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| **Stage 1 – Desired Results** |

**Established Goals (Include ACOS standards in this section)**:

* **A1.30** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.\* [F-IF7]
  1. Graph linear and quadratic functions, and show intercepts, maxima, and minima. [F-IF7a]
* **A1.21** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-REI10]

**Understandings (Students will understand that …)**:

* A quadratic function can be written as ax2 + bx + c.
* First and second differences can be used to determine if a function is quadratic.
* A parabola is the curve when a quadratic is graphed.
* The vertex is the highest or lowest point on a parabola.
* The minimum and maximum are the y-value of the vertex; in ax2 + bx + c, if a < 0 then there is a maximum and if a > 0 then there is a minimum.
* Domain is where the x-values of the function exist and range is where the y-values of the function exist.

**Essential Knowledge (Students will know …)**:

* Quadratic function
* First and second differences
* Parabola
* Vertex
* Minimum/Maximum
* Domain/Range

**Essential Skills (Students will be able to …)**:

* Identify quadratic functions
* Determine if a quadratic function has a minimum or a maximum
* Graph a quadratic function and determine its domain and range

**Essential Question(s)**:

* What are some real world representations of quadratic functions?
  + Bridges, roller coasters, Gateway arch (St. Louis), etc.

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| **Stage 2 – Assessment Evidence** |

**Performance Task(s)**:

* None

**Other Evidence**:

* Exit Slip – Students will be given a piece of paper with an equation on it. Each student will have to tell whether the equation is a quadratic function, and explain why or why not. They will then be asked to graph the given function. (10 min)

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| **Stage 3 – Learning Plan** |

**Materials needed for the lesson**:

(Other than pencil/pen, all materials will be provided for the students by the teacher.)

* Pencil/pen
* Paper
* Elmo
* PowerPoint

**Bell ringer (if one is used)**:

* Students will be given two questions. The first question asks them to evaluate x2 + 5x for x = 4 and x = -3. The second question asks the students to generate ordered pairs for the function y = x2 + 2 with the given domain: D {-2, -1, 0, 1, 2}. (5 min)

**Review of relevant, previously learned information**:

* The review of relevant material will be covered in the bell ringer. The students should have already seen learned to evaluate functions given the value of variables, and they should have learned about domain.

**Introductory Activity**:

* Students will be shown pictures of different roller coaster shapes (linear and quadratic). The teacher will ask the students to identify what functions those shapes represent. Once the students figure out the functions the pictures represent, the teacher will tell the students that they will be learning how to identify quadratic functions today. (2-3 min)

**Body of the lesson**:

* Lecture over identifying a quadratic function. The teacher will explain the different methods of how to identify a quadratic function.
  + When students are shown how to identify a quadratic, the teacher will show multiple methods one can use to identify a quadratic to ensure understanding. Students will be given multiple example problems that involve identifying and graphing a quadratic. The teacher will solve an example with the class before having students try an example on their own. The teacher will pose questions throughout the lesson to get students thinking about more complex problems they will see in future sections. (Such as cubics) (20 min)
  + Towards the end of class, the students will be given their exit slip to complete. (10 min)
  + No accommodations are needed for students. (No SPE, ESL, gifted students in the class.)
  + The lesson will incorporate multiple methods for solving problems and multiple methods for the different learners. For example, the students will be shown a few different methods on how to identify a quadratic function, and they will be shown a couple of different way to graph a quadratic function. This lesson incorporates visuals (pictures) and multiple example problems, for the visual and tactile learners.

**Preview of the next lesson**:

* None

**Related out of class assignment**:

* Homework problems

**Other class announcements or information**:

* None