Factoring Hard Trinomials

① $3x^2 - 2x - 8$ (-24)

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

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

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

② $5w^2 - 27w + 10$ (+50)

$\left(\frac{5w-25}{5}\right)\left(\frac{5w-2}{1}\right)$

$(w-5)(5w-2)$

③ $4a^2 + 4a - 8$ (-32)

$4(a^2 + a - 2)$

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

OR

$4a^2 + 8a - 4a - 8$

$4a(a+2) - 4(a+2)$

$(a+2)(4a-4)$ ← Factors Further

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

④ $10w^2 - 55w + 60$ (+600)

$5(2w^2 - 11w + 12)$ (+24)

$5\left(\frac{2w-8}{2}\right)(2w-3)$

$5(w-4)(2w-3)$ ← Therefore

∴ OR

Both were divisible by 5

$\left(\frac{10w-40}{10}\right)\left(\frac{10w-15}{5}\right)$

$5(w-4)(2w-3)$

When Finished...

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#15, 17, 18, 19, 21

Warm-Up...

Expand...

1) $(x-5)^2$

Will be Trinomial

$(x-5)(x-5)$

$x^2-5x-5x+25$

$x^2-10x+25$

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

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

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

$3(16x^2+8x+1)$

$=48x^2+24x+3$

4) $-2(6x-5)^2$

$-2(36x^2-60x+25)$

$-72x^2+120x-50$

Quiz: [6]

$(3x-2)(5x+1)-2(x-4)^2+5(2x+1)(4x-3)$

$15x^2+3x-10x-2-2(x^2-8x+16)+5(8x^2-6x+4x-3)$

$15x^2+3x-10x-2-2x^2+16x-32+40x^2-30x+20x-15$

$= 53x^2-x-49$

2. a) $2a^3b^5(4b^{10}-6a^2c^2+3a^4b^5)$

b) $(a-5b)(5w-10w^3)$

$(a-5b)(5w)(1-2w^2)$

c) $2mx+15y-6my-5x$

$2mx-6my+15y-5x$

$2m(x-3y)-5(-3y+x)$

$(x-3y)(2m-5)$

d) $(a-10)(a+2)$

e) $5(y^2-6y+5)$

$5(y-5)(y-1)$

f) $(w-15)(w+2)$

3/ (a) $5400 \Rightarrow 2^3 \cdot 3^3 \cdot 5^2$

$2016 \Rightarrow 2^5 \cdot 3^2 \cdot 7$

(b) GCF $= 2^3 \cdot 3^2$ ← overlap of factors...

$= 8 \cdot 9$ lowest exponent of each

$= 72$

LCM: $2^5 \times 3^3 \times 5^2 \times 7^1$ ⇐ every factor from BOTH... then use largest exponent.

$= 151200$

Special Polynomials:

Perfect Square Trinomials:

$(x-3)^2 = 1x^2 - 6x + 9$

$= (x-3)^2$

(1) 1st & Last MUST be Perfect Squares

(2) Square Root of 1st x Square Root of 3rd then double... MUST be equal to Middle term

$15x$

$3x \quad (\cdot 2) \quad 5$

$9x^2 + 30x + 25$

$(3x+5)^2$

$144x^2 + 96x + 16$

$12x \quad 4$

$= (12x + 4)^2$

$= [4(3x+1)]^2$

$= 16(3x+1)^2$

$(6x)\quad (8)$

$36x^2 + 96x + 64$

$(6x+8)^2$

$[2(3x+4)]^2$

$4(3x+4)^2$

Difference of Squares

$\underbrace{(x+3)(x-3)}_{\text{conjugates}} = x^2-3x+3x-9$
$= x^2-9$

$(3x-5)(3x+5) = 9x^2+15x-15x-25$
$= 9x^2-25$

$(4x+3)(4x-3)$
$= 16x^2-9$

Factor: $25x^2-9$

(1) $(5x+3)(5x-3)$

2/ x^2-49
$(x+7)(x-7)$

3/ $100x^2-81$
$(10x+9)(10x-9)$

Factor each of the following...

* Common Factor (No Limit)
  Grouping (4 terms)
  Simple Trinomials
  Hard Trinomials (3 terms)
  Perfect Square Trinomial
  Difference of Squares (2 terms)

1) $x^2 - 25$ Diff. of Sq.

$(x-5)(x+5)$

Conjugates

2) $x^2 - 10x + 21$ Simple Trinomial

$(x-7)(x-3)$

3) $5a^2 - 8a - 4$ Hard Trinomial

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$5a^2 - 10a + 2a - 4$

$5a(a-2) + 2(a-2)$

$(a-2)(5a+2)$

Decomposition

OR ...

$\left(\frac{5}{5}a - \frac{10}{5}\right)(5a+2)$

$(a-2)(5a+2)$

4) $6a^2 - 72a + 81$

$4a \cdot 9$

$4a(9) \times 2 = 72a$!! Bingo

$= (4a-9)^2$

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8, 10, 11, 13

*20, 21 Advanced

$m^2 - 6mn + 5n^2$

$(m - 5n)(m - 1n)$