

# **CREATIVE FACTORING & OTHER INTERESTING ALGEBRA**

# EXAMPLE 1: FACTOR

$$\begin{array}{l} a = \sqrt{x} \\ b = 4 \end{array} \quad x - 16$$
$$(\sqrt{x} + 4)(\sqrt{x} - 4)$$

Dif. of 2 Squares

$$x^2 - 16 \quad \begin{array}{l} a = x \\ b = 4 \end{array}$$
$$(x + 4)(x - 4)$$

## EXAMPLE 2: FACTOR

$$x^2 - 2$$

$$a = x$$
$$b = \sqrt{2}$$

$$(x + \sqrt{2})(x - \sqrt{2})$$

### EXAMPLE 3: FACTOR

$$\begin{aligned} & a = \sqrt{x^{16}} = x^8, \quad b = 1 \\ & x^{16} - 1 = (x^8 + 1)(x^8 - 1) \\ & \qquad \qquad \qquad a = x^4, \quad b = 1 \\ & (x^8 + 1)(x^4 + 1)(x^4 - 1) \\ & \qquad \qquad \qquad a = x^2, \quad b = 1 \\ & (x^8 + 1)(x^4 + 1)(x^2 + 1)(x^2 - 1) \\ & (x^8 + 1)(x^4 + 1)(x^2 + 1)(x + 1)(x - 1) \end{aligned}$$

## EXAMPLE 4: FACTOR

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

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

$$(x + 6)(x - 2)$$

Dif. of Squares

$$a = \sqrt{(x+2)^2} = x+2$$
$$b = 4$$
$$(a+b)(a-b)$$

# EXAMPLE 5: FACTOR

$$a = \sqrt[3]{(x+1)^3} = x+1$$
$$b = \sqrt[3]{64} = 4$$
$$(x+1)^3 + 64$$

Sum or Dif of  
Cubes  
 $(a+b)(a^2-ab+b^2)$

$$((x+1)+4)((x+1)^2 - 4(x+1) + 16)$$

★  $(x+5)((x+1)^2 - 4(x+1) + 16)$

$$(x^2 + 2x + 1 - 4x - 4 + 16)$$

$$(x+5)(x^2 - 2x + 13)$$

## EXAMPLE 6: FACTOR

$$a = \sqrt[3]{8c^3} = 2c$$

$$b = \sqrt[3]{(a+b)^3} = (a+b)$$

$$8c^3 - (a+b)^3$$

$$\text{Or } (2c - (a+b)) (4c^2 + 2c(a+b) + (a+b)^2)$$
$$(2c - a - b) (4c^2 + 2c(a+b) + (a+b)^2)$$

# RATIONALIZE THE NUMERATOR

multiply by conjugate

$$\frac{(\sqrt{x+6} - \sqrt{6})}{x} \cdot \frac{(\sqrt{x+6} + \sqrt{6})}{(\sqrt{x+6} + \sqrt{6})}$$

~~$(\sqrt{x+6})^2$~~   
 ~~$\sqrt{6}\sqrt{x+6} - \sqrt{6}\sqrt{x+6}$~~

$x$

$(\sqrt{x+6} + \sqrt{6})$

$$\frac{x+6 - 6}{x(\sqrt{x+6} + \sqrt{6})}$$

$$= \frac{x}{x(\sqrt{x+6} + \sqrt{6})}$$

$$= \frac{1}{\sqrt{x+6} + \sqrt{6}}$$



# SIMPLIFY COMPLEX FRACTIONS (CLEAR THE "LITTLE DENOMINATOR")

$$\left( \frac{\frac{x}{x+3} + 3}{\frac{x}{x+3}} \right) = \frac{\left( \frac{x}{x+3} + \frac{3(x+3)}{x+3} \right)}{\frac{x}{x+3}} = \frac{\frac{4x+9}{x+3}}{\frac{x}{x+3}}$$

$$\frac{4x+9}{x+3} \div \frac{x}{x+3} = \frac{4x+9}{\cancel{x+3}} \cdot \frac{\cancel{x+3}}{x} =$$

$$\frac{4x+9}{x}$$

multiply by the reciprocal!