

Chapter 12

ALGEBRAIC EXPRESSIONS

In the last lesson you have learnt about variables and you know how to write them in the form of variables or algebraic numerals. You can now easily indicate the changing or unknown quantities by variables and the constant values by constant quantities or numbers. These statements or expressions that are formed with the help of constants and variables are known as Algebraic Expressions. In the last lesson wherever we have used variables, we can call them algebraic expressions also.

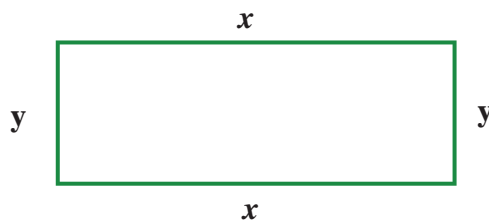
Let us observe how algebraic expressions are used in our daily life.

Razia does not know her age. Now if she needs to know what her age 5 years ago was or what will her age be 3 years hence, we would better answer the questions with the help of algebraic expressions.

Let us denote Razia's age by 'y' years then 5 years before, her age must have been $y - 5$ years and after 3 years, her age will be $y + 3$ years. Here $y - 5$ and $y + 3$ are algebraic expressions.

Now let us put some more mathematical problems into algebraic forms.

1. Radha's marks are 3 less than Neha's marks. If Neha's marks are x , then Radha's marks would be $x - 3$.
2. The length of a rectangle is 4 units more than its width. If the width of the rectangle is 'y' units, then the length of the rectangle will be $y + 4$ units.
3. The length of a rectangular ground is x and y is its width, then to take complete round, what will be the distance to be covered? A complete round will cover $p = x + y + x + y$ distance.



ACTIVITY 1

Write down the following in algebraic expressions:

1. Three times a number.
2. 6 more than a number.
3. 17 less than a number.
4. Fifth part of a number.
5. 12 more than twice of a number.
6. 3 less than seven times a number.
7. $\frac{1}{3}$ of 4 times a number.
8. 7 times of a number added to itself.

9. Subtracting 6 times of a number from 5 times the same number.
10. 5 litres of milk is taken out from a can full of milk. How much milk remains in the can?

In all the above examples, you must have noticed that algebraic expressions are made up of constants and variables. In the table given below, sort out the constant and variables. Write them in the proper columns.

ACTIVITY 2

S. No.	Algebraic expression	Variable	Constant
1.	z	z	1
2.	$x + 5$	x	1, 5
3.	$y - 8$	—	—
4.	$3x + 2y$	-----	-----
5.	$2xy - 3$	x, y	2, -3
6.	$3x^2 - 7$	-----	-----
7.	$33x$	-----	-----
8.	$y - x$	-----	-----

Are all the algebraic expressions similar?

Here the number of terms in z and $33x$ is 1, whereas in the rest of the statements there are 2 terms. This means that in an algebraic expression, the number of terms or items in the algebraic expression is always 1 more than the number of times + or - sign is used in the expression.

ACTIVITY 3

Write the number of terms or items in the given algebraic expressions.

- | | | |
|----|-------------------|-----|
| 1. | $3x + 8$ | two |
| 2. | $3 + y - 7p$ | — |
| 3. | $2x + 3y + z$ | — |
| 4. | $8x$ | — |
| 5. | $9 + 3a - 3x + b$ | — |
| 6. | $5xyz$ | — |

You know about variables and constants now for examples in $3x + 8y + 7$, x and y are variables but 3, 8 and 7 are constants. In the lesson on variables, you have seen that $3x$ is actually 3 times x ; similarly $8y$ is 8 times y . This means the constant that is with the variable is multiplied to the variable and hence we call it a multiple. Therefore in $3x + 8y + 7$; 3 is a multiple of x , 8 is a multiple of y and 7 is a constant.

ACTIVITY 4

S. No.	Algebraic expression	Multiple	Variable
1.	$8x$	8	x
2.	$9py$		
3.	xyz		
4.	$18ab$		
5.	yz		
6.	$-\frac{1}{2}yz$		
7.	$3xyz$		
8.	$32x$		
9.	$-3py$		
10.	$-\frac{3}{5}yz$		

In the above activity, you have found that in $8x$ and $32x$ the value of the variable is x ; similarly in $9py$ and $-3py$, the value of the variable is py and in $3xyz$, the value of the variable is xyz . In yz , $-\frac{1}{2}yz$ and $-\frac{3}{5}yz$, the value of the variable is yz . Such quantities with the same variables are known as like variables/

Like Terms

All terms in which the variable or algebraic part are same are called like terms. Their multiples can be different.

Unlike Terms

When the variable or algebraic part of the expressions are not same, they are called unlike terms.

ACTIVITY 5

Encircle the like variables in the given list of algebraic expressions.

Like x	$6xy, 5y, \left(\frac{2}{3}x\right), 5xz, 7z, (2x)$
Like yz	$2y, 7xz, 5z, 2yz, \frac{1}{2}yz, 6xy$
Like a	$2a, \frac{6}{7}ab, \frac{7}{6}a, -3b, 6a, 2c$
Like lmn	$6l, 5mn, \frac{2}{3}lm, lmn, 2l, -6ln$
Like $2pq$	$6r, pqr, -5pq, 7qr, 2q, 2p$
Like st	$4rs, 7st, -14rt, 2rst, 6r, 4t$

EXERCISE 12

1. Recognise the single term (univariant) and two termed (bivariant) algebraic expressions and write term separately.

- | | | |
|-----------------|----------------|-----------------|
| (i) $3x + 4y$ | (ii) $9z + 3y$ | (iii) $4a - 7b$ |
| (iv) $5x + 1$ | (v) $a - 30$ | (vi) $4ab$ |
| (vii) $abc - 1$ | (viii) $3xy$ | (ix) $ab + bc$ |
| (x) $a + abc$ | | |

2. Select the like terms from the following algebraic expressions.

$$5xy, 7c, -\frac{4}{5}yz, -7bc, -\frac{9}{4}xy, \frac{2}{7}z, -2c, bc, -37pqr, \frac{11}{13}yz, 7z, 9pqr.$$

What Have We Learnt ?

- The letters used in place of numbers are called variables. They are also called algebraic quantities.
- The terms with same letter numerals and exponents are called like terms.
- The terms with dissimilar letter numerals and exponents are called unlike terms.
- When a two variables or a variable and a constant are combined using $+$, $-$, \times , or \div signs, then we get an algebraic expression.
- Expressions with one term are known as single termed or univariate algebraic expressions.
- Expressions with two terms are known as two termed or bivariate algebraic expressions.