

Topic 7.7 – Factoring Special Cases

Critique & Explain Seth and Bailey are given the polynomial $8x^2 + 48x + 72$ to factor.

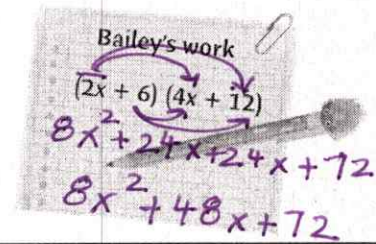
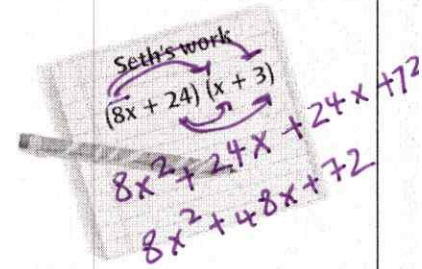
A. Analyze each factored expression to see if both are equivalent to the given polynomial.

$$8(x^2 + 6x + 9) = 8(x+3)(x+3) = 8(x+3)^2$$

B. How can the product of different pairs of expressions be equivalent?

Seth: $(8x+24)(x+3) = 8(x+3)(x+3)$
 Bailey: $(2x+6)(4x+12) = 2(x+3)4(x+3) = 8(x+3)(x+3)$

C. Find two other pairs of binomials that are different, but whose products are equal.



EXAMPLE 1 - Understand Factoring a Perfect Square

A. What is the factored form of $x^2 + 14x + 49$?

$$x^2 + 14x + 49 = (x+7)^2$$

A perfect-square trinomial results when a binomial is squared. The first and last terms are perfect squares. The middle term is twice the product of the first and last terms of the binomial.

$$(a + b)(a + b) = (a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)(a - b) = (a - b)^2 = a^2 - 2ab + b^2$$

B. What is the factored form of $9x^2 - 30x + 25$?

$$9x^2 - 30x + 25 = (3x - 5)^2$$

Try it. Factor each trinomial.

a. $4x^2 + 12x + 9 = (2x+3)^2$

b. $x^2 - 8x + 16 = (x-4)^2$

EXAMPLE 3 – Factor a Difference of Two Squares

A. What is the factored form of $x^2 - 9$?

$$x^2 - 9 = (x-3)(x+3)$$

Recall that a binomial in the form $x^2 - a^2$ is called the difference of two squares.

$$(a - b)(a + b) = a^2 - ab + ab - b^2 = a^2 - b^2$$

B. What is the factored form of $4x^2 - 81$?

$$4x^2 - 81 = (2x-9)(2x+9)$$

Try it. Factor each expression.

a. $x^2 - 64 = (x-8)(x+8)$

b. $9x^2 - 100 = (3x-10)(3x+10)$

EXAMPLE 4 - Factor a Difference of Two Squares

What is the factored form of $3x^3y - 12xy^2$?

$$3xy(x^2 - 4y) = 3xy(x-2y)(x+2y)$$

a. $4x^3 + 24x^2 + 36x = 4x(x^2 + 6x + 9)$

$$4x(x^2 + 2 \cdot x \cdot 3 + 3^2) = 4x(x+3)^2$$

b. $50x^2 - 32y^2$

$$2(25x^2 - 16y^2)$$

$$2(5^2x^2 - 4^2y^2)$$

$$2(5x-4y)(5x+4y)$$

