

Quadratic equations :

(linear) (linear) = quadratic

or

$ax^2 + bx + c = 0$ where highest degree is two

10.3

Multiplying Polynomials: Two Special Cases

$$\begin{aligned} (x + 3)(x - 3) &= x^2 - 3x + 3x - 9 && \text{"Sum and difference"} \\ &= x^2 - 9 && \text{No middle term} \end{aligned}$$

- 29. a.** Draw and label a rectangle whose area is represented by each expression.

$$x^2 + 3x + 4x + 12$$

$$x^2 + 7x + 10$$

- b.** For each expression in part (a), write an equivalent expression in factored form.

- 30.** Write each expression in factored form.

a. $x^2 + 13x + 12$

b. $x^2 - 13x + 12$

c. $x^2 + 8x + 12$

d. $x^2 - 8x + 12$

e. $x^2 + 7x + 12$

f. $x^2 - 7x + 12$

g. $x^2 + 11x - 12$

h. $x^2 - 11x - 12$

i. $x^2 + 4x - 12$

j. $x^2 - 4x - 12$

k. $x^2 + x - 12$

l. $x^2 - x - 12$



For: Help with Exercise 30

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For Exercises 31–39, determine whether the equation represents a quadratic relationship *without* making a table or a graph. Explain.

31. $y = 5x + x^2$

32. $y = 2x + 8$

33. $y = (9 - x)x$

34. $y = 4x(3 + x)$

35. $y = 3^x$

36. $y = x^2 + 10x$

37. $y = x(x + 4)$

38. $y = 2(x + 4)$

39. $y = 7x + 10 + x^2$

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$$\begin{aligned}(2x + 5)^2 &= (2x + 5)(2x + 5) && \textit{Square of a binomial} \\ &= 4x^2 + 10x + 10x + 25 \\ &= 4x^2 + 20x + 25 && \textit{Middle term is } 2(2x)(5).\end{aligned}$$

Multiply: $(5t - 2)(5t + 2)$.

Solution This special product represents the sum and difference of two terms. The product has the form $(a - b)(a + b) = a^2 - b^2$.

$$\begin{aligned}(5t - 2)(5t + 2) &= (5t)^2 - 2^2 \\ &= 25t^2 - 4\end{aligned}$$

Multiply: $(2x - 7)^2$.

Solution This special product represents the square of a binomial. The product has the form $(a - b)^2 = a^2 - 2ab + b^2$. Note that the *middle* term of the product is twice the product of the two terms of the binomial.

$$\begin{aligned}(2x - 7)^2 &= (2x)^2 - 2(2x)(7) + 7^2 \\ &= 4x^2 - 28x + 49\end{aligned}$$



1.) $(x + 2)^2$

$$(x+2)(x+2)$$

$$x(x+2) + 2(x+2)$$

$$x^2 + 2x + 2x + 4$$

$$x^2 + 4x + 4$$

3.) $(2n + 1)^2$

$$(2n+1)(2n+1)$$

$$4n^2 + 4n + 1$$

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

$$(x+3)(x+3)$$

$$x^2 + 6x + 9$$

4.) $(2m - 3)^2$

$$\begin{array}{r}
 2m - 3 \\
 \cdot 2m - 3 \\
 \hline
 6m - 9 \\
 + 4m^2 - 6m \\
 \hline
 4m^2 - 12m + 9
 \end{array}$$

5.) $(x - 9)^2$

$$x^2 - 18x + 81$$

6.) $(3t - 2)^2$

$$9t^2 - 12t + 4$$

7.) $(5x - 6)(5x + 6)$

$$25x^2 - 36$$

* 8.) $(a + 2b)(a - 2b)$

$$a^2 - 4b^2$$

9.) $(4x - 7y)(4x + 7y)$

10.) $(2x - 5)^2$

11.) $(4s + 3t)^2$

12.) $(2x - 5y)^2$