

GUITAR BUILDING 2023

Day 10-11: Quadratic Equations

Objectives

Students will learn how to solve quadratic equations using the quadratic formula. Students will

- understand that the quadratic formula can be used on any quadratic equation.
- be expected to work with solutions in the form of integers, fractions, and radicals.
- explore the significance of using the quadratic formula when solving real-life problems.

Essential Questions

- How can we use algebraic properties and processes to solve problems?
- What functional representations would you choose to model a real-world situation, and how would you explain your solutions to the problem?

Vocabulary

- **Prime:** A number that has two and only two factors, one and itself.

Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$; an algorithm for computing the roots of a quadratic equation.

Prerequisite Skills

Students should already be familiar with quadratic equations

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DAY 7-8: Intro to Quadratic Equations

Objectives

- Students will learn the characteristics and properties of quadratic equations and their graphs. They will learn how to: transition between the different representations of quadratic equations (equation, table, graph, and context).
- solve quadratic functions using factoring methods and the quadratic formula.
- apply the solving techniques learned in the unit to real-life situations and how to decide what technique would be most appropriate in a situation.
- interpret solutions to real-life problems and explain which solutions are reasonable for the situation.

Essential Questions

- How can we show that algebraic properties and processes are extensions of arithmetic properties and processes and how can we use algebraic properties and processes to solve problems?
- What functional representation would you choose to model a real-world situation and how would you explain your solution to the problem?

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Day 12-13:

Objectives

- All students should be able to solve a pair of equations simultaneously using the method of elimination given equal coefficients of one unknown.
- Most students should be able to solve a pair of equations simultaneously using the method of elimination, where one coefficient is a factor of the other.
- Some students should be able to derive and solve a pair of equations simultaneously using the method of elimination where one coefficient is a factor of the other.

Prerequisites

Students should already be familiar with

- Eliminating one of the variables from the system.
- Eliminate a variable by setting both equations equal to the same variable, then writing the expressions equal to one another.
- Eliminate a variable by multiplying each term of an equation by the same constant to make an equivalent equation.
- Using the equivalent equation to eliminate one of the variables and solve the system. Once a solution has been found, verify the solution graphically or by substitution.

Exclusions:

Students will not cover:

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Materials

- Quadratic Formula Independent Practice Worksheet
- Concept Ladder Quadratic Formula Quadratic Formula Follow-up Worksheet

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- Substitution method

Day 15: Lesson Plan: Solving Systems of Linear Equations Using Substitution

Objectives

Students will be able to

- use algebraic substitution to solve simultaneous equations,
- identify when a system of linear equations has no solutions,
- solve applications on systems of linear equations using substitution.

Prerequisites

Students should already be familiar with

- solving linear equations,
- rearranging linear equations.

Exclusions

Students will not cover

- solving systems of linear equations graphically,
- solving systems of linear equations by elimination,
- systems of three or more equations.

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Day 16: Lesson Plan: Linear Equations with Variables on Both Sides

Objectives

Students will be able to

- solve linear equations with the variable on both sides but constants on only one side,
- solve linear equations with the variable and constants on both sides,
- solve linear equations with the variable and constants on both sides and the brackets on one side,
- solve linear equations with the variable, constants, and brackets on both sides,
- solve more complex problems, including writing and solving a linear equation for a word problem taken from a real-world context.

Prerequisites

Students should already be familiar with

- one-step and two-step equations,
- distributing a constant over a set of brackets.

Exclusions

Students will not cover

- linear equations involving algebraic fractions,
- linear equations with fraction or decimal solutions.

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Day 17: Lesson Plan: Slopes and Intercepts of Linear Functions

Objectives

Students will be able to

- calculate the gradient of a line passing through two points using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$,
- find a point on a line given another point on the line and the gradient,
- convert between the slope–intercept form of a line ($y = mx + c$) and the general form ($ax + by + c = 0$),
- use the equation of a line in the form $y = mx + c$ or $ax + by + c = 0$ to identify the gradient and intercepts of the line.

Prerequisites

Students should already be familiar with

- rearranging equations,
- lines and the intersection points of lines.

Exclusions

Students will not cover

- the equation of a line in the form $y - y_1 = m(x - x_1)$,
- finding the equation of a line passing through two points,
- parallel and perpendicular lines.

