

Factoring Quadratic Expressions:  $ax^2 + bx + c$  where  $a \neq 1$ 

Date: \_\_\_\_\_

Ex. 1: Factor using the Product/Sum method.

a)  $2x^2 + 7x + 3$

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

$a=1 \quad b=7$

$c=3$

$(3=1 \quad 3)$

$1 \times 1$

$2 \times 3$

$-3+2$

$=5$

$3x^2 - 2x - 5$

$a=3 \quad b=-2$

$c=-5$

$(3=1 \quad 3)$

$1 \times 1$

$2 \times 3$

$-3+2$

$=-7$

$e) 12x^2 - 17x + 6$

$a=12 \quad b=-17$

$c=6$

$(6=2 \quad 3)$

$1 \times 1$

$2 \times 3$

$-6+3$

$=-2$

$f) 3x^2 + 13x - 10$

$a=3 \quad b=13$

$c=-10$

$(3=1 \quad 3)$

$1 \times 1$

$2 \times 3$

$-6+3$

$=-3$

d)  $6x^2 - 7x - 3$

$= (2x-3)(3x+1)$

$e) 12x^2 - 17x + 6$

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

Ex. 2: Factor using the Australian method.

a)  $4x^2 - 3x - 1$

$= \frac{(4x+1)(4x-4)}{4}$

b)  $m: -9$

$s: -3$

$6x^2 - 7x - 3$

$m: 18$

$s: 9$

$= (4x+1) \cancel{x}(x-1)$

$= \cancel{4} (4x+1) \cancel{x}(x-1)$

$= (4x+1)(x-1)$

$= (6x+2)(6x-9)$

$= \cancel{2}(3x+1) \cancel{3}(2x-3)$

$= (3x+1)(2x-3)$

**Ex. 3:** Factor. (Hint: Take out a common factor first!)

a)  $9x^2 - 15x + 6$

$$\begin{aligned} &= 3(3x^2 - 5x + 2) \\ &= 3(3x-2)(x-1) \\ &\quad \begin{array}{l} (3x-2) \\ (1) \\ -3 \rightarrow \\ -5 \end{array} \end{aligned}$$

b)  $6n^3 + 15n^2 - 36n$

$$\begin{aligned} &= 3n(2n^2 + 5n - 12) \\ &= 3n(2n-3)(n+4) \end{aligned}$$

c)  $16x^2 + 20x - 6$

$$\begin{aligned} &= 2(8x^2 + 10x - 3) \\ &= 2(4x-1)(2x+3) \end{aligned}$$

**Ex. 4:** For each expression, name an integer  $k$  such that the quadratic trinomial can be factored.

a)  $kx^2 + 4x + 1$

$$\begin{aligned} k &= 3 \\ 3x^2 + 4x + 1 \\ (3x+1)(x+1) \end{aligned}$$

b)  $4x^2 + kx - 10$

$$\begin{aligned} 4x^2 - 18x - 10 \\ 4x^2 - 3x - 10 \end{aligned}$$

$$\begin{array}{r} -40 \\ 1 - 40 \\ 2 - 20 \\ \cancel{3} \cancel{- 10} \\ 5 - 8 \end{array} \Rightarrow -18$$

**Ex. 5:** (Extending) Factor.

a)  $6x^2 + 11xy + 3y^2$

$$\begin{aligned} &\cancel{+ 6x^2} + 11xy + 3y^2 \\ &= (2x+3y)(3x+y) \\ &\quad \begin{array}{l} 6 \ 1 \ 6 \\ \cancel{2} \cancel{3} \\ 3 \ 1 \ 3 \\ 3 \cancel{x} \ 3 \quad 3 \cancel{y} \ 1 \\ = 6+3 \quad = 2+9 \\ = 9 \quad = 11 \end{array} \end{aligned}$$

b)  $8x^2 - 14xy + 3y^2$

$= (4x - y)(2x - 3y)$