 MGSE9-12.F.IF.4 Using tables, graphs,, and verbal descriptions, interpret the key characteristics of a function which models the relationship between two quantities. Sketch graphs showing key features including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior.

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Mathematics-Algebra 1

12-32 students

Characteristics of Quadratics Ball Toss

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MGSE9-12.F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

MGSE9-12.F.IF.8a Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. For example, compare and contrast quadratic functions in standard, vertex, and intercept forms.

MGSE9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Students have a hard time understanding the characteristics of quadratic functions. This lesson begins with a making meaning of quadratic functions. Students “pour out” all that they know about Quadratics on a piece of paper. They then connect what they have written down and describe why they think it should be connected. Students will get into groups of four and each will have a specific job. There will be a thrower, catcher, and two timers. Before the ball is thrown, the starting height must be measured. The thrower tosses the ball to the catcher. One timer records how long it takes for the ball to be caught and the other timer records how long it takes to get to the maximum/minimum. The height of the ball when it is caught also needs to be record. An estimation of the height of the maximum/minimum also needs to be recorder. Students will take the information and graph the parabola formed by the ball. Students will then describe the following characteristics with their group: domain, range, y intercept, roots, axis of symmetry, concavity, vertex, maximum, minimum. Intervals of increase, intervals of decrease, rate of change, and end behavior. Groups will compare their graphs with other groups and with a function provided by the teacher.