4.DA.3 Data and Analysis

> *The student will create a computational model that represents attributes and behaviors associated with a concept. (a) Examine models of physical objects and processes. (b) Create a computational model that reflects the attributes and behaviors associated with a concept. (c) Explain how a computer model illustrates a given concept.*

Understanding the Standard

Scientists, programmers, and mathematicians use models to help generate questions, make predictions, and communicate ideas. To explore how these models are created and how they can help us understand the world around us, students will use a computer to create a model that explains the characteristics and behaviors of part or all of a concept. Examples of models include diagrams, physical replicas, mathematical representations, analogies, and computer simulations. They can help in developing questions, and explanations, making predictions, or communicating ideas.

Term	Definition
Attribute	Physical description of an object (e.g., color, shape, size)
Behavior	The way in which a natural phenomenon or a machine works or functions; the actions performed by something.
Diagram	A simplified drawing showing how something works.
Model	Creating a representation of an idea, object, or a process
Prediction	Making a guess of what will happen based on current facts

Prerequisite Knowledge

Students should have a foundational knowledge of gathering and organizing data, as well as some basic digital drawing and block-based programming experience.

Integration Opportunities

History VS.3 Students will create computational models to represent the interactions between the English colonists, Africans, and Indigenous people in Jamestown.

Science 4.1e Develop and/or use models to explain natural phenomena and identify limitations of their models.

Math 4.PS.1 Study and analyze the growth of plants in the classroom and create a computational model to represent the attributes and behaviors associated with plant growth. Use the model to simulate different conditions (e.g., varying sunlight or water) and make predictions based on their observations and analysis.

Physical Education 4.2 a-e Allow students to explore physical models of major structures in the body. Then in groups, have students use common or recycled materials to create their own structure models. Have students use the models to demonstrate and explain movement patterns.

Summary of a Lesson

Students will identify and share examples of models that we see and use regularly discussing how models help us learn and make predictions about systems. In pairs, students will gather data about a grade level topic and input their data in an Excel spreadsheet (or similar program). This data will be used to create a computer model (e.g. a diagram, heat map, etc) that represents the attributes and behaviors of the topic (i.e. cause and effect events). Students will use the model to explain the system represented and analyze the patterns in their data to make predictions and draw conclusions.

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