Warm-Up: Factor!

① $(b-1)\left(\frac{(b-1)a^2+2(b-1)a-8(b-1)}{b-1}\right)$

$(b-1)(a^2+2a-8)$

⊗ -8 | $(1,-8)$, $(-1,8)$, $(2,-4)$, $(-2,4)$

⊕ $+2$ | -7 7 -2 2

$(b-1)(a-2)(a+4)$ Check

Today, we will be factoring

ax^2+bx+c

⊗ $a \cdot c$ |

⊕ b |

② $(x^2-8x+16)-y^2$ (perfect square quadratic)

⊗ 16 | $(1,16)$, $(4,4)$, $(-4,-4)$, $(2,8)$, $(-2,-8)$, $(-1,-16)$

⊕ -8 | 17 8 -8

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

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

$\sqrt{1^{st}} = \sqrt{(x-4)^2} = (x-4)$ 'a'

$\sqrt{2^{nd}} = \sqrt{y^2} = y$ 'b'

$((x-4)-y)((x-4)+y)$

Find p, q so that

$p \cdot q = a \cdot c$ and $p + q = b$

p, q are not factors anymore

Ex 1 Factor $6x^2 + 11x + 4$

$6 \times 4 = a \cdot c$

$\times$ 24	(1, 24),	(2, 12),	(3, 8),	(4, 6)
$+$ 11	25	14	11	10

(2) Split our middle term

$6x^2 + 3x + 8x + 4$

(3) Factor each pair

$(6x^2 + 3x) + (8x + 4)$

$3x(2x + 1) + 4(2x + 1)$

(4) Factor out Common factor from the pairs

$(2x+1)(3x+4)$ Check

$= 6x^2 + 8x + 3x + 4 = 6x^2 + 11x + 4$

11

Ex 2 Factor

$-4x^2 - 14x + 8$

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

$2 \cdot -4$

⊗ -8	$(-1, 8)$, $(-2, 4)$, $(2, -4)$, $(1, -8)$	
⊕ 7	7	

$= -2\left(2x^2 - x + 8x - 4\right)$

$= -2\left(x(2x-1) + 2(4x-2)\right)$

$= -2\left(x(2x-1) + 4(2x-1)\right)$

$= -2\left[(2x-1)(x+4)\right]$

$= -2\left((2x^2+8x)(-x-4)\right)$

$= -2\left[(2x^2+8x) + (-x-4)\right]$

$= -2\left[2x(x+4) - 1(x+4)\right]$

$= -2\left[(x+4)(2x-1)\right]$

Special Case #2

Perfect Square quadratics

Notice $(a+b)^2 = (a+b)(a+b) = a^2 + ab + ab + b^2$

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

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

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

If the first and last term are positive and perfect squares, check middle term

If middle term $= \pm 2\sqrt{1^{st}} \cdot \sqrt{last}$

we have a perfect Square.

Ex 3 Factor

$$4x^2 + 12x + 9$$

$\sqrt{1^{st}} = \sqrt{4x^2} = 2x$ ← a

$\sqrt{last} = \sqrt{9} = 3$ ← b

check middle: $\pm 2(2x)(3) = \pm 12x$

$= (2x + 3)^2$

Ex 4 Factor $-2a^3 + 8a^2b - 8ab^2$

$= -2a(a^2 - 4ab + 4b^2)$

$\sqrt{1^{st}} = \sqrt{a^2} = a$

$\sqrt{last} = \sqrt{4b^2} = 2b$

Check $\pm 2(a)(2b) = \mp 4ab$

$= -2a(a \mp 2b)^2$

Summary

1. Common factors!
2. Special cases (Diff. Sq. or Perf. Sq.)

(1st and last term are perf. Sq. then Probably a special case)

3. $x^2 + bx + c$ => use what we learned yesterday

4. $ax^2 + bx + c$ => use what we learned today

5. Check!

Mon: work time

Wed: Quiz