

1.10 Add and Subtract Polynomials

Recall: Like terms have the same variable(s) with the same exponent.

To simplify polynomials, combine like terms by adding or subtracting their coefficients. The variable and its exponent stays the same.

Ex.1: Simplify

$$\begin{aligned} \text{a) } & -a^2 + ab - b^2 - 2b^2 + ab^2 - 4a^2 + 5ab \\ & = \underline{-a^2 - 4a^2} + ab + 5ab - b^2 - 2b^2 + ab^2 \\ & = -5a^2 + 6ab - 3b^2 + ab^2 \\ & \quad ab^2 - 5a^2 - 3b^2 + 6ab \end{aligned}$$

$$\text{b) } 6x^3 + (-2)(-3x) - 3x^2 + x + 4x^3 + 6$$

$$\begin{aligned} & = \underline{6x^3} - 2 + \underline{3x} - \underline{3x^2} + \underline{x} + \underline{4x^3} + 6 \\ & = 6x^3 + 4x^3 - 2 + 6 + 3x + x - 3x^2 \\ & = 10x^3 + 4 + 4x - 3x^2 \quad \checkmark \\ & = 10x^3 - 3x^2 + 4x + 4 \end{aligned}$$

Ex. 2 Simplify.

a) $(5x - 3) + (4x + 6)$

$$= 5x - 3 + 4x + 6$$

$$= 9x + 3$$

Adding a bracket means that you are adding each term inside the bracket.

b) $(3m^2 - 8m + 2) + (5m - 1 + 2m^2)$

$$= \underline{3m^2} - \underline{8m} + \underline{2} + \underline{5m} - \underline{1} + \underline{2m^2}$$

$$= 5m^2 - 3m + 1$$

To subtract an expression in brackets, remove the brackets and subtract each term.

Ex. 3 Simplify.

a) $(3x - 7) - (7x + 2)$

$$= \underline{3x} - \underline{7} - \underline{7x} - \underline{2}$$

$$= -4x - 9$$

the signs in the bracket change
 $\quad - (+7x) - (+2)$
 $\quad - 7x - 2$

b) $(5x^2 + 8x - 2) - (4x^2 - 3)$

$$= \underline{5x^2} + 8x - 2 - \underline{4x^2} + 3$$

$$= x^2 + 8x + 1$$

Ex. 7 Simplify, THEN evaluate when $m = -2$

$$(m - 3) + \underline{(6 - 5m + m^2)} - \underline{(2m^2 + 4m + 1)} - \underline{(6m^2 - 1)}$$

$$= \underline{m - 3} + \underline{6} - \underline{5m} + \underline{m^2} - \underline{2m^2} - \underline{4m} - \underline{1} - \underline{6m^2} + \underline{1}$$

$$= -7m^2 - 8m + 3$$

$$\boxed{m = -2}$$

$$\begin{aligned} & -7(-2)^2 - 8(-2) + 3 \\ & = -7(4) + 16 + 3 \\ & = -28 + 16 + 3 \\ & = -9 \end{aligned}$$

$$\begin{aligned} & (-)(+) \\ & \downarrow \\ & = -7(4) - (-16) + 3 \\ & = -28 + 16 + 3 \end{aligned}$$