3.7 *Factoring A Difference of Squares*
↳ "Reverse MM's"

Warmup: 1. Expand a) $(y+2)(y-2)$ b) $(a+b)(a-b)$ c) $(2x-y)(2x+y)$

a) $= y^2 - 4$ b) $= a^2 - b^2$ c) $= 4x^2 - y^2$

Note₁: Each term in the answer line is a perfect square and the answer is called a DIFFERENCE of SQUARES.

Note₂: To factor a difference of two squares, write each term as a power with exponent 2 and add and subtract the square roots of the two terms. i.e. $(ax)^2 - (b)^2$

$= (ax+b)(ax-b)$
"sum" "difference"

Ex. Factor.

a) $x^2 - 9$

Sol'n $= (x)^2 - (3)^2$
$= (x+3)(x-3)$

b) $9x^2 - 16$
$= (3x)^2 - (4)^2$, write as $(ax)^2 - (b)^2$
$= (3x-4)(3x+4)$, factor using our pattern.

c) $49y^2 - 1$
$= (7y)^2 - (1)^2$
$= (7y-1)(7y+1)$

d) $4x^2y^2 - 25n^2$
$= (2xy)^2 - (5n)^2$
$= (2xy+5n)(2xy-5n)$

e) $2x^2 - 32$

Sol'n $= 2(x^2 - 16)$, common factor 1st
$= 2(x-4)(x+4)$, $a^2x^2 - b^2$ pattern

f) $(n-3)^2 - (n+2)^2$
$= [(n-3)+(n+2)][(n-3)-(n-2)]$, $a^2x^2-b^2$ pattern
$= [2n-1][n-3-n+2]$, simplify
$= (2n-1)(-1)$, simplify.

g) $(2x+y)^2 - (3x+2y)^2$
$= [(2x+y)+(3x+2y)][(2x+y)-(3x+2y)]$, pattern
$= (5x+3y)(-1x-1y)$

h) $x^2 + 1$
$= (x)^2 + (1)^2$, Does NOT factor b/c this is a sum of squares
DONE

e)

Remark₁: Recall how to efficiently square a binomial. We use one of these patterns: $(a+b)^2 = \underbrace{a^2+2ab+b^2}$ and $(a-b)^2 = \underbrace{a^2-2ab+b^2}$.

These trinomials are called perfect square trinomials since they are squares of binomials.

Note₃: The middle term of $a^2 \pm 2ab \pm b^2$ is equal to 2×(Product of the square roots of the outer terms)

Ex₂ Factor these perfect square trinomials.

a) $x^2+8x+16$

b) m^2-6m+9

c) $x^2-2xy+y^2$

Sol'n ✓ $\sqrt{x^2} = x$

✓ $\sqrt{16} = 4$

middle term $= 2((x)(4))$

$= 8x$

So factors are $(x+4)(x+4)$

$= (x+4)^2$

Check: $(x+4)(x+4)$

$= x^2 + 4x + 4x + 16$

F O I L

$= x^2+8x+16$ ✓

Sol'n $= (m-3)^2$

Sol'n $= (x-y)^2$

P167 # (1-3) 1st column

(6,7) odd letters

11a)

P144 # 16, 17