

2.5 Factoring Quadratic Expressions: Special Cases

[Background]: Expand.

$$\begin{array}{llll}
 \text{a)} \ (x-5)^2 & \text{b)} \ (2x+3)^2 & \text{c)} \ (8x-6)^2 & \text{d)} \ (3x-4y)^2 \\
 = x^2 - 10x + 25 & = 4x^2 + 12x + 9 & \checkmark & = 9x^2 - 24xy + 16y^2 \\
 \text{e)} \ (x-3)(x+3) & \text{f)} \ (5x-4)(5x+4) & \text{g)} \ (2x-9y)(2x+9y) \\
 = x^2 + 3x - 3x - 9 & = 25x^2 - 16 & = 4x^2 - 81y^2 \\
 = x^2 - 9 & &
 \end{array}$$

Ex. 1: Factor. When finished, point out that these are "perfect-square trinomials".

$$\begin{array}{lll}
 \text{a)} \ x^2 + 12x + 36 & \text{b)} \ 9x^2 + 12x + 4 & \text{c)} \ 25x^2 - 70x + 49 \\
 = (x+6)^2 & = (3x+2)^2 & = (5x-7)^2
 \end{array}$$

Ex. 2: Factoring a "difference of squares".

$$\begin{array}{llll}
 \text{a)} \ x^2 - 1 & \text{b)} \ x^2 - 81 & \text{c)} \ 4x^2 - 9y^2 & \text{d)} \ 4 - 9x^2 \\
 = (x+1)(x-1) & \checkmark & = (2x+3y)(2x-3y) & = (2+3x)(2-3x) \\
 = (x+9)(x-9) & & &
 \end{array}$$

Ex. 3: Factor, if possible. [It is always understood to be factor completely.]

$$\begin{array}{llll}
 \text{a)} \ 12 - 48x^2 & \text{b)} \ 25y^6 - 100 & \text{c)} \ 4xy - 16xy^3 & \text{d)} \ -8x^2 + 24x - 18 \\
 = 12(1 - 4x^2) & = 25(y^6 - 4) & = 4xy(1 - 4y^2) & \checkmark \\
 = 12(1 + 2x)(1 - 2x) & = 25(y^3 - 2)(y^3 + 2) & = 4xy(1 - 2y)(1 + 2y) & = -2(4x^2 - 12x + 9) \\
 & & & = -2(2x - 3)^2
 \end{array}$$