

$$d.) \quad \boxed{m} (x^4 - 7x + 14) + (x^2 - 5) \boxed{n} \quad m$$

$$x^4 - 7x + 14 - x^2 + 5 \quad m$$

$$\underline{\underline{(x^4 - 7x + 14)}} \underline{\underline{(x^2 - 5)}} \quad m+n$$

$$x^{4+2}$$

$$5.) \quad 4y^2 + 9y - 5 - 4y^2 + 5y - 3$$

$$(2x-7)^3 = (2x-7)(2x-7)(2x-7)$$

$$(2x-7)^3 \neq (2x)^3 - (7)^3$$

$$49.) V = \pi r^2 h$$

$$V = \pi (x-4)^2 (2x+3)$$

$$V = \pi (x^2 - 8x + 16)(2x+3)$$

$$V = \pi (2x^3 - 13x^2 + 8x + 48)$$

$$V = 2\pi x^3 - 13\pi x^2 + 8\pi x + 48\pi$$

59.) total number

$$(.09t^3) + (.19t^3)$$

## 2.4: Factoring Polynomials

Factoring by grouping

$$\textcircled{1} \quad \underline{x^3 + 3x^2} - \underline{2x - 6}$$

$$x^2(x+3) - 2(x+3)$$

$$\boxed{(x^2 - 2)(x+3)}$$

$$\textcircled{2} \quad \underline{x^3 - 3x^2} - \underline{16x + 48}$$

$$x^2(x-3) - 16(x-3)$$

$$(x^2 - 16)(x-3)$$

$$\boxed{(x+4)(x-4)(x-3)}$$

$$\textcircled{3} \quad \underline{3a^2 - 6a} - \underline{2b + ab}$$

$$\cancel{3a(a-2)} - \cancel{b(2-a)}$$

$$3a(a-2) + b(-2+a)$$

$$\boxed{(3a+b)(a-2)}$$

Sum and difference of cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

SOAP:

same opposite always positive



$$\textcircled{4} \quad x^3 - 27$$

$$a = x$$
$$b = 3$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$(x - 3)(x^2 + 3x + 9)$$

Cubes

$$1^3 = 1$$

$$2^3 = 8$$

$$3^3 = 27$$

$$4^3 = 64$$

$$5^3 = 125$$

$$6^3 = 216$$

$$\textcircled{5} \quad y^3 + 64$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$\begin{aligned} a &= y \\ b &= 4 \end{aligned}$$

$$(y+4)(y^2 - 4y + 16)$$

$$\textcircled{6} \quad -4x^4 - 500x$$

$$-4x(x^3 + 125)$$

$$\begin{array}{l} a=x \\ b=5 \end{array} \quad -4x(x+5)(x^2-5x+25)$$

$$\textcircled{7} \quad 125x^3 - 64$$

$$a = 5x$$

$$b = 4$$

$$(5x)^2$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$(5x - 4)(25x^2 + 20x + 16)$$

Factoring expressions that 'look' like quadratics

$$\textcircled{8} \quad x^2 - 3x - 4 = (x - 4)(x + 1)$$

$$\textcircled{9} \quad x^4 - 3x^2 - 4 = (x^2 - 4)(x^2 + 1) \\ = (x + 2)(x - 2)(x^2 + 1)$$

$$\textcircled{10} \quad x^6 - 3x^3 - 4 = (x^3 - 4)(x^3 + 1) \\ = (x^3 - 4)(x + 1)(x^2 - x + 1)$$

$$\textcircled{11} \quad x^8 - 3x^4 - 4$$
$$(x^4 - 4)(x^4 + 1)$$
$$(x^2 + 2)(x^2 - 2)(x^4 + 1)$$

$$\textcircled{12} \quad 18x^4 + 57x^3 - 10x^2$$

$$x^2 (18x^2 + 57x - 10)$$

$$x^2 (6x - 1)(3x + 10)$$