$

or, $\frac{7}{6}x=7$

or, $x=7\div\frac{7}{6}$

or, $x=7\times\frac{6}{7}$

or, $x=6$

Example 14 : Solve $\frac{5x+4}{2x-10}=\frac{3}{7}$

Solution : Transfering the expression $(2x-10)$ from LHS to RHS

$$5x+4=(2x-10)\times\frac{3}{7}$$

Multiplying both sides by 7

or, $7 \times (5x + 4) = (2x - 10) \times 3$

or, $35x + 28 = 6x - 30$

or, $35x = 6x - 30 - 28$

or, $35x = 6x - 58$

or, $35x - 6x = -58$

or, $29x = -58$

or, $x = -\frac{58}{29}$

$x = -2$

2.4 It can be obtained directly by method of cross-multiplication

You are familiar from the chapter on ratio-proportion that if $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$

Similarly in the case of algebraic expression, if $\frac{A}{B} = \frac{C}{D}$. then, AD = BC

Therefore, from above equation $\frac{5x+4}{2x-10} = \frac{3}{7}$, we can solve it by writing directly $7(5x+4) = 3(2x-10)$.

This method is known as **cross multiplication method**.

Example 14 : Solve $\frac{8p-5}{2p-3} = \frac{2}{3}$

Solution : $\frac{8p-5}{2p-3} = \frac{2}{3}$

or, $3 \times (8p - 5) = 2 \times (2p - 3)$ [by method of cross-multiplication.]

or, $24p - 15 = 4p - 6$

or, $24p - 4p = -6 + 15$ [by transposing –15 and 4*p*]

or, $20p = 9$

or, $p = \frac{9}{20}$

Exercise 2.1

1. Solve the following equations :

(i) $4x + 5 = 21$ (ii) $17y - 3 = 48$ (iii) $-8 + 2x = -4$

(iv) $\frac{6x}{7} = 42$ (v) $\frac{6y}{11} = \frac{54}{99}$ (vi) $3x = 180 + 6x$

(vii) $2x + 3 = x + 4$ (viii) $2 - 5x = 3x - 9$ (ix) $5(p - 3) = 3(p + 2)$

(x) $\frac{3}{4y} = -9$ (xi) $\frac{4x}{5} + 1 = \frac{7}{15}$ (xii) $\frac{17x}{3} - \frac{16}{9} = 2$

2. In the following equations, some values of the variable are associated with each equation. Determine which value of the variable is the solution of that equation.

(i) $2x - 4 = 0$; $x = 1, 2, -2$ (ii) $11y + 5 = -6$; $y = 0, 1, -1$

(iii) $\frac{3y}{5} = 3$; $y = 3, -3, 5$ (iv) $x + 5 = 7 - x$; $x = 1, -1, 2$

(v) $2x + \frac{1}{3} = 1$; $x = \frac{1}{-2}, \frac{1}{2}, \frac{1}{3}$ (vi) $10p - 4 = 4(2p + 1)$; $p = 2, 4, -4$

3. Solve the following equations and verify the result :

(i) $\frac{x}{3} - \frac{x-1}{2} = 1$ (ii) $\frac{n}{6} - \frac{2}{3} = \frac{n}{3} + \frac{5}{6}$

(iii) $2x + 7 - \frac{6x}{5} = 10 - \frac{5x}{2}$ (iv) $\frac{2y}{5} - \frac{3}{2} = \frac{y}{2} + 1$

(v) $\frac{x}{7} + \frac{x-4}{3} = 2$ (vi) $\frac{2x + (3x+1) + (4x+2)}{3} = 13$

(vii) $\frac{x-3}{2} - \frac{x-1}{5} = \frac{2x-3}{5}$ (viii) $0.25(5x - 4) = 0.05(10x - 5)$

(ix) $0.5y + \frac{5y}{6} = 21 + 0.75y$ (x) $\frac{10x+7}{4x} = 2$

(xi) $\frac{x-9}{x-4} = \frac{2}{3}$ (xii) $\frac{2y-3}{2y} = -\frac{1}{8}$

(xiii) $\frac{p}{2p+6} = \frac{3}{8}$ (xiv) $\frac{5x+2}{6x-2} = \frac{2}{3}$

(xv) $\frac{3(2+x) - 5(2x-3)}{5-3x} = 9$ (xvi) $\frac{0.4b - 2}{1.5b + 15} = \frac{2}{3}$

2.5 Application of first degree equation in one variable

Let us learn the technique of solving some problems in practical situation by forming equation in one variable.

Example 1 : When 10 is added to 5 times a number, it becomes 65. What is the number?

Solution : Let the number be x

5 times of the number = $5x$

Adding 10 to $5x$, we get $(5x + 10)$

By question $(5x + 10)$ is equal to 65.

Therefore, we obtain the equation as $5x + 10 = 65$.

To find the value of x, we must solve the equation.

$5x + 10 = 65$

or, $5x = 65 - 10$

or, $5x = 55$

or, $x = 11$

$\therefore$ Required number is 11

Example 2 : The present age of father is 4 times, that of Kabita. After 8 years, the sum of their ages will be 86 years. Find their present ages.

Solution : Let the present age of Kabita = x years

$\therefore$ Present age of her father = $4x$ years

After 8 years, age of Kabita = $(x + 8)$ years

and age of father = $(4x + 8)$ years

By question, $(x + 8) + (4x + 8) = 86$

or, $x + 8 + 4x + 8 = 86$

or, $x + 4x + 8 + 8 = 86$

or, $5x + 16 = 86$

or, $5x = 86 - 16$

or, $5x = 70$

or, $x = \frac{70}{5}$

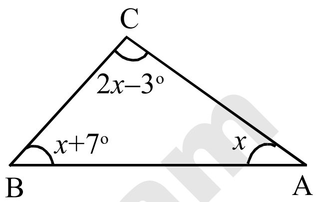
or, $x = 14$

$\therefore$ Present age of Kabita is 14 years

and present age of her father is $4 \times 14 = 56$ years

Example 3 : In ΔABC, the measure of $\angle B$ is 7° more than that of measure of $\angle A$ and the measure of $\angle C$ is 3° less than that of twice the measure of $\angle A$. Find the measure of each angles.

Solution : Let, the measure of $\angle A = x$



$\therefore$ the measure of $\angle B = x + 7^\circ$

and the measure of $\angle C = 2x - 3^\circ$

$\because$ The sum of three angles of a triangle is 180°

$\therefore$ $x + (x + 7) + (2x - 3) = 180$

or, $x + x + 7 + 2x - 3 = 180$

or, $x + x + 2x + 7 - 3 = 180$

or, $4x + 4 = 180$

or, $4x = 180 - 4$

or, $4x = 176$

or, $x = \dfrac{176}{4}$

or, $x = 44$

$\therefore$ Measure of $\angle A = 44^\circ$

Measure of $\angle B = x^\circ + 7^\circ$

$= 44^\circ + 7^\circ$

$= 51^\circ$

and Measure of $\angle C = 2x^\circ - 3^\circ$

$= 2 \times 44^\circ - 3^\circ$

$= 88^\circ - 3^\circ$

$= 85^\circ$

Example 4 : The sum of the digits of a two digit number is 5. If the digits are interchanged, the new number is 27 more than the original number, find the original number.

Solution : Let, the digit in unit's place be x

$\therefore$ Digit in ten's place $= 5 - x$

Then, the number $= 10 \times (5 - x) + x$

Remember
$54 = 5 \times 10 + 4$
$95 = 9 \times 10 + 5$

If the places of the digits are interchanged, the new number $= 10x + (5 - x)$

Given that new number is 27 more than the original number

$\therefore$ $10 \times (5 - x) + x + 27 = 10 \times x + (5 - x)$

or, $50 - 10x + x + 27 = 10x + 5 - x$

or, $-9x - 9x = 5 - 77$

or, $-18x = -72$

or, $x = \frac{72}{18}$

or, $x = 4$

$\therefore$ Digit in unit's place = 4

and digit in ten's place = 5 – 4 = 1

$\therefore$ Original number $= 1 \times 10 + 4$

$= 10 + 4$

$= 14$

Example 5 : $\frac{1}{4}$ part of a rod is in mud, its half is in water and 0.75 m is above the water. Find the length of the rod.

Solution : Let, the length of the rod be x metre

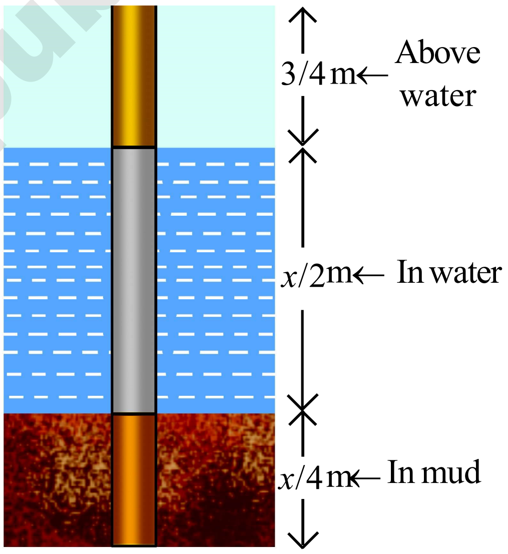
$\therefore$ portion in mud $= \frac{x}{4}$ metre

and portion in water $= \frac{x}{2}$ metre

portion above water $= 0.75$ metre

$= \frac{75}{100}$ metre

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



By question, $\frac{x}{4} + \frac{x}{2} + \frac{3}{4} = x$

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

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

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

or, $\frac{-x}{4} \times (-4) = -\frac{3}{4} \times (-4)$

or, $x = 3$

$\therefore$ Length of the rod = 3 metre.

Example 6 : Ratio of present ages of two sisters Oli and Mili is 5 : 4, 6 years ago, ratio of their ages was 3 : 2. Find their present ages.

Solution : Let, the present ages of Oli and Mili be $5x$ years and $4x$ years respectively.
6 years ago, age of Oli was $(5x - 6)$ years
and age of Mili was $(4x - 6)$ years

$\because$ Ratio of their ages 6 years ago is 3 : 2, so we can form the equation as

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

or, $2(5x - 6) = 3(4x - 6)$
or, $10x - 12 = 12x - 18$
or, $10x = 12x - 18 + 12$
or, $10x - 12x = -6$
or, $-2x = -6$
or, $2x = 6$ [Multiplying both sides by (-1)]

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

$\therefore$ Present age of Oli $= (5 \times 3)$ years = 15 years
Present age of Mili $= (4 \times 3)$ years = 12 years

Example 7 : The numerator of a fraction is 5 more than its denominator. If 4 is added to both numerator and denominator, then the fraction becomes $\frac{6}{5}$. Form an equation to determine the fraction.

Solution : Let, the denominator of the fraction be x

$\therefore$ numerator of the fraction $= x + 5$

$\therefore$ Fraction $= \frac{x+5}{x}$

Given that, if 4 is added to each numerator and denominator, the fraction becomes $\frac{6}{5}$

$\therefore$ The required equation will be

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

or, $\dfrac{x+9}{x+4} = \dfrac{6}{5}$

or, $5(x + 9) = 6(x + 4)$

or, $5x + 45 = 6x + 24$

or, $5x - 6x = 24 - 45$

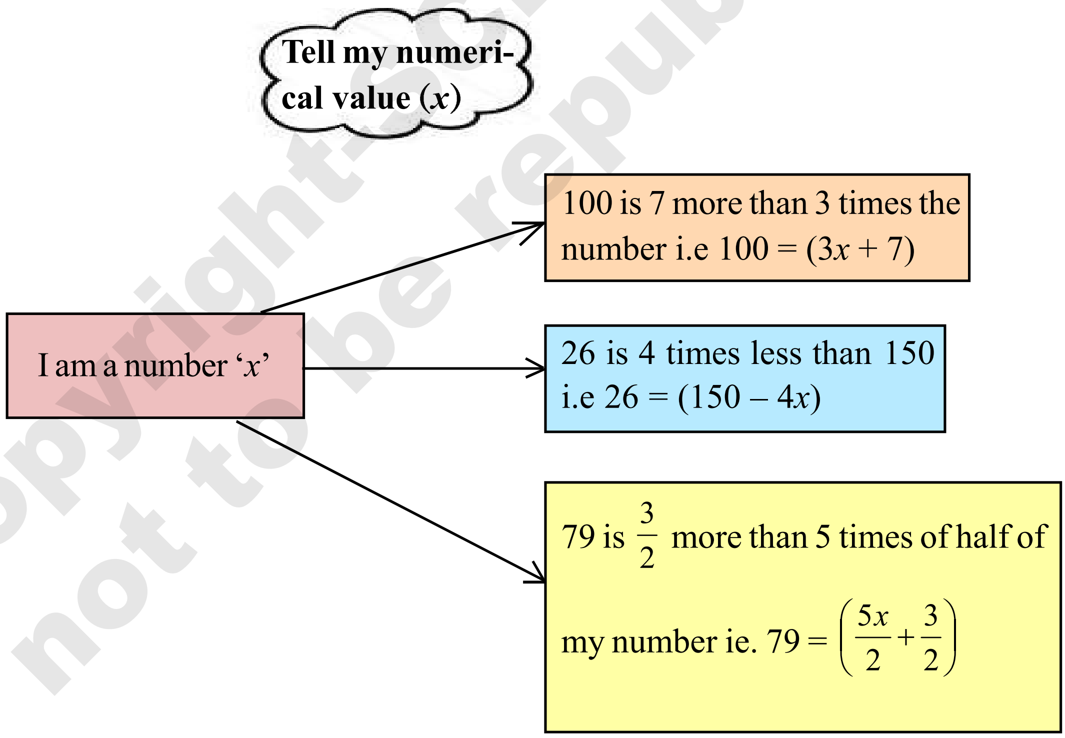
or, $-x = -21$

or, $x = 21$

$\therefore$ Denominator of the fraction = 21

Numerator of the fraction = $x + 5 = 21 + 5 = 26$

$\therefore$ Fraction is = $\dfrac{26}{21}$



Exercise 2.2

Solve the following :

1. Two numbers are in the ratio 5 : 7. The smaller number is 12 less than the larger number. Find the numbers.
2. Sum of three consecutive even numbers is 48. Find the numbers.
3. Divide Rs 17500 among three persons in the ratio 1 : 2 : 4. Find the amount that each person will get.
4. The perimeter of a rectangular play ground is 280 meter and its length is 2 meters more than twice its breadth. Find the length and breadth of the play ground.
5. The unit's place digit of a two digit number is 5. The number is 5 times the sum of the digits. Find the number.
6. The length of first side of a scalene triangle is 2 cm more than that of third side and the length of second side is 5 cm less than twice that of the third side. If the perimeter of the triangle is 29 cm, determine the length of the sides of the triangle.
7. Six times of a number is same as three times of a number obtained by adding 12 to the number. Find the number.
8. Sum of three consecutive natural numbers is 45. Find the numbers.
9. Sum of three integers in ascending order when multiplied by 2, 3 and 4 respectively is 119. Find the numbers.
10. After 20 years, age of Smita will be 4 years less than 5 times of her present age. What is Smita's present age?
11. Present age of Raj is twice that of Rashmi 10 years ago, his age was three times the age of Rashmi. Find their present ages.
12. Ranu took a 500 Rupee note to a shop for change. The shopkeeper gives her a total of 19 notes of Rs 50 and Rs 20. How many notes of each was Ranu paid?
13. The price of each ticket of a drama show is Rs 100 for children and Rs 250 for adults. Rs 8600 is collected from 50 persons by selling tickets. How many of them are children?
14. $\frac{4}{5}$th of a number is 6 more than $\frac{2}{3}$rd of that number. What is the number?
15. Find a rational number which when multiplied by $\frac{4}{3}$ and then subtracted $\frac{2}{5}$ from the product gives $-\frac{8}{15}$.
16. Two buses which are at a distance of 575 km travels from two places towards each other. Speed of one bus is 60 km per hour and that of another bus is 55 km per hour. At what time will they meet?

17. A man spends in buying $\frac{1}{4}$th of his total amount in vegetables, $\frac{3}{5}$th in fruits and $\frac{1}{8}$th in sweets. He spends the remaining Rs 8 as bus fare. How much amount had he taken for shopping?
18. A fraction has denominator 4 more than its numerator. If 6 is added to numerator and 6 is subtracted from denominator the fraction is $\frac{11}{3}$. Find the fraction.
19. The denominator of a rational number is 5 more than its numerator. If 1 is subtracted from the numerator and 3 is subtracted from denominator, then the new rational number becomes $\frac{1}{4}$. Find the rational number.
20. mother is 25 years older than Rohan. After 8 years, the ratio of Rohan's age and Mother's age will be 4 : 9. Find their present ages.
21. Mondeep sells his car to Raktim at a profit of 8%. Raktim spends Rs 5400 in repairing and then he sells it to Nripen at Rs 113400 without making any profit or loss. At what price Mondeep bought the car?
22. In a school week, one-fifth of the students take part in 100m race and one-third take part in 200 m race. The double of the difference of students taking part in 200 m race and 100 m race take part in 4 × 100 m race. The rest 15 students enjoyed only. How many students are there in the playground?

Multiple Choice Questions (MCQ)

Find the Correct answer :

1. The first degree equation in one variable out of the following equations is
   (a) $\frac{2}{x}=\frac{x}{2}$ (b) $\frac{1}{x}+\frac{1}{x+1}=1$ (c) $\frac{x}{3}+\frac{x}{5}=\frac{1}{4}$ (d) $x^2+2x-5=c$
2. 'If 15 is added to a number, it becomes 40'. The equation of this statement is
   (a) $15x = 40$ (b) $x - 15 = 40$ (c) $x + 15 = 40$ (d) $\frac{x}{15} = 40$
3. '8 is subtracted from a number gives –15'. The equation of this statement is
   (a) $x + 8 = -15$ (b) $x - 8 = 15$ (c) $x + 8 = 15$ (d) $x - 8 = -15$
4. The root of $x \div 4 = 8$ is
   (a) 12 (b) 32 (c) 4 (d) – 12

5. The root of $8x - \frac{20}{7} = 4x$ is

(a) $-\frac{5}{7}$ (b) $\frac{5}{7}$ (c) $\frac{10}{7}$ (d) $\frac{20}{21}$

6. The root of $x = 0$ is

(a) 0 (b) 4 (c) 2 (d) no root

7. y is an odd number. The immediate proceeding odd number of y is

(a) $y - 1$ (b) $y - 2$ (c) $y - 3$ (d) $y - 4$

8. For a two digit number, the digit in unit's place is 4 and digit in ten's place is y. The number is

(a) $10y - 4$ (b) $10 - 40y$ (c) $10 + 40y$ (d) $10y + 4$

9. Root of the equation $8x - 15 = 9 - 4x$ is

(a) 1 (b) 2 (c) 3 (d) 4

10. The value of x when $\frac{5x}{3} = 30$ is

(a) 15 (b) 9 (c) 18 (d) 12

11. '$\frac{2}{3}$ of number is 5 less than $\frac{3}{4}$ of that number'. The equation of this statement is

(a) $\frac{2}{3}x - \frac{3}{4}x = 5$ (b) $\frac{2}{3}x = \frac{3}{4}x - 5$ (c) $\frac{2}{3}x - 5 = \frac{3}{4}x$ (d) $\frac{3}{4}x - 5 = -\frac{2}{3}x$

12. For two complementary angles, one is 20^o greater than other angle. The measure of smaller angle is

(a) 90^o (b) 45^o (c) 55^o (d) 35^o

13. For two suplementary angles, the larger angle is twice the samller angle. The larger angle is

(a) 180^o (b) 120^o (c) 90^o (d) 60^o

14. The value of x when $bx = 0$ is

(a) 0 (b) b (c) – b (d) $\frac{1}{b}$

15. The value of m when $\frac{m}{2} = -7$

(a) 9 (b) –9 (c) –14 (d) 14

Enjoy by solving with the help of teacher :

About a century (100 years) ago (in 1918), Dandiram Dutta of village Belsor near Nalbari, travelled many places of Assam to collect traditional mathematics available in writing or orally. He published his findings in a book named *'Kautuk aru Kaitheli Anka'*. Below is a probled from his collection :

Where are going 100 brothers? We are not 100. The number of persons we have come, same number of persons come next, then comes half of them, then half of previous number and together you we will be 100.

What we have learnt

1. If LHS and RHS of an equation become equal for some value or values of the variable, that value (values) of the variable is known as the root (s) of the equation.
2. To solve an equation, terms containing the variable are generally kept in LHS of the equation and other terms are kept in RHS of the equation by applying transposition. To do this, we generally take the help of the following processes–
   (i) addition of same number to each side
   (ii) subtraction of same number from each side
   (iii) multiplication of each side by the same number
   (iv) division of each side by the same non-zero number
3. Generally, transposition of terms from one side to another side are done by changing their signs.
4. To solve an equation of the form $\frac{A}{B} = \frac{C}{D}$ where A, B, C and D are terms or experessions by using method of corss-multiplication, we write $A \times D = B \times C$
5. We can solve too many problems in our practical life by forming first degree equations.

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