Junior – Coding Basics

Material lists:

Step 1:

- Food ingredients (use your imagination to make substitutions, if needed)
  - Pretzels
  - Crispy rice cereal
  - Raisins
  - Dried pineapple (or other dried fruit)
  - Dried cranberries
  - Popcorn
- Two mixing bowls
- A large spoon
- Measuring cups (1 cup and ½ cup)
- **Trail Mix Algorithm Recipes** pdf

Step 2:

- String
- Beads (six each of five different colors and 3-4 special beads)
- **Code a Friendship Bracelet** pdf
- Pen/pencil
- Paper

Step 3:

- Markers/crayons
- Dice
- **Pixelated Image** pdf

Step 4:

- Pen/pencil
- Paper
- Deck of playing cards
- Small toys – these will be used as movers on the game board
- **Red Light, Green Light by Code Directions** and **Gameboard** pdfs

girl scouts of central indiana

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Step 1: Create algorithms for a computer that follow a sequence

Giving directions to someone can be tricky but giving directions to a computer is even trickier. Computers can only follow the steps in its program exactly as they are written. If the directions aren't clear, a computer can't ask directions or try to figure out what the programmer intended.

When a computer programmer writes a set of directions or algorithm for a computer to complete a task, they must take great care to make sure the directions are very specific and in the right order, or sequence. Computer programmers also think about making their programs efficient or as fast and easy as possible.

Use the two recipes, or algorithms, below to make trail mix.

Option 1: Trail Mix by Counting It Out Algorithm

Option 2: Trail Mix by Measuring It Out Algorithm

Now that you've followed an algorithm to create trail mix, think of something you know how to do and write an efficient algorithm for someone else to follow.

Step 2: Use loops to improve your algorithm

In step 1 we looked at how computers follow an algorithm to complete a task, we'll call this a code for short. We also looked how programmers try to make their codes as efficient as possible by trying to keep the steps short and clear. Another way a computer programmer may look at making their codes more efficient is by looking to add in loops to the algorithm. A loop is a set of directions that needs to be repeated several times before moving on to the next step in the sequence.

For this activity, use the Code a Friendship Bracelet information to make a friendship bracelet using loops like a computer programmer.

Step 3: Keep your code interesting with conditionals

While it's great to have computers do the same thing over and over, to make them even more useful, programmers often add conditional statements to their codes. A conditional statement tells the computer how to react in certain conditions or situations. Conditionals are typically written using IF/ELSE statements.

For this activity, follow the conditional statements in the Pixelated Image program to create a piece of art.

Step 4: Create your own set of commands that use conditionals

As you've worked on this badge you have already learned about writing an algorithm to create a program for someone to follow. Then we've looked at adding in loops to make

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it more efficient and conditionals to help the computer be prepared for different situations. Now it's your chance to put it all together.

For this activity, use the Red Light, Green Light by Code and gameboard for an example of how to play a game using an algorithm with conditionals. Then it'll be your turn to create your own algorithm.

Step 5: Learn about women in computer science

Part of being a leader is thinking about the problems that might happened and then figuring out what to do if those problems arise. In the 1960's, Margaret Hamilton worked with a team at NASA to create computer programs for the astronauts to use during the Apollo 11 fight to land on the moon.

Here are a few books you could check out to find about Margaret Hamilton and learn how she saved the moon landing by thinking ahead to create a solution to solve a problem no one ever thought would happen.

- *"STEM trailblazer BIOS: Space Engineer and Scientist Margaret Hamilton*"
  - by Domenica Di Piazza
- *"Margaret and the Moon: How Margaret Hamilton Saved the First Lunar Landing"*
  - *By Dean Robbins*

What kind of problems would you plan for to solve with the help of computers?

Now that you've earned this badge, you could give service by:

- Coding a computer program that can help other people.
- Creating step-by-step algorithms to teach someone a new skill.
- Sharing what I've learned about women in computer science with others.

What are you inspired to do with your new knowledge?