

## Factoring Techniques:

- 1) Common Factor
- 2) Simple Trinomials
- 3) Decomposition
- 4) Perfect Square Trinomial

Factor:

$$\textcircled{1} x^2 - 11x - 30$$
$$(x-6)(x+5)$$

$$x^2 - 6x + 5x - 30$$
$$x(x-6) + 5(x-6)$$
$$(x-6)(x+5)$$

$$\textcircled{2} 4x^2 - 14x - 8$$
$$4x^2 - 16x + 2x - 8$$
$$4x(x-4) + 2(x-4)$$
$$(x-4)(4x+2)$$
$$2(x-4)(2x+1)$$
$$2(2x^2 - 7x - 4)$$

$$\textcircled{3} 7w^2 + 70w + 25$$
$$= (7w+5)^2$$

$$\begin{array}{c} 12 \\ / \quad \backslash \\ 4 \quad 3 \\ / \quad \backslash \\ 1 \quad 1 \end{array}$$

$$\textcircled{4} 3a^2 - 1a - 2$$
$$3a^2 + 2a - 3a - 2$$
$$a(3a+2) - 1(3a+2)$$
$$(3a+2)(a-1)$$

$$\textcircled{5} 5x^2 - 50x + 120$$

$$5(x^2 - 10x + 24)$$
$$5(x-4)(x-6)$$

$$\textcircled{6} 8x^2 + 6x - 5$$

$$8x^2 + 10x - 4x - 5$$
$$2x(4x+5) - 1(4x+5)$$
$$(4x+5)(2x-1)$$

## IV. Difference of Squares:

Multiply the conjugates shown below...

$$(x+3)(x-3)$$

$$= \underbrace{x^2 - 3x + 3x - 9}_{= x^2 - 9}$$

$$(5w-4)(5w+4)$$

$$25w^2 + \cancel{20w} - \cancel{20w} - 16 = 25w^2 - 16$$

$$(4ab-c)(4ab+c)$$

$$= 16a^2b^2 - c^2$$

See any pattern to help factor a polynomial of the form  $a^2 - b^2$  ?

$$(a-b)(a+b)$$

Factor each of the following if possible:

$$\begin{array}{l} 16k^2 - 9 \\ (4k-3)(4k+3) \end{array}$$

$$\begin{array}{l} 25r^2 - 16 \\ (5r-4)(5r+4) \end{array}$$

$$\begin{array}{l} b^2 - 1 \\ (b-1)(b+1) \end{array}$$

$$\begin{array}{l} 9n^2 - 1 \\ (3n-1)(3n+1) \end{array}$$

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

$$\begin{array}{l} 16p^2 - 25 \\ (4p-5)(4p+5) \end{array}$$

$$\begin{array}{l} 25y^2 - 9x^2 \\ (5y-3x)(5y+3x) \end{array}$$

$$\begin{array}{l} 16u^2 - 25v^2 \\ (4u-5v)(4u+5v) \end{array}$$

$$\begin{array}{l} x^2 - y^2 \\ (x-y)(x+y) \end{array}$$

$$\begin{array}{l} y^2 - 9x^2 \\ (y-3x)(y+3x) \end{array}$$

ex.

1)  $49w^2 + 1$   
 ~~$(7w+1)(7w-1)$~~

Does Not Factor

3)  $-25 - x^4$   
Does Not Factor

$$\sqrt{w^{36}} = (w^{36})^{1/2} = w^{18}$$

$$36w^{36} - 1$$
$$(6w^{18} - 1)(6w^{18} + 1)$$

2)  $-16 + 9x^6$   $\sqrt{x^6} = (x^6)^{1/2}$

$$9x^6 - 16$$
$$(3x^3 - 4)(3x^3 + 4)$$

OR

$$-1(16 - 9x^6)$$

$$-1(4 - 3x^3)(4 + 3x^3)$$

Let's make things slightly more complicated...

Factor each of the following:

$$16 - (a-b)^2$$

$$\begin{aligned} & \left[ \underset{\uparrow}{4} - \underset{\uparrow}{(a-b)} \right] \left[ \underset{\uparrow}{4} + \underset{\uparrow}{(a-b)} \right] \\ & (4-a+b)(4+a-b) \end{aligned}$$

$$16 - \underbrace{a^2}_{\cancel{a^2}} - \underbrace{2ab}_{\cancel{2ab}} + \underbrace{b^2}_{\cancel{b^2}} = (4 - \frac{a}{1})(4 + \frac{a}{1})$$

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

$$(a^2 + 12)^2 - 64a^2$$

$$\begin{aligned} & \left[ (a^2 + 12) - 8a \right] \left[ (a^2 + 12) + 8a \right] \\ & (a^2 - 8a + 12)(a^2 + 8a + 12) \\ & (a-2)(a-6)(a+6)(a+2) \end{aligned}$$

$$9(a-3)^2 - 25(a+2)^2$$

$$\begin{aligned} & \left[ 3(a-3) - 5(a+2) \right] \left[ 3(a-3) + 5(a+2) \right] \\ & (3a-9-5a-10)(3a-9+5a+10) \\ & (-2a-19)(8a+1) \\ & -(2a+19)(8a+1) \end{aligned}$$

$$81(x+2y)^2 - 4(x-2y)^2$$

$$\begin{aligned} & \left[ 9(x+2y) - 2(x-2y) \right] \left[ 9(x+2y) + 2(x-2y) \right] \\ & (9x+18y-2x+4y)(9x+18y+2x-4y) \\ & (7x+22y)(11x+14y) \end{aligned}$$

## Practice Problems...

Page 194 - 195  
#8, 10, 11, 12, 13, 20

### Factoring Quiz Tomorrow

Bonus: [3 points]

Completely factor the following:

$$9y^2 - 30y + 25 - 16x^2 - 24x - 9$$