

Algebraic Expressions

By studying this lesson, you will be able to,

- construct algebraic expressions with three unknown terms,
- multiply an algebraic expression by a number and by an algebraic term,
- simplify algebraic expressions, and
- find the value of an algebraic expression by substituting integers for the unknown terms.

5.1 Algebraic expressions

Let us recall what you learnt in Grade 7 about algebraic expressions.

A certain shop purchases the same amount of milk every day to sell. If we don't know the exact amount, we cannot represent it by a number, although the amount is a constant value.



As in the above situation, when the numerical value of a constant amount is not known, it is called an **unknown constant**.



The daily income of Nimal's shop takes different values depending on its daily sales.

Since the daily income of Nimal's shop is not a fixed value, it is a **variable**.

Simple letters of the English alphabet are used to represent unknown constants and variables.

Let us denote the daily income from Nimal's shop by *x*. Nimal gives Rs.500 to his mother daily from the income from his shop. After giving Rs.500 to his mother, Nimal has an amount of Rs. x - 500 remaining.

x - 500 is an algebraic expression. x and 500 are the terms of the expression.

If 350 rambutans are sold at Rs. x each, the income is Rs. 350x. In the algebraic term 350x, 350 is called the **coefficient** of x.



Do the review exercise to recall the above facts that you learnt about algebraic expressions in grade 7.



Review Exercise

| Algebraic expression | Unknown term of the algebraic expression | Coefficient of the unknown term | Terms of the algebraic expression | Mathematical operations in the order they appear in the algebraic expression |
|-------------------------|---|---------------------------------------|--|---|
| 500 + 3x | x | 3 | 500, 3 <i>x</i> | $+, \times$ |
| 2y + 4 | | | | |
| 4 <i>p</i> – 100 | | | | |
| <i>p</i> – 10 | | | | |
| 3n - 7 | | | | |

- (2) The length of a table is 2 meters more than its breadth.
 - (i) Write an algebraic expression for the length of the table by taking its breadth as b meters.
 - (ii) Write an algebraic expression for the breadth of the table by taking its length as *a* meters.
- (3) A pencil, a pen and an eraser are bought for Rs. a, Rs. b and Rs. 4 respectively.
 - (i) Write an algebraic expression for the total amount of money needed to buy these three items.
 - (ii) Write an algebraic expression for the amount of money needed to buy 2 such pencils, 3 such pens and 4 such erasers.
- (4) A taxi service charges Rs.100 as an initial fee and Rs.50 for each kilometer travelled. Write an algebraic expression for the total amount that has to be paid for a journey of x meters.
- (5) The price of 1 kg of rice is Rs. x and the price of 1 kg of wheat flour is Rs. y.
 - (i) Write an algebraic expression for the total amount of money required to buy 1 kg of each type.













- (ii) Write an algebraic expression for the amount of money required to buy 5 kg of rice and 2 kg of wheat flour.
- (iii) Write an algebraic expression for the amount of money required to buy 500 g of each type.
- (6) Simplify the algebraic expressions given below.

| (a) (i) $a + a + a$ | (ii) $4x + 3x$ |
|----------------------------------|---------------------------------|
| (iii) $p + 4p - 2p$ | (iv) $8a - 5a - a$ |
| (v) $a + 2 + 2a + 3$ | (vi) $6x + 10 - 4x + 7$ |
| (b) (i) $3a + 4b + a - 3a + 5$ | (ii) $5x - 3y - 4x - 2y$ |
| (iii) $4m - 3n - 4m - n + 8$ | (iv) $6x + 7y - 8 - 5x + y - 2$ |
| (v) $2p + 3q + 4r + p - 2q - 3r$ | <i>p</i> |

5.2 Constructing algebraic expressions with three unknown terms

In Grade 7 we learnt to construct algebraic expressions with one or two unknown terms. Now let us consider how to construct algebraic expressions with three unknown terms.

• Let us express the total price of 10 books which cost Rs. *x* each, 3 pens which cost Rs. *y* each and 5 pencils which cost Rs. *z* each by an algebraic expression.

Price of the 10 books = Rs. $x \times 10$ = Rs. 10xPrice of the 3 pens = Rs. $y \times 3$ = Rs. 3yPrice of the 5 pencils = Rs. $z \times 5$ = Rs. 5zThe price of 10 books, 3 pens and 5 pencils = Rs. 10x + 3y + 5z

• A cake is made with 500 g of sugar, 1 kg of wheat flour and 500 g of butter. The price of 1 kg of sugar is Rs. *x*, the price of 1 kg of wheat flour is Rs. *y* and the price of 1 kg of butter is Rs. *z*. Let us represent the amount of money required to purchase the items for the cake by an algebraic expression.



Price of 500 g of sugar of which 1 kg is Rs. $x = \text{Rs.} \frac{x}{2}$ Price of 1 kg of wheat flour of which 1 kg is Rs. y = Rs. yPrice of 500 g of butter of which 1 kg is Rs. $z = \text{Rs.} \frac{z}{2}$ The total amount required = Rs. $\frac{x}{2} + y + \frac{z}{2}$

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A bus depot uses x number of buses on route 1, y number of buses on route 2, z number of buses on the highway and 12 buses for school services each day. Write an algebraic expression for the total number of buses scheduled to run in a day.

Total number of buses scheduled for route 1, route 2, the highway and school services = x + y + z + 12

Example 2

Naveen gave Rs. 500 to the shop keeper to buy 2 kg of rice of which 1 kg is Rs. x, 500 g of sugar of which 1 kg is Rs.y and 250 g of flour of which 1 kg is Rs.z. Write an algebraic expression for the balance Naveen received.

Price of 2 kg of rice of which 1 kg is Rs. x = Rs. 2xPrice of 500 g of sugar of which 1 kg is Rs. $y = \text{Rs. } \frac{y}{2}$ Price of 250 g of flour of which 1 kg is Rs $z = \text{Rs. } \frac{z}{4}$ Price of 2 kg of rice, 500 g of sugar and 250 g of flour $= \text{Rs. } 2x + \frac{y}{2} + \frac{z}{4}$ The amount Naveen gave = Rs. 500Balance Naveen received $= \text{Rs. } 500 - (2x + \frac{y}{2} + \frac{z}{4})$

Exercise 5.1

- (1) There are three members in a family. The ages of the mother, the father and the son are given in years by *x*, *y*, and *z* respectively. Using this information, construct algebraic expressions for;
 - (i) the sum of their ages.
 - (ii) the sum of their ages after 5 years.
 - (iii) the difference between the ages of the father and the son.
 - (iv) the sum of the ages of the mother and the father when the son was born.



Sugar

Multiplying an algebraic expression by a positive number

Gift parcels are to be prepared for the students in a class. Each parcel is to contain x number of books and v number of pens. Let us find the total number of books and pens needed for 8 such parcels.

Method I

Number of books and pens in a parcel = x + yNumber of books and pens needed for 8 such parcels = $(x + y) \times 8$ $(x + y) \times 8$ is also written as 8 (x + y).

(2) The price of a newspaper was Rs. p. If the price increased by Rs. 5, construct algebraic expressions for,

- (i) the new price of the newspaper.
- (ii) the price of two newspapers after the increase in price.
- (iii) the profit gained from a newspaper with the new price, if the cost of printing a newspaper is Rs. q.
- (iv) the profit gained from 10 copies, if Rs. r is spent for the distribution of each copy, in addition to the printing cost.
- (3) v liters of water is stored in a tank. p liters of water flows out and q liters of water flows into the tank per hour. Construct an algebraic expression for the volume of water in the tank after 3 hours.
- (4) There are 700 seats in an auditorium, xnumber of first class tickets which are Rs.1000 each, y number of second class tickets which are Rs. 500 each and z number of third class tickets which are Rs. 300 each were issued for a drama. Construct algebraic expressions for,
 - (i) the total number of tickets issued
 - (ii) the number of seats which are not occupied.
 - (iii) the income from the issued tickets.
 - (iv) the remaining amount when half the income generated from the issued tickets and Rs. 100,000 is paid to the producer of the drama.

5.3 Multiplying an algebraic expression by a number









From this it is clear that 8(x + y) = 8x + 8y.

$$\therefore 8(x+y) = 8x+8y$$

The total mass of a container packed with balls is x kg. The mass of the empty container is y kg. Let us find the total mass of the balls in 5 such containers.



Method I

The mass of the balls in one container = x - yThe mass of the balls in 5 such containers = 5(x - y)

Method II

The mass of the 5 containers with balls = 5xThe mass of the 5 empty containers = 5yThe mass of the balls in the 5 containers = 5x - 5y

It is clear that 5(x - y) = 5x - 5y

 $\therefore 5(x-y) = 5x - 5y$

When multiplying an algebraic expression by a number, each term in the algebraic expression is multiplied by that number.



Exercise 5.2

(1) Simplify

| (i) $5(a+4)$ | (ii) $7(x+5)$ | (iii) $6(2x+4)$ |
|-----------------------|-----------------------|----------------------|
| (iv) $4(4c + 7)$ | (v) $5(y-2)$ | (vi) $3(3-x)$ |
| (vii) $2(m + n - 2p)$ | (viii) $4(x - y + 7)$ | (ix) $2(x - 2y - q)$ |

(2) Fill in the blanks.

(i) $2(x + 7) = 2x + \dots$ (ii) $5(6 + a) = 30 + \dots$ (iii) $8(4 - y) = 32 - \dots$ (iv) $6(x - y) = \dots - 6y$ (v) $3(x - 2y + z - 5) = \dots - 6y + \dots - \dots$

- (3) The daily wages of a person is Rs. x and overtime payment for an hour is Rs. y. If he did 2 hours of overtime on each of the 5 days he worked,
 - (i) write an algebraic expression for his salary for the 5 days with overtime payments.
 - (ii) Due to a loan he has taken, Rs. 150 is deducted from his daily wages. Construct an algebraic expression for the amount he receives in hand for the 5 days and simplify it.
- (4) A teacher bought three gift parcels for three students who came first in the third term test. Each parcel contained 5 books and 2 pens.
 - (i) Write an algebraic expression for the price of one such parcel by taking the price of a book as Rs. *a* and the price of a pen as Rs. *b*.
 - (ii) Write the total price of all three gift parcels as an algebraic expression and simplify it.

- (5) On a packet of tea, the mass of the tea is mentioned as *p* grammes and the mass of the packet as *q* grammes.
 - (i) Obtain an algebraic expression for the mass of 20 such packets and simplify it.



(ii) The above 20 packets are packed in a box which is of mass t grammes. Obtain an algebraic expression for 12 such boxes and simplify it.

• Multiplying an algebraic expression by a negative number

When multiplying an algebraic expression by a negative number such as -2 or -1 we have to consider it as a directed number and multiply each term of the algebraic expression by it.



Exercise 5.3

(1) Simplify.

(i)
$$-3 (x + 5)$$
(ii) $-2 (2x + 1)$ (iii) $-2 (4 + x)$ (iv) $-6 (a - 6)$ (v) $- (x + 5)$ (vi) $- (x - 3)$ (vii) $-2 (8 + x + y)$ (viii) $-6 (3b - 2 + 3a)$ (ix) $- (a - c - 3x)$ (x) $-3 (6 - 2x + 3b)$

(2) Fill in the blanks.

- (i) $-3(x+4) = -3x \dots$ (ii) $-3(x-4) = -3x + \dots$ (iv) $-2(y-2) = -2y + \dots$ (iii) $-2(y+2) = -2y - \dots$ (v) $-(m+2) = \dots -2$ $(vi) - (m - 2) = \dots + 2$ (vii) $-4(2x + 3) = \dots -12$ (viii) $-4(2x - 3y + 1) = \dots + 12y - \dots$
- (3) Jayamini buys x number of coconuts at Rs. 35 each and y number of mangoes at Rs. 58 each. She gives Rs. 1000 to the vendor. Construct an algebraic expression for the balance she receives and simplify it.

Multiplying an algebraic term by another algebraic term **5.4**

Now let us consider multiplying an algebraic term by another algebraic term.

Let us simplify the product of the algebraic terms 5x and 3a.

$$(5x) \times (3a) = 5x \times 3a$$

= 5 × x × 3 × a
= 5 × 3 × x × a
= 15xa

Similarly, $2p \times 5c = 2 \times p \times 5 \times c = 2 \times 5 \times p \times c = 10pc$ $8r \times 3v = 8 \times r \times 3 \times v = 8 \times 3 \times r \times v = 24rv$

Accordingly, in the algebraic term we get by multiplying an algebraic term by another algebraic term,

- the coefficient is the product of the coefficients of the original two algebraic terms and.
- the product of the unknowns is the product of the two unknowns in the original algebraic terms.

Example 1

Simplify.

(i) $4m \times 3n$ (ii) $8k \times 5y$ (iii) $x \times 5y$ (v) $2m \times (-7xy)$ (iv) $2y \times (-2y)$ (vi) $(-2x) \times 7yz \times 2a$ ¢, (i) $4m \times 3n = (4 \times 3) \times (m \times n) = 12mn$ (ii) $8k \times 5y = (8 \times 5) \times (k \times y) = 40ky$ (iii) $x \times 5y = (1 \times 5) \times (x \times y) = 5xy$ (iv) $2y \times (-2y) = (2 \times -2) \times (y \times y) = -4y^2$ (v) $2m \times (-7xy) = (2 \times -7) \times (m \times xy) = -14mxy$ (vi) $(-2x) \times 7yz \times 2a = (-2 \times 7 \times 2) \times (x \times yz \times a) = -28axyz$



5.5 Multiplying an algebraic expression by an algebraic term

A rectangular land is divided into two blocks A and B as shown in the figure. Both blocks are rectangular in shape and equal in breadth. Let us find the area of the whole land.



Method I

Area of block $A = a \times x = ax$ Area of block $B = a \times y = ay$

So the area of the whole land = ax + ay

We can obtain the area of the land in the following manner too.

Method II

The length of the whole and = (x + y)The breadth of the and = a \therefore the area of the and = a (x + y)Now it is clear that a (x + y) = ax + ay

 $\therefore a(x+y) = ax + ay$

When multiplying an algebraic expression by an algebraic term, every algebraic term of the algebraic expression is multiplied by the given algebraic term.

| $5(x-y)$ $\sqrt{64}$ | 170 (-1) |
|--|--|
| Example 1 | |
| Simplify. | |
| (i) $y(3x+5)$ (ii) $2y(3x+5)$ | 5) (iii) $(-y) (3x + 5)$ |
| (iv) $(-2y)(3x+5)$ (v) $2y(5y-$ | 3 <i>x</i>) |
| (i) $y(3x+5) = y \times 3x + y \times 5$ (ii) | $2y(3x+5) = 2y \times 3x + 2y \times 5$ |
| $= 3 \times y \times x + 5 \times y$ | $= 2 \times 3 \times y \times x + 2 \times 5 \times y$ |
| = 3xy + 5y | = 6xy + 10y |
| (iii) $(-y)(3x + 5) = (-y) \times 3x + (-y) \times 5$ = $(-1) \times 3 \times y \times x + (-1)$ = $-3xy - 5y$ | $\times 5 \times y$ |
| (iv) $(-2y)(3x+5) = (-2y) \times 3x + (-2y) \times 3x$ | 5 2) × 5 × y |
| (v) $2y(5y-3x) = 2y \times 5y - 2y \times 3x$ = 2 × 5 × y × y - 2 × 3 × = 10y ² - 6xy | $\times x \times y$ |

The length of a playground is x meters and its breadth is y meters. Grass is grown on one side, in a square shaped section of side length ymeters. Express the area of the remaining land by an algebraic expression and simplify it.



y

Length of the remaining land
$$= x - y$$

Breadth of the remaining land $= y$
Area of the remaining land $= (x - y) y$
 $= x \times y - y \times$
 $= xy - y^2$



(2) Express the area of each rectangular figure given below by an algebraic expression and simplify it.



5.6 Sum of two algebraic expressions

• Like terms

In Grade 7 you learnt that algebraic terms such as x and 2x with the same unknown are called **like terms**.

In each of the two terms 3xy and 5xy, the coefficient is multiplied by the common term xy which is the product of the two unknowns x and y. Therefore, they are also known as **like terms**.

• Unlike terms

You learnt in Grade 7 that terms such as 2x and 4y which have different unknowns are called **unlike terms**.

Let us consider the algebraic terms $3x^2y$ and $5xy^2$.

The coefficient of $3x^2y$ is 3 and the product of the unknowns by which it is multiplied is x^2y .

The coefficient of $5xy^2$ is 5 and the product of the unknowns by which it is multiplied is xy^2 .

In these two terms, the products of the unknowns are not the same.

Such algebraic terms are not **like terms**. Therefore they are known as **unlike terms**. Like terms can be added or subtracted and simplified to a single algebraic term.

Add 6t + 5 and 2t + y + 3 and simplify your answer. 6t + 5 + 2t + y + 3 = 6t + 2t + y + 5 + 3= 8t + y + 8

Example 2

Simplify.

(i)
$$(2x - y + 8) + 2(3y - 10)$$

(ii) $(7a - 4b + 2bc) + 2b(4a - 2c + 5)$
(i) $(2x - y + 8) + 2(3y - 10) = 2x - y + 8 + 6y - 20$
 $= 2x + 5y - 12$
(ii) $(7a - 4b + 2bc) + 2b(4a - 2c + 5) = 7a - 4b + 2bc + 8ab - 4bc + 10b$
 $= 7a + 6b - 2bc + 8ab$

Exercise 5.6

(1) Simplify.

| (i) 3 $(a+5b) + a (a+4)$ | (ii) $y (10 - y) + 3 (y - 2)$ |
|-----------------------------|----------------------------------|
| (iii) $2(8a-5b) + 3(5a-12)$ | (iv) $3(y-3) + (8-6y+x)$ |
| (v) $a (a-2b) + b (b+2a-c)$ | (vi) 5 $(x - y + z) + (4x + 3y)$ |

5.7 Simplifying the difference of two algebraic expression

Now let us subtract an algebraic expression from another algebraic expression and simplify it.

Let us subtract
$$(a + 6)$$
 from $(2a + 7)$.
 $(2a + 7) - (a + 6) = 2a + 7 + (-1) \times (a + 6)$
 $= 2a + 7 + (-1) \times a + (-1) \times 6$
 $= 2a + 7 + (-a) + (-6)$
 $= 2a + 7 - a - 6$
 $= 2a - a + 7 - 6$
 $= a + 1$

Here, the answer is obtained by multiplying each the terms of the algebraic expression which is to be subtracted by (-1) and adding them to the first algebraic expression.

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Simple 1
Simplify.
(i)
$$(4x + 3) - (2x - 3)$$
 (ii) $(3x + 7y) - (2x - 3y - z)$
(iii) $(10a - 8b + c) - 2(4a + b)$ (iv) $a(3a + 1) - a(a - 5)$
(i) $(4x + 3) - (2x - 3) = 4x + 3 + (-1) \times (2x - 3)$; [multiplying $(2x - 3)$ by (-1)]
 $= 4x + 3 + (-1) \times 2x + (-1) \times (-3)$
 $= 4x + 3 + (-2x) + 3$
 $= 4x + 3 - 2x + 3$
 $= 4x - 2x + 3 + 3$
 $= 2x + 6$
(ii) $(3x + 7y) - (2x - 3y - z) = 3x + 7y - 2x + 3y + z$; [multiplying $(2x - 3y - z)$ by (-1)]
 $= 3x - 2x + 7y + 3y + z$
 $= x + 10y + z$
(iii) $(10a - 8b + c) - 2(4a + b) = 10a - 8b + c - 8a - 2b$; [multiplying $(4a + b)$ by (-2)]
 $= 10a - 8a - 8b - 2b + c$
 $= 2a - 10b + c$
(iv) $a(3a + 1) - a(a - 5) = a \times 3a + a \times 1 - a \times a + a \times 5$
 $= 3a^2 + a - a^2 + 5a$
 $= 2y^2 + 6a$

Exercise 5.7

(1) Simplify.

- (i) 4 (x+2) 2 (x+2)(ii) 4 (x-6) 6 (2+x)(iii) 3 (x-2) (x+2)(iv) 4 (y-5x) 2 (y+3x+z)(v) 4x (x+2) 3x (x-3)(vi) 6a (a-3) 3 (a-1+b)
- (2) Simplify.

| (i) $-(y+1) - 3(y+2)$ | (ii) $-3(y-2) - 3(6-y)$ |
|-------------------------|---------------------------|
| (iii) $-(2-a) - 3(a+8)$ | (iv) $-x(x+3) - 2x(1-x)$ |
| (v) $a(a+6) - a(a+2)$ | (vi) $a (2a-1) - a (6-a)$ |

5.8 Substituting given values for each unknown in an algebraic expression with up to three unknowns

In Grade 7 you learnt that replacing an unknown term of an algebraic expression by a numerical value is called substitution. By substitution, an algebraic expression takes a numerical value.

Now let us substitute numerical values for the unknown terms of an algebraic expression with three unknowns and find its value.

Let us find the value of the algebraic expression 2p + q - r + 1 when p = 4, q = 2 and r = -3.

$$2p + q - r + 1 = 2 \times 4 + 2 - (-3) + 1$$
$$= 8 + 2 + 3 + 1$$
$$= 14$$

Now let us find the value of an algebraic expression with brackets by substituting numerical values for the unknowns.

Let us find the value of 3(x + y) + z when x = 2, y = 5 and z = 10,

$$3 (x + y) + z = 3(2 + 5) + 10$$
 or
$$3 (x + y) + z = 3x + 3y + z$$

$$= 3 \times 7 + 10$$

$$= 21 + 10$$

$$= 31$$
 or
$$3 (x + y) + z = 3x + 3y + z$$

$$= 3 \times 2 + 3 \times 5 + 10$$

$$= 6 + 15 + 10$$

$$= 31$$

Example 1

Find the value of the algebraic expression 2x - y - 2z when x = 4, y = 3 and z = 2.

$$2x - y - 2z = 2 \times 4 - 1 \times 3 - 2 \times 2$$

= 8 - 3 - 4
= 1

Example 2

Find the value of the algebraic expression -p + 2q - 3r + 7 when p = 5, q = -2 and r = -3. $-p + 2q - 3r + 7 = -1 \times 5 + 2 \times (-2) - 3 \times (-3) + 7$

$$p + 2q = 3r + r = -1 \times 3 + 2 \times (-2) = 3 \times (-3) + r$$
$$= (-5) + (-4) - (-9) + 7$$
$$= (-9) + (+9) + 7$$
$$= 0 + 7$$
$$= 7$$

Find the value of the algebraic expression 6 (2a - b) - c when a = 4, b = 5 and c = 8.

 $6 (2a - b) - c = 6 (2 \times 4 - 5) - 8$ = 6 (8 - 5) - 8 = 6 \times 3 - 8 = 18 - 8 = 10 Example 4

Find the value of the algebraic expression 10(k-l) + r when k = 4, l = 1 and r = -3.

$$10 (k - l) + r = 10 (4 - 1) + (-3)$$
$$= 10 \times 3 - 3$$
$$= 30 - 3 = 27$$

Example 5

Simplify the algebraic expression 5x + 3y - 4x - y + 8 and find its value when x = 2 and y = -1.

$$5x + 3y - 4x - y + 8 = 5x - 4x + 3y - y + 8$$
$$= x + 2y + 8$$

Substituting the given values,

$$x + 2y + 8 = 2 + 2 (-1) + 8$$
$$= 2 + (-2) + 8$$
$$= 0 + 8 = 8$$

Example 6

Simplify the algebraic expression 4(a-2b)+2(b-3c) and find its value when a = 3, b = 1, c = -1.

Expanding the expression,

 $4 (a-2b) + 2 (b-3c) = 4 \times a - 4 \times 2b + 2 \times b - 2 \times 3c$ = 4a - 8b + 2b - 6c= 4a - 6b - 6cSubstituting the alignment has

Substituting the given values,

$$4a - 6b - 6c = 4 \times 3 - 6 \times 1 - 6 \times (-1)$$

= 12 - 6 + 6
= 12

Exercise 5.8

- (1) Find the value of each algebraic expression when x = -3, y = -1, z = 0
 - (i) x + y(ii) y + 3z + 7(iii) x 4y + 4z(iv) x + y z(v) z (2x 3y)(vi) 5y 4z + 3x
- (2) In the given rectangle, the length is *l* cm and the breadth is *b* cm.
 - (i) Write an algebraic expression for its perimeter.
 - (ii) Find the perimeter of the rectangle if l = 10 cm and b = 7 cm.
 - (iii) Find the perimeter of the rectangle if b = 5 cm and l is twice b.
 - (iv) Find the perimeter of the rectangle if b = 12 cm and l is 8 cm more than b.

(3)
$$2x - 9y - 4z + 7$$

- (i) Find the value of the above algebraic expression when x = 4, y = 3 and z = -2.
- (ii) Find the value of the above algebraic expression when x = 10, y = 15 and z = -1.
- (iii) Find the value of the above algebraic expression when x = -4, y = -3 and z = -2.
- (iv) Find the value of the above algebraic expression when x = 2, y = -3 and z = 0.
- (4) Complete the tables given below.

| (a) | Expression | Values of the unknowns | Value of the algebraic expression |
|-----|--------------|---------------------------|-----------------------------------|
| | 3x + 2y + 10 | x = 4, y = 3 | |
| | 2p - 3q - 4r | p = 1, q = 2, r = -3 | |
| | 4a - b + 5c | a = 2, b = -4, c = 1 | |

| (b) | Expression | Values of the unknowns | Value of the algebraic expression |
|-----|-----------------|---------------------------|-----------------------------------|
| | 3(x+y) + 10z | x = -1, y = 3, z = 2 | |
| | 4(a + 3b) + c | a = 5, b = 1, c = -10 | |
| | 10(m+n) - k | m = 3, n = -1, k = 8 | |
| | 100 - 3(p + 2q) | p = 4, q = -5 | |
| | 2(a+2b)+5(a-b) | a = 4, b = -1 | |

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b

- (5) Expand each algebraic expression given below and find its value by substituting the given values for the unknowns.
 - (i) Find the value of 10 (a + 2b) + 3 (a 5b) when a = 7 and b = 1.
 - (ii) Find the value of 4(m + 3n) + m + 5n when m = 9 and n = -2.
 - (iii) Find the value of 7(2p-q) 10p + 3q 8 when p = 2 and q = 3.
 - (iv) Find the value of 3(2a + 7b) + 3(b + 3c) 10 when a = 1, b = 2 and c = -3.
 - (v) Find the value of 4(x 5y) 3(7 x) + 8l when x = 8, y = -1 and l = -2.

Summary

- When multiplying an algebraic expression by a number, each term of the algebraic expression needs to be multiplied by the number. That is, the coefficient of each algebraic term should be multiplied by the given number and simplified.
- When multiplying an algebraic term by an algebraic term, their coefficients are multiplied first and then the unknowns are multiplied.
- When multiplying an algebraic expression by an algebraic term, every algebraic term of the algebraic expression needs to be multiplied by the given algebraic term.
- By substituting values for the unknown terms of an algebraic expression, we obtain a numerical value for the algebraic expression.