Chapter – 4
Simple Equation

G1V4X2

4.1 Let us verify what we have learnt in Class VI in the lesson "Unknown Quantity and Formation of Simple Equation"–

(i) Statement : Adding 5 marbles with number of marble possessed by Bubu becomes total 12 marbles. How many marbles are there with Bubu?

Here numbers of marbles with Bubu is unknown. If this unknown numbers is taken as 'variable x' then number of marbles possessed by Bubu is $x + 5$. This $(x + 5)$ is called an algebraic expression.

Therefore, as per statement $x + 5 = 12$, isn't it? This is a simple equation.

(ii) For the function of a school many boxes of water were brought. Each box contains 10 numbers of water bottles. Anima counted 100 numbers of water bottles. Anima has formed the equation to find number of boxes, as given below
Here total number of water bottles = 100
Let the no of boxes considered by Anima = x
Then number of water bottles in x boxes is $10x = 100$. This is a simple equation, here $10x$ is an algebraic expression.

(iii) Age of Nirmali's mother is three times of the age of Nirmali. Age of Nirmali's father is 5 years more than the age of Nirmali's mother. Let us see how to form a simple equation to find the age of Nirmali and Nirmali's mother if the age of Nirmali's father is 41 years.
Let the age of Nirmali $= x$ years.
Age of Nirmali's mother is three times the age of Nirmali, that is, three times of 'x' $= 3x$.
Nirmali's father's age is 5 years more than her mother's age $3x$
Nirmali's father's age $3x + 5$
According to question, a3ge of Nirmali's father = 41 years
Therefore the equation for the age of her father formed by Nirmali is $3x + 5 = 41$.
If you observe the examples above, you will see that–
In all the three examples, the unknown numbers are denoted by the variable 'x'. Instead of x any letter from the english alphabet like *y, z, l, m* etc. can also be taken.

Simple Equation

Now let us find out the number of marbles possessed by Bubu, number of boxes of water, and age of Nirmali. According to what you have learnt in Class VI :

	$x + 5 = 12$ – (i)	all these are simple equations
	$10x = 100$ – (ii)	
and	$3x + 5 = 41$ – (iii)	

Each equation will depend upon the value of 'x'that is, for specific value of 'x' left hand side (LHS) and right hand side (RHS) of the equation shall be equal.

'='equal sign means LHS (Expression in the left hand side) and RHS (Expression in the right hand side) are equal.

The process of finding the specific value of 'x' is called solution and **the specific value of 'x'is called as 'root of the equation'.**

Now if 1, 2, 3, 4, 5 and 6 are placed as value for 'x' in equation (i) then LHS is not equal to RHS (you may verify if).

But, if we place 7 as value of 'x' that is ($x = 7$), both sides would be equal as (7+5= 12). That is $x = 7$ satisfy the given equation. Therefore $x = 7$ is the solution of the given equation.

Therefore, number of marbles possessed by Bubu is 7.

Similarly in example (ii) $10x = 100$ is a condition on the variable 'x'. This condition given in the equation is satisfied when $x = 10$. This is the root of the equation. $10x = 100$. So, $x = 10$, [As $10 \times 10 = 100$].

Therefore number of boxes = 10.

Now let us find out in example no (iii) for what value of 'x' the equation is satisfied

$3x + 5 = 41$–

$x = 1$ is placed, $3\times1 + 5 = 8$ not satisfied.

$x = 2$ is placed, $3\times2 + 5 = 11$ not satisfied.

$x = 3$ is placed, $3\times3 + 5 = 14$ not satisfied.

When $x = 12$ is placed, we get $3\times12 + 5 = 41$, satisfied.

Therefore, for $x = 12$, the equation $3x + 5 = 41$ is satisfied. Therefore $x = 12$ is the root of the equation (iii) and hence age of Nirmali is 12 years

Thus age of Nirmali's mother = $3 \times 12 = 36$ years

On the above examples we find a number only on the RHS (Right Hand Side). It does not happen always. On the right hand side there may be terms which constitute variable.

For example –

The age of Nirmali's brother Anuj is half the age of Nirmali. Age of Nirmali's mother is six times the age of Anuj. Age of Nirmali's father is 29 years more than Nirmali and 5 years more than Nirmali's mother. Let us form the equation.

Hence,

Let the age of Nirmali $= x$ years

Age of Anuj is half the age of Nirmali, that is $\frac{x}{2}$ years.

Age of Anuj's mother is six times the age of Anuj i.e. $6 \times \frac{x}{2} = 3x$ years.

Age of Anuj's father is 29 years more than the age of Nirmali that is $x + 29$

Age of Anuj's father is 5 years more than the age of Anuj's mother that is $3x + 5$ years.

Therefore, the age of Anuj's father which can be expressed in two different algebraic expression are equal, isn't it?

Equality of the quantities $x + 29$ and $3x + 5$ depends on specific value of the variable 'x' (age of Nirmali).

by condition $x + 29 = 3x + 5$ – (i)

[In above example, equation can also be formed by considering the age of Anuj as 'x'. Try of your own] [If we write $3x + 5 = x + 29$ will it be wrong? No, it will not be wrong.]

If we interchange the LHS and RHS of an equation, the equation remains same that is $x + 29 = 3x + 5$ and $3x + 5 = x + 29$ both equations are same. While solving equation sometime we have to transpose the terms (interchanging the terms).

Example 1 :

Write the following statements in the form of equation :

(i) When 7 is subtracted from 5 times of 'x', the result is 8.

(ii) When 2 is added to one fifth of a number, the result is 3.

(iii) When 3 is added to 2 times of a number, the result is 11.

(iv) 8 times of a number is equal to 32.

(v) To get 10, add 4 with 3 times of a number.

Solution : (i) 5 t3imes of $x = 5x$.

When 7 is subtracted from '$5x$' the result is $5x - 7$.

But the given result (subtraction) is 8.

Therefore, the required equation is $5x - 7 = 8$

(ii) Let the number be x; one fifth of x is $\frac{x}{5}$; when 2 is added with $\frac{x}{5}$, we get $\frac{x}{5}+2$ but $\frac{x}{5}+2=3$ as per the statement

$\therefore$ required equation is $\frac{x}{5}+2=3$.

(iii) Let the number be z; 2 times of $z = 2z$ When 3 is added to $2z$
We get $2z + 3$ (adding 3 as per statement)
Therefore the required equation is $2z + 3 = 11$

(iv) Let the number be p; 8 times of $p = 8p$;
$8p$ is equal to 32
$\therefore$ The required equation $8p = 32$

(v) Let the number be m,
When 4 is added to 3 times of m that is $3m$ we get $3m + 4 = 10$
$\therefore$ Therefore the required equation is $3m + 4 = 10$

Remember, in the above examples to denote the unknown numbers x, y, z, p, m are used as variables. There is no hard and fast rule to accept 'x' as variable while forming an equation.

Example 2 :

Convert the following equation to statement

(i) $3x + 7 = 4$ (ii) $\frac{y}{4} + 5 = 6$ (iii) $2z - 5 = 3$

(iv) $6p = 24$ (v) $\frac{q}{3} - 1 = 2$

Solution :

(i) When 7 is added to 3 times of 'x', the result is 4.

(ii) When 5 is added to one fourth of a number 'y' the result is 6.

or

To get 6, 5 is added with one fourth of a number.

(iii) When 5 is Subtracted from 2 times of number, it results 3

(iv) 6 times of a number is eaual to 24

(v) subtraction of 1 from one third of a number results 2

or

To get 2 subtract 1 from one third of a number.

Example 3 : Denominator of a fraction is more than its numerator by 4. If 1 is added to both numerator and denominator value of the fraction becomes $\frac{1}{2}$. Form the equation to find the fraction.

Solution : Let the numerator of the fraction be x.
Therefore denominator $= x + 4$ (since Denominator of fraction is more than the numerator by 4)

$\therefore$ Fraction is $\frac{x}{x+4}$, Now 1 is added to both numerator and denominator the new fraction is $\frac{x+1}{x+4+1} = \frac{x+1}{x+5}$.

According to the question the value of the fraction $= \frac{1}{2}$

$\therefore$ the equation is $\frac{x+1}{x+5} = \frac{1}{2}$

Example 4 : There are total 50 marbles in the pockets of Amal, Romen and Anup. There are 11 marbles in the pocket of Anup. In both his pockets, Romen possesses twice the number of marbles compared to Amal. Form an equation to find the marbles in the pocket of Amal and Romen.

Solution : Let marbles in the pocket of Amal be 'x'. Therefore marbles in the pocket of Romen is $2x$. Marbles in the pocket of Anup = 11

Total Marbles = $x + 2x + 11$

Given that number of total marbles = 50

According to question, $x + 2x + 11 = 50$

$\therefore$ Required equation, $3x + 11 = 50$

Example 5 : Length of a rectangle is 5 cm more than its breadth, perimeter of the rectangle is 26 cm. Form the equation to find the length and breadth of the rectangle.

Solution : Let the breadth of the rectangle $= x$ cm

According to question, length of the rectangle $= x + 5$ cm (length of rectangle is 5 cm more than its breadth)

$\therefore$ Perimeter of rectangle $= 2(\text{Length} + \text{Breadth})$

$= 2[x + (x + 5)]$

$= 2(2x + 5)$

$= 4x + 10$

According to question, Perimeter of the rectangle = 26 cm

Required equation is $4x + 10 = 26$.

Example 6 : Age of Ariful's mother is 4 times the age of Ariful's sister Rehena. Rehena is 4 years younger to Ariful. Age of mother is 32 years. Form the equation to find the age of Ariful and Rehena.

Solution : Let the age of Ariful be 'x' years
Rehena is 4 years younger than Ariful.
That is age of Rehena = $x - 4$
According to question Age of their mother is 4 times the age of Rehena.
That is 4 times of $(x - 4) = 4(x - 4)$.
Given that age of mother = 32 years.
That is $4(x - 4) = 32$
Therefore required equation is $4(x - 4) = 32$.

Example 7 : (i) Examine whether is $x = 1$ is a root of the equation $3x + 8 = 11$

Solution : By putting $x = 1$ in the equation $3x + 8 = 11$
We get $3 \times 1 + 8 = 11$ that is equation $3x + 8 = 11$ is satisfied with $x = 1$
(ii) Examine whether $y = 2$ is a root of the equation $6y - 7 = 5$

Solution : By putting $y = 2$ in the equation $6y - 7 = 5$
We get $6 \times 2 - 7 = 5$, that is equation $6y - 7 = 5$ is satisfied with $y = 2$

Try yourself : (i) Examine whether $p = 21$ is a root of the equation $\frac{p}{3} + 5 = 12$.

Example 8 : Try to solve the equation by changing the value of the variable (Trial and Error method) **:** (i) $2x + 6 = 10$ (ii) $5x - 2 = 13$

Solution :

(i) $2x + 6 = 10$
When $x = 1$
When $x = 1$ is placed, we get $2 \times 1 + 6 = 2 + 6 = 8$ not satisfied.
When $x = 2$ is placed, we get $2 \times 2 + 6 = 4 + 6 = 10$ satisfied.

Therefore, for $x = 2$ the equation $2x + 6 = 10$ is satisfied. Therefore $x = 2$ is the root of the equation.

Solution :

(ii) $5x - 2 = 13$
When $x = 1$ is placed in $5x - 2$ we get $= 5 \times 1 - 2 = 5 - 2 = 3$ not satisfied
When $x = 2$ is placed in $5x - 2$ we get $= 5 \times 2 - 2 = 8$ not satisfied
When $x = 3$ is placed in $5x - 2$ we get $= 5 \times 3 - 2 = 15 - 2 = 13$ satisfied

Therefore, for $x = 3$, the equation $5x - 2 = 13$ is satisfied. Therefore $x = 3$ is the root of the equation.

This is how an equation can be solved substituting different values by 'x'.

Exercise - 4.1

1. Express the following statement in the form of an equation
   (i) When 5 is added to 6 times of a number the result is 35.
   (ii) One fourth of a number is equal to 9.
   (iii) 5 times of a number is equal to 5 more than 20.
   (iv) To get 10 add 3 to 7 times of a number.
   (v) When 4 is subtracted from one fifth of a number the result is 2.
   (vi) 4 times of p is equal to 20.
   (vii) When 1 is subtracted from 3 times of a number the result is 2.
   (viii) To get 40 divide a number by 10 then subtract 10 from it.
2. Write the following equation in statement :
   (i) $3x - 4 = 5$ (ii) $\frac{m}{3} + 6 = 11$ (iii) $7p = 42$ (iv) $\frac{y}{6} = 2$
   (v) $5x + 7 = 2$ (vi) $\frac{q}{2} - 1 = 4$
3. Form equations for each of the following statement :
   (i) Sum of the ages of Anupama, Nirupama and Upoma is 22 years. Anupoma is younger to Nirupoma by 1 year, Upoma is older to Nirupoma by 2 years. Write the equation considering the age of Nirupoma.
   (ii) Age of Anjan's grandfather is 72 years. Age of grandfather is 2 years more than seven times of the age of Anjan.
   (iii) Perimeter of a square is 32 centimeter.
   (iv) Romen's father bought potato at the rate of ₹ 20 per Kg and onion at the rate of ₹ 10 per kg. He paid to the shopkeeper ₹ 50 after buying 1kg less onion than potato.
   (v) Measure of two angles of a triangle is two times and three times of the smallest angle of the triangle. Sum of the three angles of the triangle is 180°।
4. Tell whether the value of variable inserted within the brackets satisfy the given equation or not.
   (i) $x + 5 = 0, (x = -5)$ (ii) $2x - 8 = 7, (x = 4)$ (iii) $\frac{x}{3} + 6 = 7, (x = 3)$
   (iv) $\frac{x}{7} - 2 = 0, (x = 7)$ (v) $5x = 35, (x = 7)$ (vi) $4x + 8 = 4, (x = -1)$
   (vii) $7x + 2 = 9, (x = 2)$ (viii) $2x = 16, (x = 8)$ (ix) $\frac{x}{5} = 20, (x = 100)$
   (x) $\frac{x}{8} + 4 = 9, (x = 1)$

5. Examine whether the value of variable inserted within the brackets is the root of the given equation or not.

(i) $4x + 3 = 7, (x = 1)$ (ii) $\frac{2x}{3} + 5 = 7, (x = 3)$ (iii) $x - 4 = 1, (x = 3)$

(iv) $6x = 18, (x = 2)$ (v) $5x - 1 = 7, (x = 2)$ (vi) $x + 9 = 13, (x = 4)$

(vii) $5x - 7 = 8, (x = 3)$ (viii) $\frac{y}{3} + 5 = 8, (y = 9)$ (ix) $\frac{p}{5} + 4 = 5, (p = 1)$

(x) $\frac{x}{7} = 6, (x = 42)$

6. Try to solve the equation by changing the value of the variable (Trial and Error method) :

(i) $2x + 5 = 11$ (ii) $\frac{x}{5} + 5 = 7$ (iii) $7x - 4 = 24$

4.2 Equality :

Is the value of $9 - 4 = 3 + 2$, on both sides of '=' sign equal here? Since the value of both side of 'equal sign' is equal, so we call it an 'equality'. If we add 5 to both sides of equal sign then we get 10 on both sides. After adding 5 with both sides still equality remains.

You may examine the balance of equality by multiplying both sides of an equality by non zero number and divide both sides by non zero number. You will find Left Hand Side (LHS) = Right Hand Side (RHS), that is

- If same number is added to both sides of an equality then there will be no change in equality, it remains same. In the same way,
- If same number is subtracted from both sides of an equality then there will be no change in equality, it means same.
- When we multiply both sides of an equality by non zero number, equality remains same; again when we divide both sides of an equality by non zero number, equality remains same

Properties of these equality are applied as mathematical operation while solving equation. Remember, if these mathematical operations are not applied to both sides of equality then it does not satisfy ; that is, it will not balance the equality.

(i) If x and y are equal then $x = y \Rightarrow x + 2 = y + 2$, (adding 2 to both sides)

(ii) If x and y are equal then $x = y \Rightarrow x - 2 = y - 2$, (subtracting 2 from both sides)

(iii) If x and y are equal then $x = y \Rightarrow 2x = 2y$, (multiplying both sides by 2)

(iv) If x and y are equal then $x = y \Rightarrow \frac{x}{2} = \frac{y}{2}$, (dividing both sides by 2)

4.3 Solving Equation :

While solving an equation by applying conclusions of equality.
Let us observe the following examples –

(i) $x + 4 = 8$
$\Rightarrow x + 4 - 4 = 8 - 4$
$\Rightarrow x = 4$

4 is subtracted from both sides of the equation so that in the LHS there will be unknown quantity (variable) only.

This is the solution for equation no. (i). Whether solution of the equation is correct or not, it can be verified by substituting the value of x = 4 in equation (i)

Putting $x = 4$ in equation (i) we get LHS = 4 + 4 = 8, which is equal to RHS. [In the equation $x + 4 = 8$, subtracting 4 from both sides of the equation is the mathematical process of solving the equation.]

Let us take another example

(ii) $x - 5 = 10$
$\Rightarrow x - 5 + 5 = 10 + 5$
$\Rightarrow x = 15$

5 is added to both sides of the equation so that in the LHS there will be unknown quantity (variable) only.

is $x = 15$ is the solution of the equation no. (ii).

Let us take another example to see how to solve an equation–

(iii) $6x = 24$

The aim of solving an equation is to find the value of 'x', isn't it? Therefore, to have 'x' only in the LHS we have to divide LHS by 6 and to maintain the balance of the equality we have to divide RHS by 6

$6x = 24$
$\Rightarrow \frac{6x}{6} = \frac{24}{6}$
$\therefore x = 4$

That is, $x = 4$ is the solution of the equation no. iii.
(The mathematical process of solving the equation is to divide it by 6.)

Let us take another equation –

(iv) $\frac{x}{5} = 4$

If we have to keep 'x'only in the LHS we have to multiply LHS by 5 and to maintain the balance of the equality we have to multiply RHS by 5.

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

that is, $x = 20$ is the solution of the equation no. (iv)

The mathematical process of solving the equation is to multiply both sides by 5.

Whether solution of the equation in the example (iii) and (iv) are correct or not, it can be verified by substituting the value of $x = 4$ in equation (iii) and $x = 20$ in equation (iv)

You have seen that while solving the equations in the above examples, that is to find the value of the variable separately, we have to use mathematical operations. In the above examples we are using only one mathematical operation but sometimes we have to use more than one mathematical operations.

Let us observe the following examples –

Example 1 : Solve (a) $3x + 5 = 41$ (b) $5x - 7 = 8$

Solution : $3x + 5 = 41$

Step 1 : In order to keep only the term '3x' in the LHS we have to subtract 5 from both sides and thus we get

$3x + 5 - 5 = 41 - 5$

Or $3x = 36$

Step 2 : If to keep only 'x' in the LHS then we have to divide LHS by 3 and to maintain the balance of the equality we have to divide RHS by 3.

Thus we get

$$\frac{3x}{3} = \frac{36}{3}$$

Or $x = 12$, this is the solution to equation 1 (a)

[Whether solution of the equation is correct or not, it can be verified by substituting the value of $x = 12$ in equation 1(a)
Putting $x = 12$ in equation 1 (a) we get LHS = $3 \times 12 + 5 = 41$, which is equal to RHS. This is how correctness of the equation is verified]

(b) $5x - 7 = 8$

Step 1 : In order to keep the term '5x' only in the LHS we have to add 7 to both sides and thus we get

$5x - 7 = 8$

$\Rightarrow 5x - 7 + 7 = 8 + 7$

Or $5x = 15$

Step 2 : In order to keep 'x' only in the LHS then we have to divide LHS by 5 and to maintain the balance of the equality we have to divide RHS by 5. Thus we get

$\Rightarrow 5x = 5$

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

Or $x = 3$, this is the solution to equation 1 (b).

[Verify the correctness the solution of the equation by yourself]

Exercise - 4.2

1. Solve the equation and write down the step while separating the variable.

(i) $x + 5 = 12$ (ii) $x - 7 = 0$ (iii) $y - 3 = 6$ (iv) $z + 6 = -5$

(v) $3x = 42$ (vi) $\frac{x}{5} = 6$ (vii) $12x = -36$ (viii) $\frac{x}{4} = \frac{3}{5}$

(ix) $7x = 35$ (x) $\frac{p}{4} = 3$

2. Solve the equation and write down the step while seperating the variable.

(i) $4x + 5 = 45$ (ii) $3x - 7 = 11$ (iii) $\frac{2x}{3} + 5 = 7$ (iv) $\frac{4y}{3} - 7 = 5$

3. Solve the following equations –

(i) $4x = 64$ (ii) $4x + 7 = 15$ (iii) $\frac{y}{4} = 6$ (iv) $3y = 60$

(v) $6p + 7 = 37$ (vi) $7p - 9 = 5$ (vii) $5x - 7 = 8$ (viii) $\frac{x}{5} + 2 = 3$

(ix) $\frac{q}{3} - 1 = 2$ (x) $3x + 11 = 50$ (xi) $4x + 10 = 26$ (xii) $\frac{x}{3} + 4 = 6$

(xiii) $\frac{p}{3} + 5 = 12$ (xiv) $\frac{q}{2} + 4 = 7$ (xv) $2(x + 3) = x + 7$

4.4 Solving Equations by Transposing :

In our previous discussion it was observed that while solving an equation same number is added or substraced in the both sides of the equation. Now observe while solving the equation $x + 7 = 5$, Here 7 is subtracted from both sides, that is

$x + 7 = 5 \quad \rightarrow$ (i)

$x + 7 - 7 = 5 - 7$ (subtracting 7 from both sides)

$\Rightarrow x + 0 = 5 - 7$

$\Rightarrow x = 5 - 7$

$\Rightarrow x = -2$

Let us take other two, examples –

Example 1 :

Solution :

(i) $x + 7 = 12$

$\Rightarrow x + 7 - 7 = 12 - 7$

$\Rightarrow x = 5$

Transposing

x + 7 =12 (+ 7 transposed from

$\Rightarrow x$ = 12 – 7 LHS to RHS it changes to -7)

= 5

(ii) $4p - 11 = 5$

$\Rightarrow 4p - 11 + 11 = 5 + 11$

$\Rightarrow 4p = 16$

$\Rightarrow p = 4$

Transposing

$4p - 11 = 5$ (–11 transposed from

$\Rightarrow 4p = 5$ it changes to + 11)

$\Rightarrow 4p = 16$

$\Rightarrow p = 4$

Example 2 :

Solution : (i) $3x + 5 = x + 29$ (ii) $\frac{y}{3} - 2 = 5$ (iii) $4(x - 4) = 32$

(i) $3x + 5 = x + 29$

$\Rightarrow 3x - x = 29 - 5$ (Transposing 'x' to LHS and 5 to RHS)

$\Rightarrow 2x = 24$

$\Rightarrow \frac{2x}{2} = \frac{24}{2}$ [Divided both sides by 2]

$\Rightarrow x = 12$

Required solution is $x = 12$

(ii) $\frac{y}{3} - 2 = 5$

Or $\frac{y}{3} = 5 + 2$

Or $\frac{y}{3} = 7$

Or $\frac{y}{3} \times 3 = 7 \times 3$

Or $y = 21$

Required solution is $y = 21$

(iii) $4(x - 4) = 32$

$\Rightarrow x - 4 = \frac{32}{4}$ [Divided both sides by 4]

$\Rightarrow x - 4 = 8$

$\Rightarrow x = 8 + 4 = 12$

Example 3 : Sum of one fourth a number and 5 is 6. Find the number.
Solution : Let the number be x.

According to the question, sum of one fourth of x ie $\frac{x}{4}$ and 5 is 6.

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

$\Rightarrow \quad \frac{x}{4} = 6 - 5$ [Transposing 5 to RHS]

$\Rightarrow \quad \frac{x}{4} = 1$

$\Rightarrow \quad \frac{x}{4} \times 4 = 1 \times 4$ [Multiplying both sides by 4]

$\Rightarrow \quad x = 4$

Required number is 4.

Example 4 : When 4 is added to 3 times of a number the result is 10. Find the number.

Solution : Let the number be x.

Therefore three times the number is $3x$, when 4 is added to $3x$ sum becomes $(3x + 4)$, sum is equal to 10

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

$\Rightarrow \quad 3x = 10 - 4$ [Transposing 4 to RHS]

$\Rightarrow \quad 3x = 6$

$\Rightarrow \quad x = 2$ [Transposing 3 to RHS]

$\therefore$ Required number is 2.

Example 5 : Romen's father bought potato at the rate of ₹ 20 per kg and onion at the of ₹ 30 per Kg. He paid to the shopkeeper (vendor) ₹ 70 after buying 1 kg less onion than potato. What is the cost of onion and potato?

Solution : Let quantity of Potato purchased by Romen's father be x kg.
Therefore quantity of Onion bought = $(x - 1)$ kg.
Total cost price of potato = ₹ $20x$.
Total cost price of onion = ₹ $30\ (x-1)$.
Total cost price of potato and onion = ₹ $\{20x + 30\ (x - 1)\}$
According to the question Romen's father paid to the vendor is ₹ 70

$\therefore \ 20x + 30(x - 1) = 70$

$\Rightarrow \ 20x + 30x - 30 = 70$

$\Rightarrow \ 50x = 70 + 30$

$\Rightarrow 50x = 100$

$$\Rightarrow x = \frac{100}{50} = 2$$

$\therefore$ Romen's father bought 2 kg of potato and $(x - 1) = (2 - 1) = 1$ kg of onion.

Example 6 : Measure of two angles of a triangle is two times and three times of the third angle of the triangle. Sum of the three angles of the triangle is 180^o. Find the measure of the three angles of the triangle.

Solution : Let the measure of the third angle be x

Therefore measure of the other two angles are $2x$ and $3x$

According to question $x + 2x + 3x = 180$ [sum of the three angles of a triangle is 180^0]

$$\Rightarrow \quad 6x = 180$$

$$\Rightarrow x = \frac{180}{6}$$

$$\Rightarrow \quad x = 30^0$$

$\therefore$ Measure of first angle is $x^0 = 30^0$,

Measure of second angle is $2x^0 = 60^0$

measure of third angle is $3x^0 = 90^0$.

Example 7 : Perimeter of a square is 32 centimeter. Find the area of the square.

Solution : Let the measure of the side of the square be 'a'

Perimeter of the square is 32 cm

$$\text{Or } 4a = 32$$

$$\text{Or } \quad a = \frac{32}{4} \qquad \text{[Dividing both sides by 4]}$$

$$\text{Or } \quad a = 8$$

$\therefore$ Measure of the side of the square is 8 cm

Area of the square $= 8^2 = 64$ cm^2

Exercise - 4.3

1. Form equation for the following statements and solve the equations.
   (i) Subtract 7 from 5 times of a number which results 8.
   (ii) One third of a number is 2 more than the number 5.
   (iii) To get 10, 4 is added with 3 times of a number.
   (iv) Jehirul added 6 with a number and when the sum is divided by 3 he gets 4.
   (v) When 4 is subtracted from two third of a number, the results is 7.

(vi) 6 times of a number is equal to 24.

(vii) When 5 is added to one fourth of a number, the result is 6.

(viii) Three fourth of a number is equal to 12.

2. There are total 50 marbles in the pockets of Amal, Ramen and Anup. There are 11 marbles in the pocket of Anup. In the two pockets of Ramen there are marbles which is equal to two times of marbles possessed by Amal. Form equation to find the marbles in the pocket of Amal and Romen.
3. Denominator of a fraction is 4 more than the numerator. If 1 is added to both numerator and denominator the value of the fraction becomes $\frac{1}{2}$. Form the equation to find the fraction.
4. Length of a rectangle is more than its breadth by 5 cm. Perimeter of the rectangle is 26 cm. Find the area of the rectangle.
5. Age of Ariful's mother is 4 times the age of Ariful's sister Rehena. Rehena is 4 years younger to Ariful. Age of mother is 32 years. Form the equation to find the age of Ariful and Rehena.
6. Sum of the ages of Anupam, Rahul and Jahirul is 32 years. Anupam is 1 year younger to Rahul, Jahirul is 2 years older than Rahul. Find their ages.
7. Age of Anjan's Grandfather is 72 years. Age of grandfather is 2 years more than seven times the age of Anjan. Find the age of Anjan.
8. Robin, Naren, Shreya, Anubhav, Irfan and Paruma obtained marks in Mathematics in the following manner– Shreya obtained two times of marks obtained by Naren, Anubhav obtained 5 marks less than marks obtained by Shreya, sum of the marks of Irfan and Naren is 105, Robin obtained 5 marks less than marks obtained by Paruma and Paruma obtained 15 marks more than marks obtained by Irfan. Sum of their marks is 435. Find the marks they have obtained.
9. The sum of three consecutive odd numbers is 75. Find the numbers.
10. The sum of two consecutive even numbers is 38. Find the numbers.
11. In a two digit number, the digit in tens place is thrice the digit in ones place. The sum of the original number and new number obtained by interchanging the digits is equal to 88. Find the original number.
12. The sum of three consective numbers 48. Find the numbers.
13. The sum of two numbers is 40. One number 10 more than other number 0. Find the numbers.

14. Ratio of two numbers is 8:3. Difference of the numbers is 60. Find the numbers.
15. Length of a rectangle is two times its breadth. Perimeter of the rectangle is 72 unit. Find the length and breadth of the rectangle.
16. Ajoy is 5 years younger to Bijoy. After 4 years, age of Bijoy will be 2 times the age of Ajoy. What are their present ages?
17. Age of Ramen's father is 4 times the age of Ramen. After 5 years the age of Ramen's father will be 3 times the age of Ramen. What are their present ages?
18. Total cost of 2 tables and 3 chairs is Rs. 705. Cost price of a table is Rs. 40 more than the cost price of a chair. What is the cost price of a table and a chair ?
19. Difference of measures of two complimentary angles is 12^0. What are the measures of two angles?

What we have learnt

1. An equation is equality of two quantities on certain condition of the variable. Quantity present in left side of equal sign is called Left Hand Side (LHS) and quantity present in the right side of equal sign is called Right Hand Side (RHS) of an equation. An equation is a statement of equality which contains a variable on one or both the sides.
2. The value of the variable which satisfies an equation is called the root or solution of the equation.
3. While solving an equation following are the mathematical rules to be applied –
   (i) We add the same number to each side.
   (ii) We subtract the same number from each side.
   (iii) We multiply both sides by the same number.
   (iv) We divide both sides by the same non zero number.

   By these rules they do not disturb the equality of the equation, that is the value of both sides remain equal. These mathematical rules are applied and completed in such a way that variable remain in any one of the side (either in LHS of in RHS). Last step yields the solution/root of the Equation.
4. By transposing also we can solve an equation. We must change the sign while transposing numbers or variables.
5. We can form equation reflecting problems of different real situation those equations can be solved with the help of mathematical rules as well.