Equivalent expressions:

Definition :

Equivalent algebraic expressions are those expressions which on simplification give the same resulting expression.

Two algebraic expressions are said to be **equivalent** if their values obtained by substituting the values of the variables are same.

To represent equivalent expressions an equality =

sign is used.

Examples of Equivalent Expressions:

$3x+2$and 3x + 6 are equivalent expressions, because the value of both the expressions remains same for any value of x.

For instance, for x = 4,

$3x+2$

$= 34+2$

= 18 and

3x + 6 = 3 x 4 + 6 = 18.

The expressions $6(x^2 + 2y + 1)$ and $6x^2 + 12y + 6$ are equivalent expressions

and can also be written as $6(x^2 + 2y + 1) = 6x^2 + 12y + 6$.

In this lesson, we learn to identify equivalent expressions.

Given an expression, we select all equivalent expressions from a list.

Example 1 :

For given expression, select one correct equivalent expression from the four options.

8y + 4y + 2y

A - 11y

B - y + 13

C - 7y - 6y

D - 9y + 5y

Solution

Step 1:

As 9y + 5y = 14y = 8y + 4y + 2y, the given expression

Step 2:

Only option **D** is the correct equivalent expression

Example 2 :

For given expression, select one correct equivalent expression from the four options.

20x − 10y

A - $5 4x-2y$

B - 10x + 25y

C - $5 5x+2y$

D - $5 5x-10y$

Solution

Step 1:

As $5 4x-2y$

= 20x − 10y, the given expression

Step 2:

Only option **A** is the correct equivalent expression

Example 3 :

For given expression, select one correct equivalent expression from the four options.

$15x + 25x^2$

A - $7(5x^2 + 2x)$

B - $15x - 35x^2$

C - $5x3+5x$

D - $53+7x$

Solution

Step 1:

As $5x\ 3+5x$

$= 15x + 25x^2$, the given expression

Step 2:

Only option **C** is the correct equivalent expression

Example 4:

Are the two expressions $2y+5y-5+8$

and $7y+3$

equivalent? Explain your answer.

Combine the like terms of the first expression.

Here, the terms $2y$

and $5y$ are like terms. So, add their coefficients. $2y+5y=7y$

.

Also, -5

and 8 can be combined to get 3

.

Thus, $2y+5y-5+8=7y+3$

.

Therefore, the two expressions are equivalent.

Example 5:

Are the two expressions $6(2a+b)$

and $12a+6b$

equivalent? Explain your answer.

Use the Distributive Law to expand the first expression.

$6(2a+b)=6\times 2a+6\times b \qquad =12a+6b$

Therefore, the two expressions are equivalent.

Example 6:

Check whether the two expressions $2x+3y$

and $2y+3x$

equivalent.

The first expression is the sum of $2x$

's and $3y$'s whereas the second one is the sum of $3x$'s and $2y$

's.

Let us evaluate the expressions for some values of x

and y . Take $x=0$ and $y=1$

.

$$2(0)+3(1)=0+3=32(1)+3(0)=2+0=2$$

So, there is at least one pair of values of the variables for which the two expressions are not the same.

Therefore, the two expressions are **not** equivalent.

Example 7:

Check whether the two expressions $3 \times m \times mm$

and $m+m+m$

equivalent.

Consider the first expression for any non-zero values of the variable.

Cancel the common terms.

$3 \times m \times m$

$m=3m$

Combine the like terms of the second expression.

$$m+m+m=3m$$

So, $3 \times m \times mm=m+m+m$

when $m\neq0$

.

When $m=0$

, the expression $3 \times m \times mm$

is not defined.

That is, the expressions are equivalent except when $m=0$

. They are **not** equivalent in general.