Module 2.A: Algebra- Simplifying Expressions

Learning Objectives

1. **Use the Properties of Real Numbers to simplify an algebraic expression.**
2. **Multiply polynomials.**
3. **Multiply special form polynomials.**
4. **Simplify a rational expression.**
5. **Factor a polynomial.**
6. **Factor one of the special form polynomials.**

SECTION 1 - Use the Properties of Real Numbers to simplify an algebraic expression.

Properties of Real Numbers: Let *a, b* and *c* represent real numbers.

- Commutative: $a + b = b + a$, and $ab = ba$
- Associative: $a + (b + c) = (a + b) + c$, and $a(bc) = (ab)c$
- Distributive: $a(b + c) = ab + ac$
- Additive Identity is 0 since $a + 0 = 0 + a = a$.
- Multiplicative Identity is 1 since $a \cdot 1 = 1 \cdot a = a$.
- Additive Inverse of *a* is $-a$ since $a + (-a) = -a + a = 0$.
- Multiplicative Inverse of *a* is $\frac{1}{a}$ since $a \cdot \frac{1}{a} = \frac{1}{a} \cdot a = 1$, when $a \neq 0$.

EXERCISE 1

Simplify a) $-3x^2 - \left(x + 2x^2\right) - 3x$ b) $-3xy^2 + 2x^2y - \left(4xy^2 + 5x^2y\right)$

SOLUTION

a)

$-3x^2 - \left(x + 2x^2\right) - 3x =$

$-3x^2 - x - 2x^2 - 3x =$

$-3x^2 - 2x^2 - x - 3x =$

$\left(-3-2\right)x^2 + \left(-1-3\right)x = -5x^2 - 4x$

b)

$-3xy^2 + 2x^2y - \left(4xy^2 + 5x^2y\right) =$

$-3xy^2 + 2x^2y - 4xy^2 - 5x^2y =$

$-3xy^2 - 4xy^2 + 2x^2y - 5x^2y =$

$\left(-3-4\right)xy^2 + \left(2-5\right)x^2y = -7xy^2 - 3x^2y$

SECTION 2 Multiply polynomials.

EXERCISE 2

Multiply $3x\left(2x^2-6x+1\right)$.

SOLUTION

$3x\left(2x^2-6x+1\right)=6x^3-18x^2+3x$

MODULE 2.A - ASSESSMENT

_____**1**. Simplify $5x^2-2\left(3x-4x^2\right)-x$

A $13x^2-7x$ **B** x^2-7x **C** $-3x^2-7x$ **D** $3x^2-x$
E I do not know

_____**2**. Simplify $5xy^2+3x^2y+2\left(-xy^2+3x^2y\right)$

A $9x^2y$ **B** $7xy^2+9x^2y$ **C** $7xy^2+6x^2y$ **D** $3xy^2+9x^2y$
E I do not know

_____**3**. Multiply $2x\left(7x^2-2x-1\right)$

A $14x^2-4x-2$ **B** $14x^3-4x^2-2x$ **C** $14x^3-2x-1$
D none of these **E** I do not know