Module 2.B: Algebra- Simplifying Expressions

SECTION 1 - Multiply special form polynomials.

Special Products of Polynomials

- Difference of Squares $(a+b)(a-b)=a^2-b^2$
- Perfect Squares $(a+b)^2=a^2+2ab+b^2$ and $(a-b)^2=a^2-2ab+b^2$
- Difference of Cubes $(a-b)(a^2+ab+b^2)=a^3-b^3$
- Sum of Cubes $(a+b)(a^2+ab+b^2)=a^3+b^3$
- Perfect Cubes $(a+b)^3=a^3+3a^2b+3ab^2+b^3$ and $(a-b)^3=a^3-3a^2b+3ab^2-b^3$

EXERCISE 3

Multiply the following binomials.

a) $(x-2)(x+2)$ b) $(3a+2b)^2$ c) $(2x-1)(4x^2+2x+1)$

SOLUTION

a) $(x-2)(x+2)=x^2-2^2=x^2-4$

b) $(3a+2b)^2=(3a)^2+2(3a)(2b)+(2b)^2=9a^2+12ab+4b^2$

c) $(2x-1)(4x^2+2x+1)=(2x-1)((2x)^2+2x+1)=(2x)^3-1^3=8x^3-1$

SECTION 2 - Simplify a rational expression.

For two rational expressions, $\frac{a}{b}$ and $\frac{c}{d}$,

- $\frac{a}{b}\cdot\frac{c}{d}=\frac{ac}{bd}$ when $b\neq 0, d\neq 0$ and $\frac{\frac{a}{b}}{\frac{c}{d}}=\frac{a}{b}\cdot\frac{d}{c}=\frac{ad}{bc}$ when $b\neq 0, c\neq 0, d\neq 0$.
- $\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$ when $b\neq 0$ and $\frac{a}{b}-\frac{c}{b}=\frac{a-c}{b}$ when $b\neq 0$.

EXERCISE 4

Simplify: $6-\dfrac{4x-2y}{x+y}$

SOLUTION:

$$6-\frac{4x-2y}{x+y}=\frac{6}{1}-\frac{4x-2y}{x+y}=\frac{6}{1}\cdot\frac{x+y}{x+y}-\frac{4x-2y}{x+y}=\frac{6(x+y)}{x+y}-\frac{4x-2y}{x+y}=\frac{6x+6y-4x+2y}{x+y}=\frac{2x+8y}{x+y}$$

ASSESSMENT 2

_____**4**. Multiply $(x-3)(x+3)$

A x^2-3 **B** x^2-9 **C** x^2-6x+9
D none of these **E** I do not know

_____**5**. Multiply: $(5a+b)^2$

A $25a^2+b^2$ **B** $25a^2+5ab+b^2$ **C** $25a^2+10ab+b^2$
D none of these **E** I do not know

_____**6**. Simplify: $2+\dfrac{3x+y}{x+y}$

A $\dfrac{5x+3y}{x+y}$ **B** $\dfrac{4y}{x+y}$ **C** 0 **D** $\dfrac{-x+3y}{x+y}$ **E** I do not know