Coding Basics

Ambassador Badge

What is the Coding Basics Badge?

Girls explore the power of music and coding to spread a positive message and write code to share their own performance routine with others.

Step 1: Learn about functions through song lyrics

Step 2: Learn about loops through song patterns
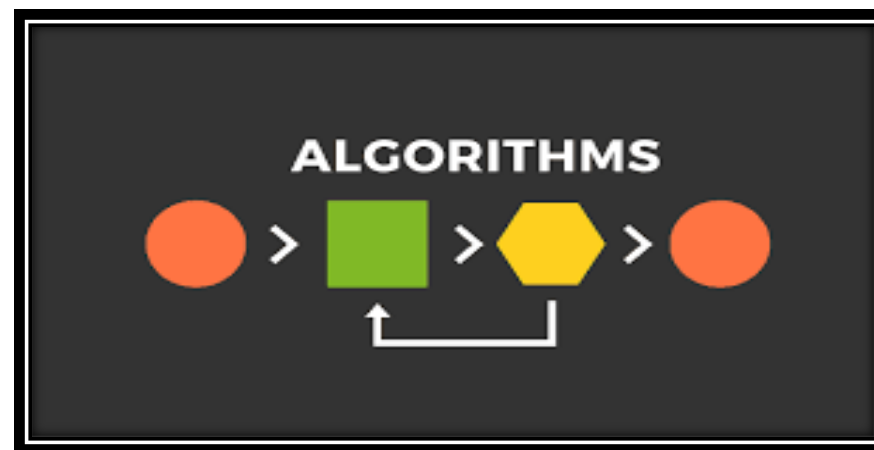
Step 3: Write an algorithm duet

Step 4: Code a performance routine

Step 5: Share their coded routine with others

Computers can fly airplanes, restart stopped hearts, and give you directions to your favorite restaurant! Programmers write the algorithms computers use to accomplish tasks. **Algorithms** are the step-by-step instructions a computer follows. The algorithms are made up of different parts like functions, arguments, and variables.

In coding, a **function** tells a computer to do something. It's similar to a verb, like sing or whistle.

You can make a function like sing() more specific by including an argument. An **argument** tells the computer what words to sing. For example, sing("Oh beautiful, for spacious skies, for amber waves of grain").

You can use the same function, sing(), with different arguments or **variables** to get your computer to sing other verses or an entirely different song.

WORDS TO KNOW

Algorithm a series of specific instructions. By creating a sequence of instructions that can be applied to many circumstances, you're creating an algorithm.

Argument a part of code that makes a function more specific and reusable in a number of different ways: it adds details to the function that are changeable. In many programming languages, arguments are represented as a list separated by commas inside the parentheses.

Choreographer a person who arranges dance movements for dancers to perform.

Code a series of instructions that make up a program directing a computer to do something.

Computer an electronic machine that can store and process data. A computer has hardware, which is the machine itself, and software, which is a set of instructions.

DRY a concept in programming that means "Don't Repeat Yourself."

Function one of the basic building blocks of a program. It's a type of instruction similar to a verb: a function does something. In JavaScript, as in most programming languages, it has a special form, which is the name of the function followed by '()'. For example, turnLeft() and whistle() are two examples of functions. The () tells the computer to "do" the named function. "Doing" a function is typically described as "calling" a function or a "function call."

Function declaration the process of creating a new function. This allows a coder to write reusable code.

Iteration when you repeat a process. For example, each time a program loops, the code inside the curly brackets runs.

JavaScript a computer programming language.

Loop a function that repeats a piece of code a number of times. For example, a loop using pseudocode syntax might look like this:

```
for 1...3 {
        The repeating code
        goes here
        }
```

This piece of code loops 3 times, starting at 1. Each time the program goes through an iteration, which means one looping, the code inside the braces runs.

Programmer a person who writes algorithms to create programs or code for computers.

Pseudocode a way to plan a computer program using human-friendly language. It's not actual programming, but a written description of the key elements of an algorithm or program. It's used as a quick way of thinking about a program without completely writing it out in code.

Sequence the order in which the computer performs the steps the programmer writes.

Software the end product of written computer code.

Syntax rules for how a program is written. These rules have a purpose similar to written grammar: it's a standard format that the computer understands. In programming, the syntax is more specific and detailed, and needs to be exactly correct for a computer to know what to do. For that reason, programmers often use pseudocode to help them flesh out ideas without the burden of being too exact.

Variable in coding, a variable holds or "stores" information. This makes it easy to reuse information that might be used many times.

Whiteboarding the process of writing or reading code on a whiteboard or in other unplugged ways. It's used often as a way of understanding code without the assistance of a computer.

Computers were invented to do repetitive tasks, and they're really good at it!

Loops in a program tell the computer to repeat an action. For example, a computer programmer might use a loop to tell a computer to repeat a math calculation using different sets of data.

If you were writing a song in computer code, lyrics that repeat could be written in a loop. The chorus in a song is a loop, because you repeat it. Verses aren't loops because they don't repeat, and the words for verses are different.

Remember:

DON'T
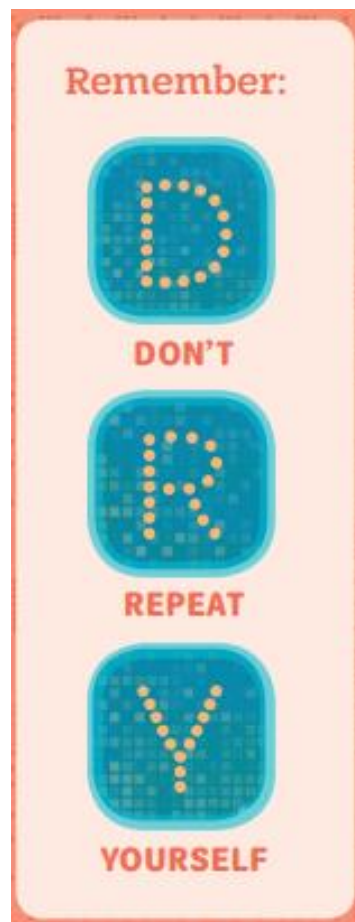
REPEAT

YOURSELF

Programmers like to follow the concept of DRY—Don't Repeat Yourself! Loops make code more efficient. They let the computer do the repeating, instead of the programmers!

Think of your favorite song. What lyrics repeat and which ones do not? Can you identify loop(s) in the song?

Two heads are better than one. When you're first planning a new project with others, you work together to put all of your ideas down on paper. They might not be the best ideas or the ones that you use in your final project, but they're a good starting point.

Programmers write code in much the same way. They often work in teams to write programs. Programmers often work in teams to write programs. Any program will be revised many times.

Collaboration also allows programmers to share ideas and inspire each other. Programmers build on their teammates' ideas, often creating better code than if they wrote it alone. Sometimes songwriters and musicians collaborate, too.

What are the benefits of working together on a creative project? Can you think of any challenges to collaborating or drawbacks? What makes a good collaborative team?

How to declare a function:

1. Start with the keyword "function." This tells the computer it's going to be a new function.

2. Give the new function a name followed by parentheses.

3. Start the body of the function with open curly brackets "{"

4. Insert the code you want to run - functions for smaller steps in this larger function. Put one function per line and to indent a bit. This makes your code easier to read because it creates visual chunks or blocks.

5. Close the curly brackets "}" to tell the computer the function is complete.

Here is an example of coding a dance.

Line No.	Explanation	Code
1	Declare function name, open bracket to start new function	function boxDance ( ) {
2	Step to the left	stepLeft ( )
3	Step forward	stepForward ( )
4	Step to the right	stepRight ( )
5	Step back	stepBack ( )
6	Close bracket to finish new function	}

Try it yourself! On a piece of paper, code a dance that goes with your song.

Here are some functions you can use to create your performance code. You can also make your own.

- stepLeft()
- stepRight()
- stomp()
- clap()
- pause()
- say("message")
- shout("message")
- whisper("message")

Step 4: continued

Then, combine your song lyrics and dance routine into one piece of code.

How to combine song lyrics and dance moves into a coded performance:

1. Start the new function by deciding on the new function's name and filling it in on line 1.
2. After you fill in a name for your main function, use each line to write in the steps of your routine. These go inside of your main function.
3. Continue adding lines until your all your lyrics are translated into code and you've added your dance moves, too.
4. Remember that the computer can only do exactly what you tell it to do, in the order you tell it to do.
5. Remember: Don't forget to use loops for any code that repeats!

Step 4: continued

Here's one example of a coded performance:

Line No.	Code
1	function loveNotHate() {
2	var line1 = "Love"
3	var line2 = "Not Hate"
4	var line3 = "Makes America Great"
5	var line4 = "We choose love"
6	
7	for 1...4 {
8	shout(line1)
9	shout(line2)
10	shout(line3)
11	}
12	
13	shout(line4)
14	raiseArms()
15	headBow()
16	fistPump()
17	}

Step 5: Share your coded routine with others

Imagine a dancer hasn't seen a dance and was trying to recreate it based only on a set of written notes from a choreographer—it would be a lot like a computer running a program. The dancer could only do what was written down. The notes would have to be very detailed and specific for the dancer to recreate the dance accurately.

Since a computer can't guess or make assumptions about code, programmers share their code with their colleagues to make sure it's clear and understandable. One way programmers gather feedback is by using a process called whiteboarding, where they write their code on a whiteboard and ask others to look for places that are confusing.

Having other people look at your code to find and fix errors, improve the user experience, or clarify instructions is an important step in writing good code

Coding For Good

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