Computational Thinking: Abstraction & Pattern Generalization

**Abstraction** is the process of identifying and extracting relevant information to define main idea(s) in order to create a generic representation of a problem.

**Pattern Generalization** is the process of creating models, rules, principles or theories of observed patterns to test predicted outcomes and determining the correct relationship between the variables to accurately represent the problem.

**Examples of Abstraction & Pattern Generalization**

**Science**
- Models of natural processes such as the water cycle, nitrogen cycle and rock cycle
- Classification of living organisms (e.g. mammals, marine organisms)
- Periodic table

**Mathematics**
- Equations
- Geometric representations
- Graphing

**Art**
- Picasso

**English Language Arts**
- Sentence structure
- Parts of speech
- Mad Libs™
Abstraction helps create models related to a problem that can work for large quantities and ranges of data.

Other Examples of Abstraction (modelling)
- Children learning about physics using a ball and ramp
- Older students conducting experiments and graphing results in an acceleration lab
- Engineers designing roller coasters

Practicing Abstraction & Pattern Generalization
- Computational Thinking (Make a Monster—studio.code.org)
- Candy Dichotomous Key
- Mad Libs™
- Mad Glibs (studio.code.org)
- Mad Takes (www.madtakes.com)
- Describing an Everyday Object (Google)
- Tangrams
- GeoShapes (National Geographic Kids)

The key to abstraction is to be able to identify and filter out or ignore the details not necessary to solve the problem. From there, a model (equation, image, word, simulation, etc.) can be developed to represent all the important variables.

Access the Course: Problem Solving through Computational Thinking for Educators
Access this Module: Abstraction & Pattern Generalization