BOARD NOTES

13 NOVEMBER 2019

2A.7 (B) add, subtract, and multiply polynomials;
2A.7 (C) determine the quotient of a polynomial of degree three and of degree four when divided by a polynomial of degree one and of degree two;
2A.7 (D) determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
2A.7 (E) determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping;

We will be able to determine the factors of trinomial polynomials using the quadratic formula.

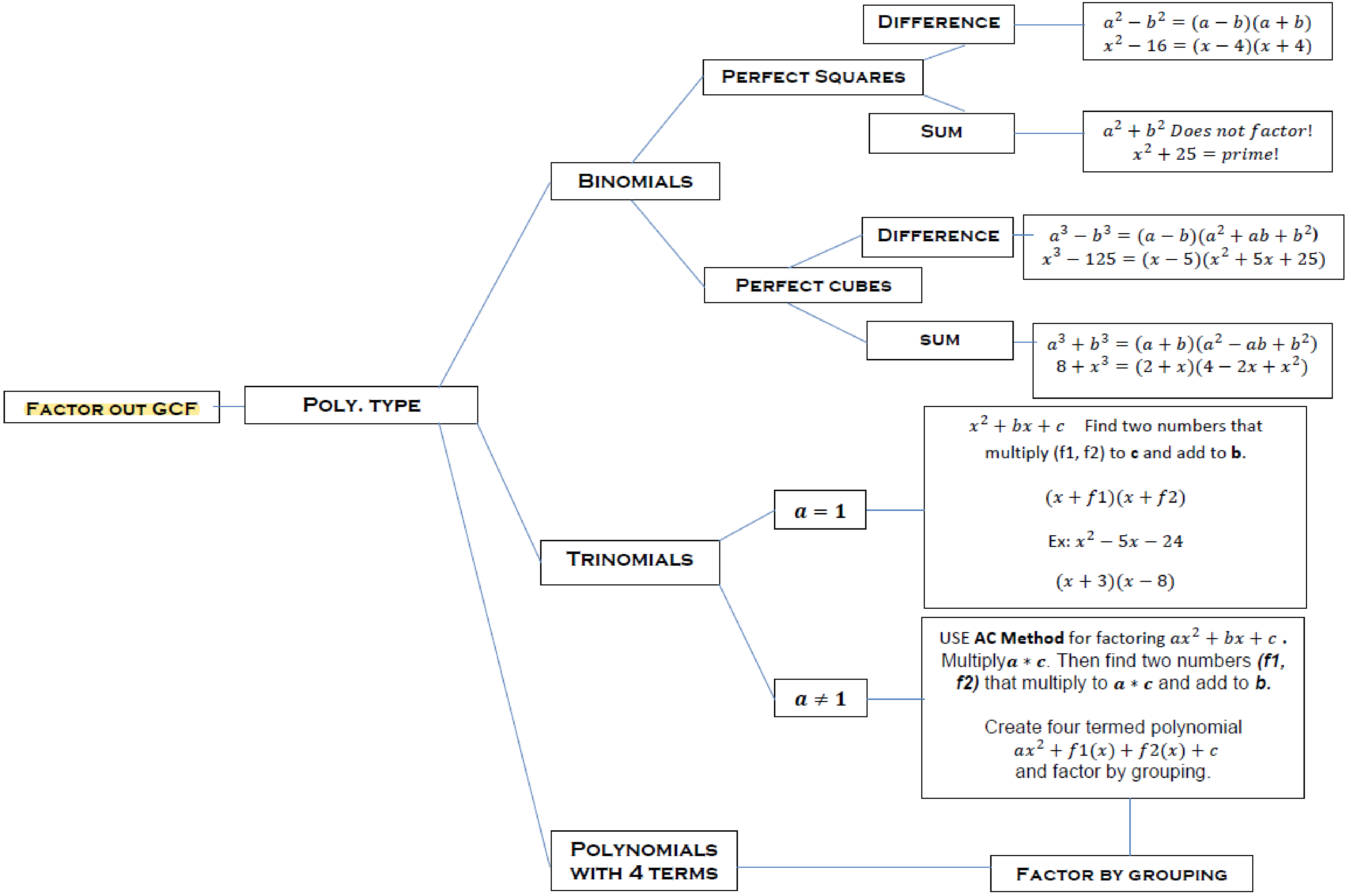
WHAT WE NEED:

- Definition of polynomial
- Laws of Exponents
- Addition and Subtraction of Polys
- Multiplication of Polys
- Division of Polys

I WILL BE ABLE TO COMPLETE MY HOMEWORK GIVEN THE

- Polynomial

FACTORING POLYNOMIALS FLOW CHART



The Zero-Product Principle

To solve a quadratic equation by factoring, we apply the **zero-product principle** which states that:

If the product of two algebraic expressions is zero, then at least one of the factors is equal to zero.

If $AB = 0$, then $A = 0$ or $B = 0$.

Solving a Quadratic Equation by Factoring

If necessary, rewrite the equation in the general form $ax^2 + bx + c = 0$, moving all nonzero terms to one side, thereby obtaining zero on the other side.

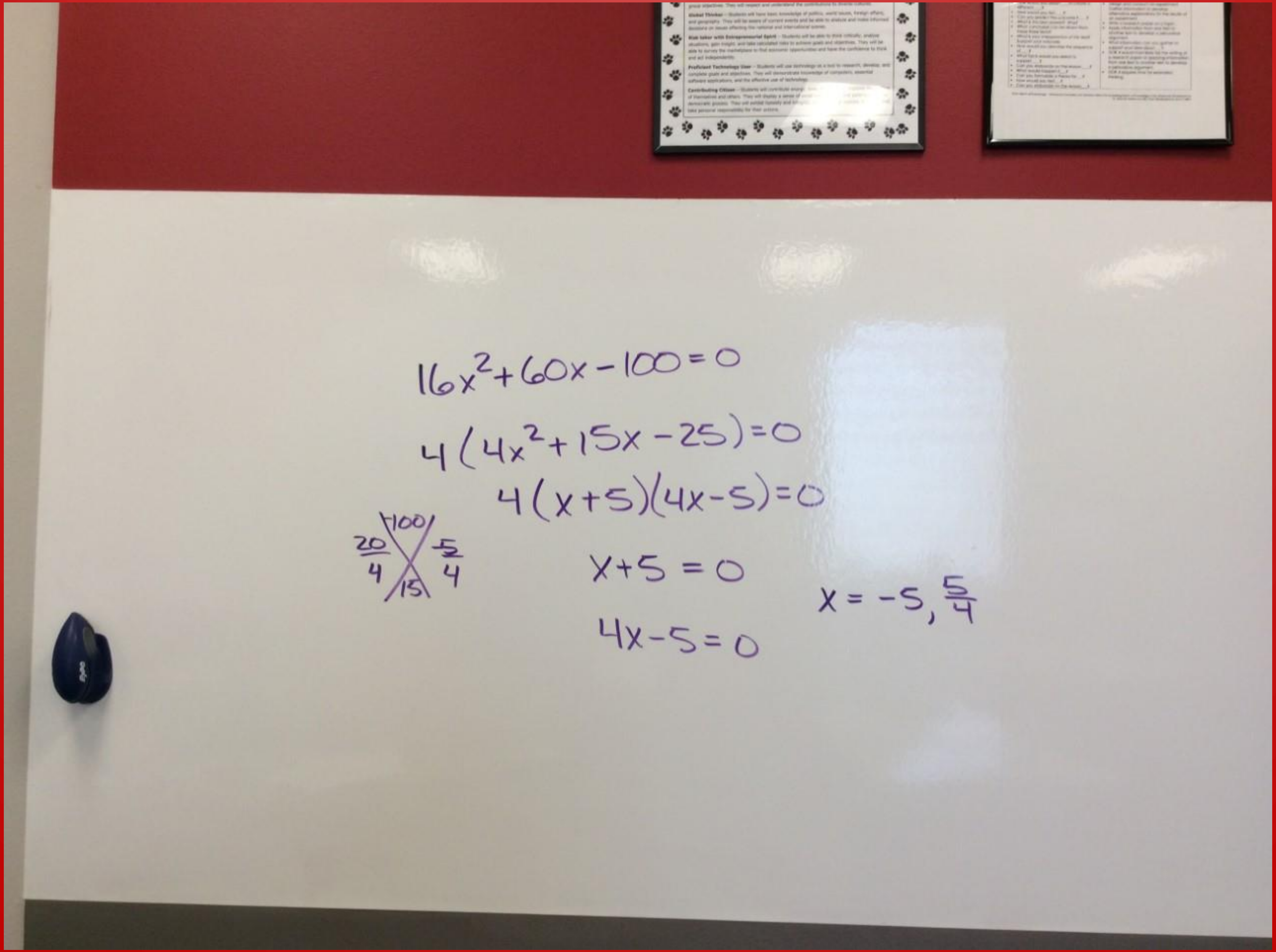
Factor completely.

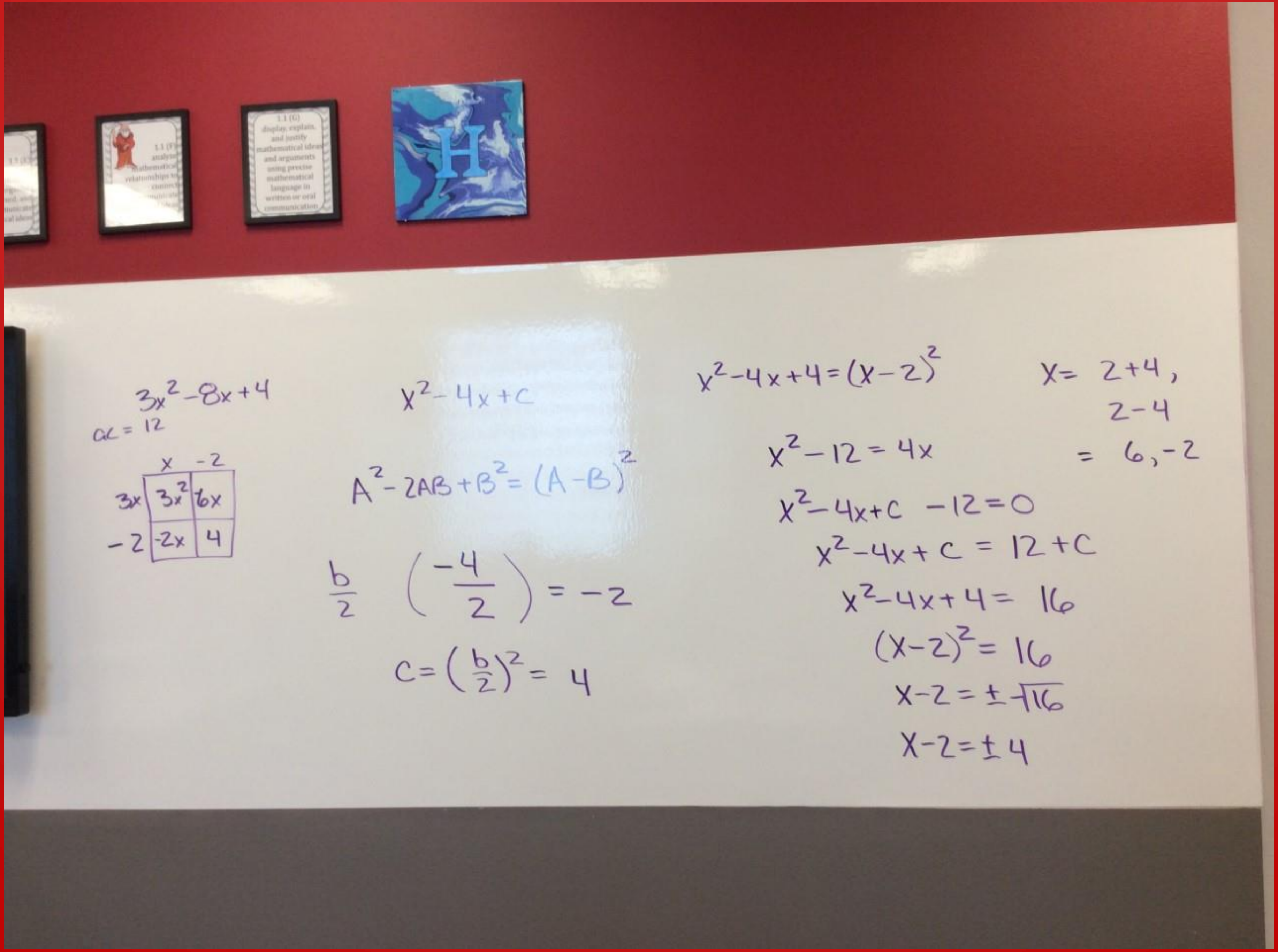
Apply the zero-product principle, setting each factor containing a variable equal to zero.

The Quadratic Formula

The solutions of a quadratic equation in general form $ax^2 + bx + c = 0$ with $a \neq 0$, are given by the **quadratic formula**:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$


16x²+60x−100=0
4(4x²+15x−25)=0
4(x+5)(4x−5)=0
−100
20
4
−5
4
15
x+5=0
4x−5=0
x=−5, 5/4



H
3x²−8x+4
ac = 12
x −2
3x 3x² −6x
−2 −2x 4
x²−4x+C
A²−2AB+B² = (A−B)²
b/2 (−4/2) = −2
C = (b/2)² = 4
x²−4x+4 = (x−2)²
x²−12 = 4x
x²−4x+C −12 = 0
x²−4x+C = 12+C
x²−4x+4 = 16
(x−2)² = 16
x−2 = ±√16
x−2 = ±4
x = 2+4, 2−4
= 6, −2

$x^2 - 12 = 4x$

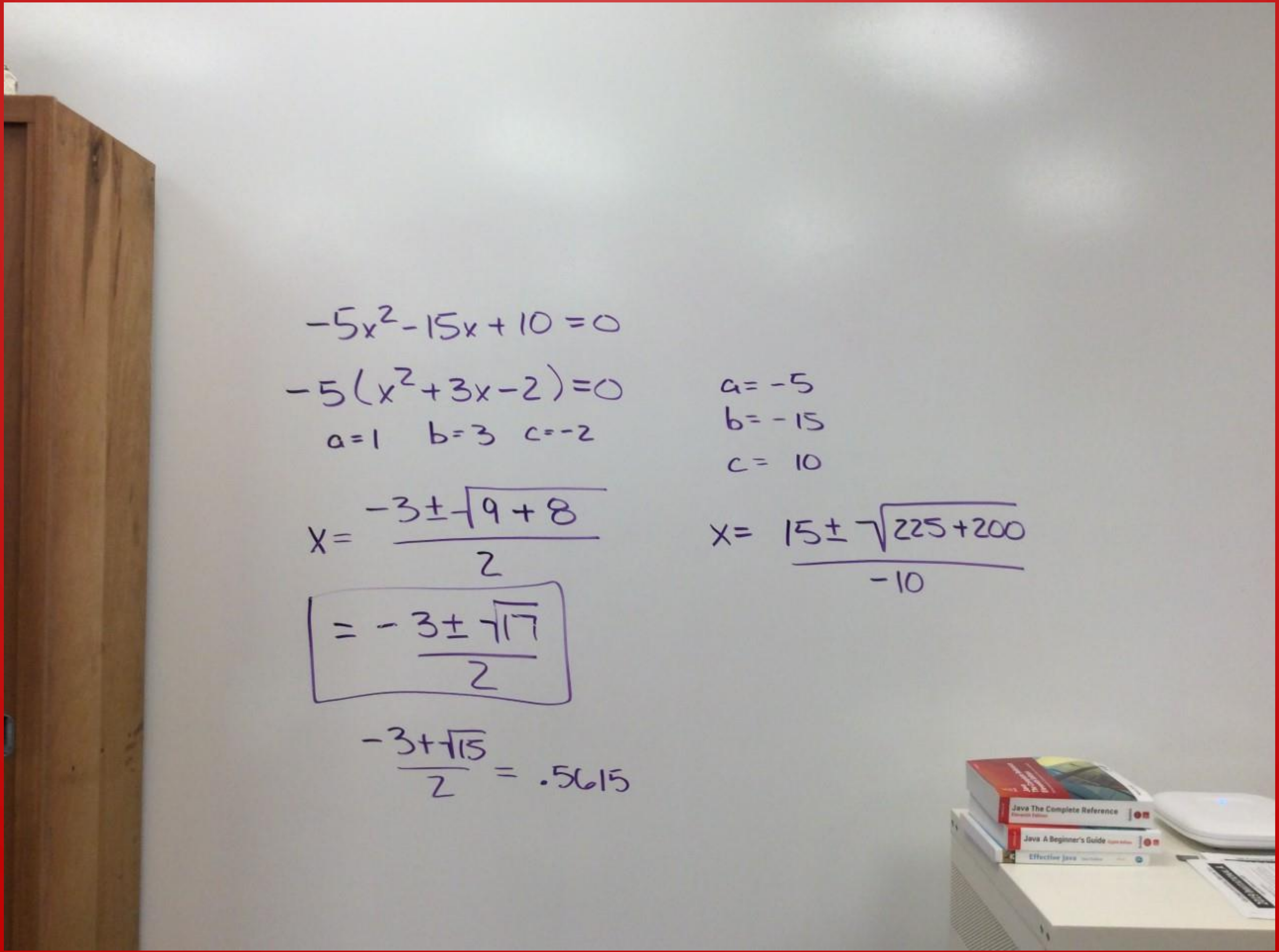
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$x =$

$\boxed{}\,x^2 \boxed{-4}\,x \boxed{-12} = 0$

a, b, c

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-12)}}{2(1)} = \frac{4 \pm \sqrt{16 - (-48)}}{2} = \frac{4 \pm \sqrt{64}}{2} = \frac{4 \pm 8}{2}$$


-5x^2 - 15x + 10 = 0
-5(x^2 + 3x - 2) = 0
a = 1   b = 3   c = -2
a = -5
b = -15
c = 10
x = (-3 ± √(9 + 8)) / 2
= (-3 ± √17) / 2
x = (15 ± √(225 + 200)) / -10
(-3 + √15) / 2 = .5615
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Factoring Polynomials

Factoring a polynomial expressed as the sum of monomials means finding an equivalent expression that is a product. The goal in factoring a polynomial is to use one or more factoring techniques until each of the polynomial's factors, except possibly for a monomial factor, is prime or irreducible. In this situation, the polynomial is said to be **factored completely**.

Greatest Common Factor

The **greatest common factor**, abbreviated GCF, is an expression of the highest degree that divides each term of the polynomial.

The Difference of Two Squares

If A and B are real numbers, variables, or algebraic expressions, then

$$A^2 - B^2 = (A + B)(A - B).$$

In words: The difference of the squares of two terms factors as the product of a sum and a difference of those terms.

Factoring Perfect Square Trinomials

Let A and B be real numbers, variables, or algebraic expressions.

1. $A^2 + 2AB + B^2 = (A + B)^2$
2. $A^2 - 2AB + B^2 = (A - B)^2$

Factoring the Sum or Difference of Two Cubes

1. Factoring the Sum of Two Cubes

$$A^3 + B^3 = (A + B)(A^2 - AB + B^2)$$

2. Factoring the Difference of Two Cubes

$$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$$

A Strategy for Factoring $ax^2 + bx + c$

Assume, for the moment, that there is no greatest common factor.

1. Find two **F**irst terms whose product is ax^2:

$$(\square x + \quad)(\square x + \quad) = ax^2 + bx + c.$$

2. Find two **L**ast terms whose product is c:

$$(\square x + \square)(\square x + \square) = ax^2 + bx + c.$$

3. By trial and error, perform steps 1 and 2 until the sum of the **O**utside product and **I**nside product is bx:

$$(\square x + \square)(\square x + \square) = ax^2 + bx + c.$$

I

O

Sum of O + I

If no such combination exists, the polynomial is prime.