Intro to Computer Science - Unit 5 - Iteration and Computer Simulation

Unit Focus

In this unit, students will learn how to solve problems that require looping, also known as iterations. Students will learn several different ways to structure loops, and how iteration can be a valuable problem solving technique. Students will also gain experience modeling real world events through computer simulations that are implemented using loops.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core
Mathematics: 9-12

- Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1)
- Model with mathematics. (CCSS.MATH.MP.4)
- Use appropriate tools strategically. (CCSS.MATH.MP.5)

Madison Public Schools Profile of a Graduate

- Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)
- Idea Generation: Studying a problem, need or model (mentor text, political piece, documents, art work, etc.) to consider limitations and imagine new solutions/transformations. (POG. 2.1)

Transfer

Students will be able to independently use their learning to...
T1 model real world situations with software.
T2 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.
T3 use appropriate tools to make reaching solutions more efficient, accessible and accurate.

Meaning

Understanding(s)

Students will understand that...
T1 model real world situations with software. (Synthesizing, Imagining)
T2 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.
T3 use appropriate tools to make reaching solutions more efficient, accessible and accurate.

Essential Question(s)

Students will keep considering...
Q1 What is another way that this problem could be solved?
Q2 What math tools/models/ strategies can I use to solve the problem?
Q3 What is the most efficient way to solve this problem?
Q4 How do I model a real world situation with computer programming?

Acquisition of Knowledge and Skill

Knowledge

Students will know...
K1 what types of problems can be solved with iteration
K2 the difference between pre- and post-test loops
K3 how to calculate experimental probabilities using computer simulation
K4 Vocabulary: loop, iteration, loop counter, For Next, Do While, infinite loop, experimental probability, nested loops, "off by one" (OBO) errors, lists

Skill(s)

Students will be skilled at...
S1 writing For...Next loops
S2 writing Do...While loops
S3 writing For...Each loops
S4 modeling events with random numbers and loops