

Algebra II Clarifying Lessons: Quadratic Functions

OLD Resources. These resources have NOT yet been updated to align with the revised secondary mathematics TEKS. These revised TEKS were adopted by the Texas State Board of Education in 2005, with full implementation scheduled for 2006–07. These resources align with the original TEKS that were adopted in 1998 and should be used as a starting point only.

What is a Clarifying Lesson?

A model lesson teachers can implement in their classroom. Clarifying Lessons combine multiple TEKS statements and may use several Clarifying Activities in one lesson. Clarifying Lessons help to answer the question "What does a complete lesson look like that addresses a set of related TEKS statements, and how can these TEKS statements be connected to other parts of the TEKS?"

TEKS Addressed in This Lesson

Foundations for functions: b.1.A, B

Quadratic and square root functions: d.1A, B, C; d.3.A, B, C, D

Materials

- Graphing calculator
- Student worksheet

Lesson Overview

Students use quadratic functions to describe the relationship of the height of a football thrown in a parabolic path to its distance from the goal line.

Mathematics Overview

Students collect and organize data, make a scatterplot, fit a curve to the appropriate parent function, and interpret the results. Students translate among the various representations of the quadratic function, formulate equations, use a variety of methods to solve the quadratic equations, and analyze the solutions in terms of the situation.

Set-up (to set the stage and motivate the students to participate)

1. If necessary, have students discuss the layout of a football field before beginning the problem on the worksheet.
2. Have students work in pairs. If appropriate, pair students so that at least one of them has a working knowledge of football.
3. Use the guiding questions to direct students in working through the worksheet.

Teacher Notes (to personalize the lesson for your classroom)**Guiding Questions (to engage students in mathematical thinking during the lesson)**

- What data are you using to determine the function that best describes the relationship of the height of the ball to its distance from the goal line? (b.1.B, d.1.C, d.3.A)
- How is the graph related to the actual path of the ball? (b.1.B)
- What values would not make sense to use for x in this situation? (b.1.A, d.1.A, d.3.C)

Teacher Notes (to personalize the lesson for your classroom)**Summary Questions (to direct students' attention to the key mathematics in the lesson)**

- How can you use the equation to determine the height of the ball at a given position on the field? (d.1.B)
- How can you use the graph to determine the height of the ball at a given position on the field? (d.1.B)
- How is using the graph like using the equation? How are they different? (d.3.C)
- How can you use the equation to determine the distance of the ball from the goal line at a given height? (d.3.D)
- How can you use the graph to determine the distance of the ball from the goal line at a given height? (d.3.B)
- How is using the graph like using the equation? How are they different? (d.3.C)

Teacher Notes (to personalize the lesson for your classroom)

Assessment Task(s) (to identify the mathematics students have learned in the lesson)

After discussing the Football Problem in class, give a similar problem for students to complete working independently or working together in small groups.

Teacher Notes (to personalize the lesson for your classroom)

Extension(s) (to lead students to connect the mathematics learned to other situations, both within and outside the classroom)

Have students write their own problems involving situations that can be represented by quadratic functions and share their problems with the class.

Teacher Notes (to personalize the lesson for your classroom)