Algorithms & Programming: Variables Grade: 3

Standard 3.AP.V .01
Create **programs** that use **variables** to store and modify grade appropriate **data**.

Essential Skills
Create a **computer program**, using **code** that is provided, in which **variables** are used to store **data**.
Identify the data that is stored in a variable in a computer program that uses a variable.

Essential Questions
How do **variables** make it easier for the user to store and retrieve **data** in a **computer program**?

Explanation
Students will be able to create a **program** (in a programming language or in pseudocode) that contains one or more **variables**. Variables, in computer science, are like containers that can be used to store different types of **data** or information within a computer program. Variable names that are descriptive (like “score”) allow our programs to be understood more clearly by the programmer and users. Variables can be referenced, used and manipulated within a computer program. Unlike variables in math, variables in a computer program can reference and change their own value; x=x+1 is impossible in math, but a common way to count in a computer program.

Think of this as similar to….
The score of a basketball game changes each time a team gets a basket.

Implementation Examples—What would this look like in the classroom?

Title	Description	Link	Content Connection & Notes
Binary Bracelets	Grade 3--Students learn about how computers store information in binary --since all information in the computer has to be ON or OFF. Students are given a key that translates the alphabet into a binary code. They use a bracelet template --the variable-- to "store" (color) their initials.	Binary Bracelets	
Robot Boxes	**Grade 3**--Students explore variables in the game Robot Boxes. Boxes on a handout become "variables" that hold different values (on small cards or sticky notes). One student chooses a value for each box and ""assigns"" those values to the variables by putting the slips of paper in the boxes. A second student is the Robot and ""dances"" based on the values that the first student has assigned to the variables. **Grade 4**--Variable boxes can contain text and actions as well as numbers so that the Robot can speak and perform other actions (jump, spin). Once students are familiar with the ""program"" as written, they can create a variation on that program. **Grade 5**--Using the values assigned, a third student applies the formula for finding the area or perimeter using values assigned to the variables. The Robot performs some action (output) based on that calculation.	Variables: Robot Boxes	This lesson is part of the Scratch Encore curriculum, which is available free with registration. See pages 2-4 of the Variables Module write up for additional context.
Variables--Math Chat	**Grade 3**--Students try this Scratch program and notice how two different values are inputted to calculate area. When they look inside the code, they determine what variable is storing which input and correct the formula for area. They can further modify the program to calculate the perimeter **Grade 4**--Students add variables to the program that can accommodate text. For example, students can have the user input their name and then ""Ben"" (the character in the program) can address the user by name. **Grade 5**--Students modify the program to react to the calculations. For example, they can add a sprite that changes size depending on the area or perimeter calculated; or ""Ben"" can say different things depending on if the output is the area or perimeter, and/or how large the numbers are."	Use the Scratch project Variables—Math Chat as a starter or sample project	This lesson is also aligned with **CS** AP.C.01 and AP.PD.03 and Math 4.MD.A.3 and 5.MD.C.5b. It is part of the Scratch Encore curriculum, which is available free with registration. See pages 5-8 of the Variables Module write up for additional context.

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These annotations are a collaboration between Maryland Center for Computing Education and the Maryland State Department of Education.