

Exam 1 Overview

There were four main topics on Exam 1: factoring, complex numbers, radicals and solving quadratic equations.

Factoring

There are three steps to factoring: (1) Put your terms in descending order, (2) identify and factor out the GCF and (3) count your terms and use an appropriate method. (See the table below,)

Two Terms (Binomial)	Three Terms (Trinomial)	Four Terms (Quadrinomial)
Difference of Squares $a^2 - b^2 = (a + b)(a - b)$	Educated Guess and Check	Grouping
Difference of Cubes $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$	AC Method	
Sum of Cubes $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$		

Complex Numbers

There are three tools we need to work with complex numbers:

The Imaginary Number i

- $i = \sqrt{-1}$
- If b is a positive real number, then $\sqrt{-b} = i\sqrt{b}$.

Radicals

To multiply radicals, they must all be of the same type. (For example, they must all be square roots, or they must all be cube roots, or... .) In this class, we limited our discussion to square roots. To multiply two square roots, use the Product Property of Square Roots:

$$\sqrt{a} \cdot \sqrt{b} = \sqrt{ab} \text{ for any nonnegative numbers } a \text{ and } b$$

To add or subtract radicals, they must all be of the same type AND they must all have the same “stuff” underneath them (called the radicand). We call such radicals like radicals, and we add or subtract like radicals the same way we add or subtract like terms. For example, we know that $2x + 3x = 5x$ and $7x - x = 6x$. Similarly, $2\sqrt{7} + 3\sqrt{7} = 5\sqrt{7}$ and $7\sqrt{2w} - \sqrt{2w} = 6\sqrt{2w}$. (Try replacing all of your radicals that are exactly the same with “ x ” to do your algebra, then put them back the way they were afterwards.)

Solving Quadratic Equations

We learned three methods for solving quadratic equations. They are listed below, including the steps for using each method:

Factoring/Zero-Product Property	The Square Root Property	The Quadratic Formula
Step 1: Put your equation in the form $ax^2 + bx + c = 0$. Step 2: Factor the non-zero side. Step 3: Use the Zero-Product Property (set each factor equal to zero). Step 4: Solve each equation	Step 1: Put your equation in the form $(expression)^2 = k$ (where k is a number). Step 2: Use the Square Root Property: On the left, drop the square. On the right, put $\pm\sqrt{\quad}$ Step 3: Solve the equation.	Step 1: Put your equation in the form $ax^2 + bx + c = 0$. Step 2: Identify the coefficients a , b and c (they are <i>numbers</i> and contain no variables) and put them in the quadratic formula. Step 3: Simplify to solve.

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

Be prepared to answer these questions when you visit me during my office hours:

What are the three steps of factoring?

What are the three factoring methods we learned in class for when you have two terms?

What are the two factoring methods we learned in class for when you have three terms?

What is the factoring method we learned in class for when you have four terms?

State all three tools needed to work with complex numbers, including the condition for using the third tool.

State the Product Property of Square Roots including the conditions for using it.

Provide an example of how to add two like radicals. Provide an example of how to subtract two like radicals.

What are the three methods of solving a quadratic equation?

What are the steps for using method 1?

What are the steps for using method 2?

What are the steps for using method 3?