CODE-POWERED MATH LABS: 6th Grade

OVERVIEW

The 6th grade math module is meant to support instruction for most domains in Common Core Mathematics. The curriculum is divided into 6 labs, each of which will take approximately 3 to 5 days and include a capstone project. Math domains addressed include The Number System (2 projects), Expressions & Equations, Geometry, and Statistics (2 projects).

Prerequisites
- **Required:** Intro to Codesters (5 Lesson Module)
- **Recommended co-requisite:** Intro to Python part 1 (20 Lesson Module)

1) THE NUMBER SYSTEM

CCSS Math Standards Addressed
- CCSS.MATH.CONTENT.6.NS.C.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- CCSS.MATH.CONTENT.6.NS.C.6 (A - C): Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- CCSS.MATH.CONTENT.6.NS.C.7.A: Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right*.

Lab #1: [Number Line Baseball](#)
- Students will use knowledge of the coordinate plane and loops to build vertical and horizontal number lines that increase and decrease by regular increments. They will use program a sprite to appear at a random location and guess and check the value at a position on the number line.

2) EXPRESSIONS & EQUATIONS

CCSS Math Standards Addressed
- CCSS.MATH.CONTENT.6.EE.B.5: Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- CCSS.MATH.CONTENT.6.EE.B.8: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the

form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Lab #2: Zombie Number Line

- Students will use a loop and conditional to repeatedly test points on a number line to determine when an inequality is or is not true. Students will test integer and non-integer values and build an understanding of a line as a continuous representation of discrete points. Students will be able to recognize and construct graphs of inequalities and their solution sets.

3) GEOMETRY

CCSS Math Standards Addressed
- CCSS.MATH.CONTENT.6.G.A.1: Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
- CCSS.MATH.CONTENT.6.G.A.3:Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Lab #3: Plotting Polygons

- Students will use points on the coordinate plane to plot and connect points that form regular and irregular polygons. Students will use formulas to calculate the area of shapes on the coordinate plane.

4) STATISTICS

CCSS Math Standards Addressed
- CCSS.MATH.CONTENT.6.SP.B.4: Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- CCSS.MATH.CONTENT.6.SP.B.5: Summarize numerical data sets in relation to their context, such as by:
    - CCSS.MATH.CONTENT.6.SP.B.5.A: Reporting the number of observations.
    - CCSS.MATH.CONTENT.6.SP.B.5.B: Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
    - CCSS.MATH.CONTENT.6.SP.B.5.C: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

○ CCSS.MATH.CONTENT.6.SP.B.5.D: Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Lab #4: Finding Range, Frequency, and Dot Plots

- Students formalize their understanding of range, frequency, and dot plot construction by systematizing their approach in code. Using this tool, they can analyze a variety of data sets, including their own student-generated data. Using lists, they can quickly alter their graphs and examine graphs with different shapes and spread.

Lab #5: Mean and Variability

- Students develop methods for finding mean and MAD using Python math, loops, and lists. They use these methods to find and analyze the mean and MAD several sets of numbers. They will enter and explain the effects of outliers, and identify what Mean Absolute Deviation tells us about a set of data.