

## 5.5 Factor Quadratic Expressions of the Form $ax^2 + bx + c$

### A Factoring $ax^2 + bx + c$

To factor the trinomial  $ax^2 + bx + c$   $a \neq 0, \pm 1$

- ✓ Find two integers  $p$  and  $q$  so:

$$pq = ac \quad \text{and} \quad p + q = b$$

- ✓ break up the middle term  $bx$  into  $px + qx$
- ✓ factor by grouping

Example 1. Factor fully, if possible.

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

b)  $3x^2 - 11x + 6$

c)  $15x^2 + 16x + 4$

Example 2. Factor fully, if possible.

a)  $9x^2 - 6xy - 8y^2$

b)  $10x^2 + 17xy + 3y^2$

c)  $6x^2 - 23xy + 20y^2$

Example 3. Factor fully by factoring first the GCF.

a)  $-6x^3y - 9x^2y + 6xy$

b)  $12x^3y^2 + 14x^2y^3 + 4xy^3$

c)  $-30x^3yz + 52x^2y^2z - 16xy^3z$

Example 4. Factor fully.

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

b)  $(x - 2)^2 + 4(x - 2) - 5$

c)  $3(x + 1)^3 - 7(x + 1)^2 + 2(x + 1)$

### C Technology

- ✓ Use technology to find  $x_1$  and  $x_2$  for the equation  $ax^2 + bx + c = 0$
- ✓ Substitute  $x_1$  and  $x_2$  into  $a(x - x_1)(x - x_2)$  to get the *factored form*
- ✓ Distribute the factors of  $a$  between the two brackets according to specific needs

Example 5. Use technology (scientific calculator, [Wolfram Alpha](#), [Symbolab](#)) to factor.

a)  $5x^2 - 5x - 6$

b)  $12x^2 - 23x + 5$