

GUIDED PRACTICE

Class: Math 1040 (Pre-Calculus)

Date assigned: October 15

Date due: October 30

Time estimate to complete this assignment: 120 minutes

Overview/Introduction

You can use quadratic equations to model the heights of projectiles. For example, the height of a baseball hit by a batter can be modeled by a quadratic equation. *Other question:* How does changing the ball speed and hitting angle affect the maximum height of a baseball?

SOLVING QUADRATIC EQUATIONS BY FACTORING: There are many methods to solve certain *quadratic equations* (by graphing, completing the square, factoring, formula, etc). A **quadratic equation** in one variable can be written in the form $ax^2 + bx + c = 0$, where $a \neq 0$, and a , b & c are real numbers.

- This is usually called the **standard form** of the quadratic equation.
- If the left side of $ax^2 + bx + c = 0$ can be factored, then the equation can be solved using the *zero product property*.

Learning Objectives

Basic objectives: Upon completing the preparation work, students will be able to:

- Identify a quadratic equation
- Solve a quadratic equation by
 - Graphing or
 - Completing the square or
 - Quadratic formula
- Perform the factoring technique:
 - With/without using some special factoring patterns and
 - Applying the zero-product property to solve

Advanced objectives: Upon completing the lesson, students will be able to:

- Compare the answer using the above methods
- Figure out the best method to solve a general quadratic equation
- Apply to solve for real-world problems
- Use another method to solve if the equation cannot be factored

Preparatory Activities and Resources:

1. **Read text:** *Section 4.3* (Solve $x^2 + bx + c = 0$, where b & c are real numbers, by factoring)
2. **Review videos and Powerpoint files** (MyMathLab)
Useful links: <https://www.youtube.com/watch?v=qeByhTF8WEw>
<https://www.youtube.com/watch?v=SDe-1IGeS0U>
3. **Take the warm-up quiz** on Canvas (Section 4.3)

Exercises: Please complete by __October 30__.

- Submit through Canvas
- OR print them out and bring to class

Questions?

Email your questions via Canvas

ADVANCED PRACTICE

This is given for students to complete after the class meeting in which they work together.

Class: Math 1040: Pre-Calculus

Date assigned: November 1

Date due: November 15

Time estimate to complete this assignment: 120 minutes

Learning Objectives

Advanced objectives

- Compare the answer using the different methods
- Figure out the best method to solve a general quadratic equation
- Apply to solve for real-world problems
- Use another method to solve if the equation cannot be factored:
 - Graphing or
 - Completing the square or
 - Quadratic formula

Activities & deliverables

- Take the quiz in Canvas (Section 4.4)
- Read the instruction of this assignment on Canvas and follow the examples (MyMathLab)
- Show all work for each problem and make sure YOU check all solutions
- MUST be your own work

Reflection:

- TRY the most confident method to get the answer,
- Switch to another method if necessary
- Compare and contrast which method is the best and why
- Give at least one example that works for all methods
- Give at least one real-world problem
- For real-world problems, it usually exists one solution (Why?); find it out
- Figure out which method to be used if the equation cannot be factored
- Figure out the importance of solving quadratic equation by factoring and how to apply

Due date: Upload the assignment to Canvas by November 15

Resources:

- Read text: Section 4.4. Solve $ax^2 + bx + c = 0$, where $a \neq 0$, $a \neq 1$, and a, b & c are real numbers, by factoring (pgs 259-265)
- Review videos and Powerpoint (MyMathLab)

Useful links: <https://www.youtube.com/watch?v=qeByhTF8WEw>
<https://www.youtube.com/watch?v=SDe-1IGeS0U>
<https://www.youtube.com/watch?v=Z5MnP9da4EM>

Questions?

Email your questions via Canvas

Flipped IN-CLASS Lesson Plan (75 minutes)

Topic: SOLVE THE QUADRATIC EQUATION, $ax^2 + bx + c = 0$, where $a \neq 0$, a , b & c are real numbers, BY FACTORING

Basic objectives for preparatory work:

- Identify a quadratic equation
- Solve a quadratic equation by:
 - Graphing or
 - Completing the square or
 - Quadratic formula
- Perform the factoring technique using:
 - With/without some special factoring patterns and
 - The zero-product property to solve

Advanced objectives for classwork & after class work:

- Compare the answer using the different methods
- Figure out the best method to solve a general quadratic equation
- Apply to solve for real-world problems
- Use another method to solve if the equation cannot be factored:
 - Graphing or
 - Completing the square or
 - Quadratic formula

	Time planned	Activity and rationale	Resources needed
Beginning of class period	10 mins	Offer a warm-up problem to all students to try themselves; then might be solved by a volunteer student on the board for credits Explain and check the solution to make sure all students understand	Paper + pencils, Board + chalk/marker

	Time planned	Activity and rationale	Resources needed
Middle of period	20 mins	<ul style="list-style-type: none"> ▪ Introduce the topic and main points of the day ▪ Solve a general problem using the previous methods <ul style="list-style-type: none"> ○ Graphing or ○ Completing the square or ○ Quadratic formula ▪ Mini-lecture based on Q&A from preparatory activities 	Lecture PP slides Board + chalk/marker <i>(if needed)</i>
Middle of period	20 mins	<ul style="list-style-type: none"> ▪ Give some handouts of special factoring patterns and formulas to students ▪ Explain why the new method, factoring, is helpful ▪ Offer some examples with clear solutions and compare ▪ Answer all questions and give feedback ▪ Clarify misconceptions and offer new information 	Problem sheets Board + chalk/marker <i>(if needed)</i>
Middle of period	15 mins	<ul style="list-style-type: none"> ▪ Assign in-class activities (3-5 problems) to class where each group of two students may work together to solve these regular and real-world problems. ▪ Offer hints, not solutions to students if needed ▪ Give extra credits for volunteers who solve the problems correctly ▪ Check and figure the best methods for each problem 	Problem sheets Board + chalk/marker <i>(if needed)</i>

	Time planned	Activity and rationale	Resources needed
End of period	10 mins	<ul style="list-style-type: none"> ▪ RSQC (Recall, Summarize, Question, Review, Connect, Comment). Students solidify understanding in preparation for doing advanced work at home ▪ Compare and contrast student's notes and participations as usual ▪ Assign homework and post activities ▪ Explore more applications and resources 	RSQC template handouts PowerPoint slides Useful websites/links Board + chalk/marker <i>(if needed)</i>

Flipped AFTER CLASS Work Plan

Advanced learning objective	Activity and rationale	Instructions to students
<ul style="list-style-type: none"> ▪ Compare the answer using the different methods ▪ Figure out the best method to solve a general quadratic equation ▪ Apply to solve for real-world problems ▪ Use another method to solve if the equation cannot be factored: <ul style="list-style-type: none"> ○ Graphing or ○ Completing the square or ○ Quadratic formula 	<ul style="list-style-type: none"> ▪ Review sections 4.1 - 4.4 and take each corresponding quiz in Canvas ▪ For each method of solving a quadratic equation, give a reasonable example and explain all steps ▪ Compare and contrast which method is the best and why ▪ Give at least one example using all methods to solve ▪ Give at least one real world problem ▪ Explore the connections between the factoring method and other method 	<ul style="list-style-type: none"> ▪ Read the instruction for each method in Canvas ▪ Follow the examples in MyMathLab ▪ Show all work for each problem and make sure YOU check all solutions ▪ TRY the most confident method to get the answer, switch to another method if necessary ▪ For real-world problems, it usually exists one solution; find it out ▪ Do your OWN work