Solving Quadratics

A filled Cornell notes example for algebra

Course	Unit	Date	Name
Algebra	**Quadratics**	**[Date]**	**[Name]**

Cues and Questions	Notes
What is a quadratic equation?	An equation that can be written as $ax^2 + bx + c = 0$, where a is not 0.
Method 1: factoring	$x^2 - 5x + 6 = 0$ $(x - 2)(x - 3) = 0$, so $x = 2$ or $x = 3$
Method 2: the quadratic formula	$x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$ Works for every quadratic, even when factoring is hard.
What does the discriminant tell me?	$b^2 - 4ac > 0$: two real solutions $b^2 - 4ac = 0$: one real solution $b^2 - 4ac < 0$: no real solutions
Worked example	$2x^2 + 3x - 2 = 0$, so $a = 2$, $b = 3$, $c = -2$ $b^2 - 4ac = 9 + 16 = 25$ $x = (-3 \pm 5) / 4$, so $x = 1/2$ or $x = -2$
When should I factor first?	When a = 1 and two numbers multiply to c and add to b. Otherwise use the formula.

Summary

A quadratic equation has the form $ax^2 + bx + c = 0$. Factoring is quickest when the numbers are simple, and the quadratic formula always works. The discriminant, $b^2 - 4ac$, shows how many real solutions to expect before solving, and substituting each answer back checks the work.

Review Questions

1. Solve $x^2 + 7x + 12 = 0$ by factoring.
2. How many real solutions does $x^2 + 2x + 5 = 0$ have? Use the discriminant.
3. Solve $3x^2 - 2x - 1 = 0$ with the quadratic formula, then check both answers.

Example page written for this guide. Use the cue column for the steps you get wrong, not only for definitions.