

Division of a Polynomial by a Monomial

$$\frac{x^a}{x^b} = x^{a-b}$$

When dividing a polynomial with two or more terms by a monomial, divide every term in the numerator by the monomial in the denominator.

$$x^0 = 1$$

Example 2

Divide the following polynomials.

$$\begin{aligned} \text{a) } \frac{8+12x}{4} &= \frac{8}{4} + \frac{12}{4}x \\ &= 2 + 3x \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{5y-15}{-5} &= \frac{5y}{-5} - \frac{15}{-5} \Rightarrow -y + 3 \\ &= -y + 3 \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{4x^3-6x^2+2x+2}{2} &= \frac{4x^3}{2} - \frac{6x^2}{2} + \frac{2x}{2} + \frac{2}{2} \\ &= 2x^3 - 3x^2 + x + 1 \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{-6m^2+18m}{6m} &= \frac{-6m^2}{6m} + \frac{18m}{6m} \Rightarrow -1m^{2-1} + 3m^{1-1} \\ &= -m + 3 \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{-8m^3-4m^2+12m}{2m} &= \frac{-8m^3}{2m} - \frac{4m^2}{2m} + \frac{12m}{2m} \\ &= -4m^2 - 2m + 6 \end{aligned}$$

$$\begin{aligned} \text{f) } \frac{-4a^5b^2+18a^4b^3-2a^2b^2}{2a^2b} &= \frac{-4a^5b^2}{2a^2b} + \frac{18a^4b^3}{2a^2b} - \frac{2a^2b^2}{2a^2b} \\ &= -2a^{5-2}b^{2-1} + 9a^{4-2}b^{3-1} - 1a^{2-2}b^{2-1} \\ &= -2a^3b + 9a^2b^2 - b \end{aligned}$$