

## **Project: Linear Equations, Slope, and Music Control with NXT-G**

### **Standards: (From Common Core Standards: Functions Overview)**

#### Interpreting Functions:

7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

#### Building Functions:

1. Write a function that describes a relationship between two quantities.

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.

### **Learning Objectives:**

#### **Students will:**

-Identify the slope variable within a graphic program and function that takes sensory input and passes it to pitch output.

-Analyze the effect of changing slope within a function embodied within an graphic programming environment.

-Produce equations and 2 dimensional graphs based on their analysis.

### **Procedure:**

You have been tasked to create a musical instrument that takes input from either distance, light, or rotation. Design a this musical instrument and write a program that produces the best range of pitches. Create a function for your program and a graph describing the relationship between the sensor, multiplier, and pitches.

Using the templates provided at:

[www.nebomusic.net/nxtgsensortosound.html](http://www.nebomusic.net/nxtgsensortosound.html)

1. Build a device with the NXT Brick and Sensor.

2. Create an NXT-G program that takes input from a sensor and passes the value to the speaker (tone generator).

3. Run program and make note of the range of pitches generated by sensor.

4. There are three blocks within these samples. Experiment and find the parameter that will change the range of pitches when the program is run. Select the best number for each sensor.

5. Write an equation and make a graph describing your findings.