Unit 15 – Equations and Formulae (1)

- ## Constructing simple equations

- A vendor had x mangoes. He bought another 24 mangoes. He now has a total of 114 mangoes. Let us express this information by an equation.

  The number of mangoes the vendor had initially $= x$
  The number of mangoes the vendor bought $= 24$
  The total number of mangoes the vendor has now $= x + 24$
  Moreover, since the total number of mangoes the vendor has now is 114,

  $$x + 24 = 114$$

- "The price of a loaf of bread reduced by 4 rupees. The new price of a loaf of bread is 50 rupees." Let us express this by an equation.

  Let us take the initial price of a loaf of bread as b rupees.
  Since the price of a loaf of bread reduced by 4 rupees,
  the new price of a loaf of bread $= b - 4$
  Moreover, since the new price of a loaf of bread is 50 rupees,

  $$b - 4 = 50$$

- Books have been placed on the shelves of a bookcase in a library such that each shelf contains x books. There are 6 shelves in the bookcase. After 10 of these books were issued to students, the number of books remaining in the bookcase reduced to 104. Let us express this information by an equation.
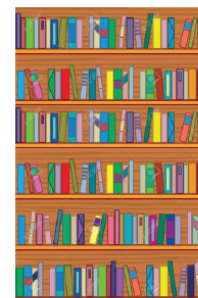
  The total number of books that were on the 6 shelves $= 6\,x$
  Number of books issued to students $= 10$
  $\therefore$ the number of books remaining in the bookcase $= 6\,x - 10$
  Moreover, since the number of books remaining is 104,

  $$6x - 10 = 104$$

✓ In the first example $x + 24 = 114$, In the second example $b - 4 = 50$ and in the third example $6x - 10 = 104$ are examples for simple Equations.

- Solving simple equations

  ➢ Let us find the value of the unknown which satisfies the equation $a + 8 = 10$.

  When the same number is subtracted from the two sides of an equation, the new values that are obtained on the two sides are equal.

  Let us subtract 8 from both sides of the equation $a + 8 = 10$.

  $a + 8 - 8 = 10 - 8$ $(8 - 8 = 0)$
  $\therefore a = 2$

  ➢ Let us find the value of the unknown which satisfies the equation $x - 7 = 10$.

  In this equation, the value of $x - 7$ is equal to 10.

  When the same number is added to the two sides of an equation, the new values that are obtained on the two sides are equal.

  When 7 is added to the two sides of the equation $x - 7 = 10$, the left-hand side is equal to x and the right-hand side is equal to 17.

  $x - 7 + 7 = 10 + 7$ $(- 7 + 7 = 0)$
  $\therefore x = 17$

  ➢ Let us solve the equation $5x = 10$.

  When the two sides of an equation are divided by the same non-zero number, the new values that are obtained on the two sides are equal.

  Let us divide both sides of the equation $5x = 10$ by 5.

  $$\frac{5x}{5} = \frac{10}{5} \qquad (\frac{5}{5} = 1)$$
  $\therefore x = 2$

  o **Another method of solving simple equations**

Example 1

Solve $x - 7 = 10$.

$\xrightarrow{\quad x \quad} \boxed{-7} \xrightarrow{\quad x - 7 \quad}$ (left-hand side)

$\xleftarrow[17]{\quad x \quad} \boxed{+7} \xleftarrow[10]{\quad x - 7 \quad}$ (right-hand side)

$\therefore x = 17$

Example 2

Solve $5\,x = 30$.

$\xrightarrow{\quad x \quad} \boxed{\times 5} \xrightarrow{\quad 5x \quad}$ (left-hand side)

$\xleftarrow[6]{\quad x \quad} \boxed{\div 5} \xleftarrow[30]{\quad 5x \quad}$ (right-hand side)

$\therefore x = 6$

Example 3

Solve $3y - 2 = 10$.

$\xrightarrow{\quad y \quad} \boxed{\times 3} \xrightarrow{\quad 3y \quad} \boxed{-2} \xrightarrow{\quad 3y - 2 \quad}$ (left - hand side)

$\xleftarrow[4]{\quad y \quad} \boxed{\div 3} \xleftarrow[12]{\quad 3y \quad} \boxed{+2} \xleftarrow[10]{\quad 3y - 2 \quad}$ (right-hand side)

$\therefore y = 4$

✓ **Do all the exercises in your text book 15.1 and 15.2**