Name: _____   Date: _____

Learning Goal 0.2	Expectations for algebra from previous years.

Example Factor the following expressions.

a. $x^2 + 5x - 24$

$$= (x+8)(x-3)$$

b. $x^4 - 16$

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

DDS

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

c. $x^3 - 7x^2 + 12x$

$$= x(x^2 - 7x + 12)$$
$$= x(x-4)(x-3)$$

d. $12x^5 - 19x^3 - 18x$

$$216$$

$$= x(12x^4 - 19x^2 - 18)$$
$$= x(12x^4 + 8x^2 - 27x^2 - 18)$$
$$= x[4x^2(3x^2+2) - 9(3x^2+2)]$$
$$= x(3x^2+2)(4x^2 - 9)$$
DDS
$$= x(3x^2+2)(2x+3)(2x-3)$$

e. $y^2 - x^2 + 6x - 9$

$$= y^2 - (x^2 - 6x + 9)$$
$$= y^2 - (x-3)^2$$
$$= (y+(x-3))(y-(x-3))$$
$$= (y+x-3)(y-x+3)$$

f. $x^4 + 4$

↳ Not Factorable

g. $x^6 - 8y^3$

FORMULA:

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

$$a = x^2, \quad b = 2y$$

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

h. $\dfrac{128}{\sqrt[3]{x}} - 2x^{17/3}$

$$= \frac{1}{\sqrt[3]{x}}(128 - 2x^6)$$

$$= \frac{2}{\sqrt[3]{x}}(64 - x^6) \qquad a=4 \atop b=x^2$$

$$= \frac{2}{\sqrt[3]{x}}(4 - x^2)(16 + 4x^2 + x^4)$$
DDS

$$= \left(\frac{2}{\sqrt[3]{x}}(2+x)(2-x)(16 + 4x^2 + x^4)\right) \times \frac{\sqrt[3]{x^2}}{\sqrt[3]{x^2}}$$

$$= \frac{2\sqrt[3]{x^2}}{x}(2+x)(2-x)(16 + 4x^2 + x^4)$$

Assignment   Handout   Quiz Next Day!

Example Simplify the following rational expressions using factoring.

a.
$$\dfrac{a + \dfrac{a}{b}}{1 + \dfrac{1}{b}}$$

$$= \dfrac{\dfrac{1}{b}(ab + a)}{\dfrac{1}{b}(b+1)}$$

$$= \dfrac{a(b+1)}{b+1}$$

$$= a$$

NVPS: $b \neq 0, -1$

b.
$$\dfrac{x^2 - \dfrac{1}{x}}{x^3 - \dfrac{1}{x^3}}$$

$$= \dfrac{\overset{x^{-1}}{\boxed{\dfrac{1}{x}}}(x^3 - 1)}{\overset{x^{-3}}{\boxed{\dfrac{1}{x^3}}}(x^6 - 1)}$$

$$= \dfrac{x^{\overset{2}{3}}(x^3 - 1)}{x(x^6 - 1)}$$

$$= \dfrac{x^2(x^3 - 1)}{x^6 - 1}$$

$$= \dfrac{x^2(x-1)(x^2 + x + 1)}{(x^2 - 1)(x^4 + x^2 + 1)}$$

$$= \dfrac{x^2(x-1)(x^2 + x + 1)}{(x+1)(x-1)(x^4 + x^2 + 1)}$$

$$= \dfrac{x^2(x^2 + x + 1)}{(x+1)(x^4 + x^2 + 1)}$$

NPVS: $x \neq 0, \pm 1$

c.
$$\dfrac{x + 7 - \dfrac{8}{x}}{x + 10 + \dfrac{16}{x}}$$

$$= \dfrac{\dfrac{1}{x}(x^2 + 7x - 8)}{\dfrac{1}{x}(x^2 + 10x + 16)}$$

$$= \dfrac{(x+8)(x-1)}{(x+8)(x+2)}$$

$$= \dfrac{x-1}{x+2}$$

NVPS: $x \neq 0, -2, -8$

Assignment   Handout   Quiz Next Day!