



Badge 1: Coding Basics

Have you ever wondered how a smartphone keeps track of all your phone calls or how the computer in a stoplight tells it when to change? Someone wrote step-by-step instructions for the computer in a language it understands. That someone is a computer programmer.

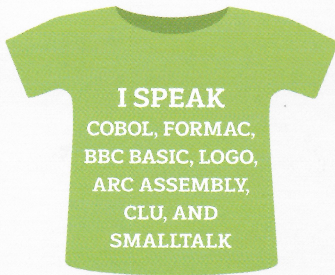
By learning about how computers work and how people write code for them, you'll understand what computer programmers do and be able to do it, too.

Steps

1. Learn about functions and arguments
2. Explore how memes are created
3. Write pseudocode for a meme
4. Write shareable code
5. Share your meme

Purpose

When I've earned this badge, I'll know the basics of computer coding and how to create a meme that can have an impact on other people, my community, and the world.



Parlez-vous Computer?

If coding were a country, it would be the country with the third-most languages spoken in the world.

- 1 The people in Papua New Guinea speak nearly 835 languages! That makes it number one in language diversity.
- 2 Next comes Indonesia, with more than 700 languages.
- 3 Third is Nigeria, with more than 500 different languages.

There are more than 690 widely used computer languages. That means that there are more coding languages than languages spoken in Nigeria! For comparison, about 350 languages are spoken in the United States

Women have developed many of these computer languages, including COBOL, FORMAC, BBC BASIC, Logo, ARC Assembly, CLU, and Smalltalk.

STEP

1 Learn about functions and arguments

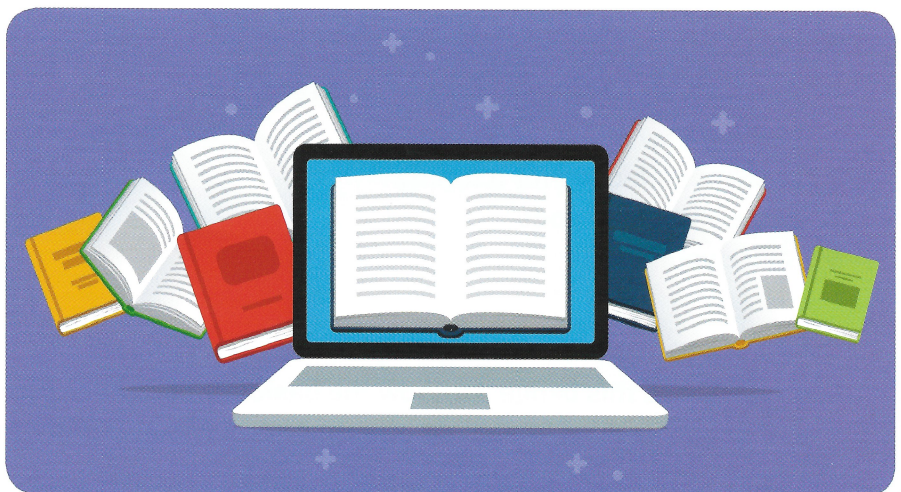
Computers follow directions and can only do exactly what their program tells them to do. A step-by-step list of instructions for a computer is called an **algorithm**. Algorithms can be very simple, but sometimes computer programmers need them to do more complex tasks. To make more detailed instructions, programmers add **functions** and **arguments** to the steps in their algorithms.

A **function** is a type of instruction in an algorithm that's like a verb: a function does something. An **argument** names the specific thing a function can do. For example, if you wrote an algorithm about homework, it might have a function that says:

- **read()**—This would tell you that you needed to read for school, but not what to read. Do you need to read a textbook? A handout? An article online? You could improve your function by adding **WHAT** you are supposed to read.
- **readTextbook()**—Now you know to read a textbook, but which textbook? Add an argument with that detail.
- **readTextbook("socialstudies")**—You now know you need to read your social studies textbook, but do you have to read the whole textbook?
- **readTextbook("socialstudies", chapter3)**—You only need to read Chapter 3!

You could use this same function, **readTextbook()**, with other arguments, such as ("English", pages 2-13), for other textbook-reading assignments.

What other homework algorithm functions can you think of? How could you answer questions? Write an essay? Collaborate on a project?



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. Adding an argument makes the function 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.

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.

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: the name of the function followed by '()'. For example, `turnLeft()` and `drawEye()` 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."

Going viral when a meme or other story gets spread rapidly

through social media. The metaphor of a virus spreading is used to explain how images and messages get passed from person to person, and from a large media outlet to many people at once.

JavaScript a computer programming language.

Meme a humorous image (or video) with text that's copied and shared online, especially on social media. Memes often use a recognizable image (celebrities, scenes from TV/movies, animals, etc.) taken out of context to express opinions and emotions. This can make them a powerful way to spread ideas, which can have either positive or negative effects.

Pixel the smallest element of a digital image. Pixel comes from "pix" for picture and "el" for element. Pixels exist on screens in a grid. Technically they come in different colors, but for this badge, they'll be treated as binary (on/off, color/not color, one/zero).

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

Propaganda a message that is meant to serve the interests of the messenger or spread information in order to influence public opinion and to manipulate other people's beliefs.

Pseudocode a way to plan a computer program using human-friendly language instead

of a computer language like JavaScript. 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.

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. Just like grammar rules tell you to start a sentence with a capital letter and end a sentence with a period, syntax in coding works in the same way: it's a standard format for writing code that the computer understands. In programming, the syntax needs to be exactly correct for a computer to know what to do. For this reason, programmers often use pseudocode to help them flesh out ideas without the burden of being too exact.

X-Y coordinates when programmers put images on screens, they use a grid that represents the screen. Each square in the grid has a reference number like an address. This number is a square's location and can be written as a pair of numbers: the first number is the X (horizontal position), and the second one is the Y (vertical position). The grid's numbers start with the top left corner square as (0,0), which is called the origin.

Meme Example

Here's pseudocode to create a meme:

Get the image of a dog in a tuxedo

Use a black marker

Write "THAT FEELING WHEN" on one line at the top in all capital letters

Write "YOU GET YOUR FRIENDS TO RECYCLE" under the dog on one line in all capital letters

This can be written like this in JavaScript:

```
getImage("dog with tuxedo")
```

```
getMarker(black)
```

```
writeText("THAT FEELING  
WHEN", top)
```

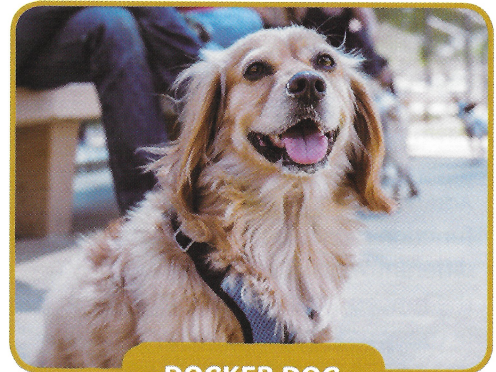
```
writeText("YOU GET YOUR  
FRIENDS TO RECYCLE", under  
the dog)
```

STEP

2 Explore how memes are created

Have you ever had pineapple pizza? Seen a dog that was part dachshund and part cocker spaniel? Worn a frilly dress and big, clunky boots? These combinations are surprising.

Memes similarly use surprising combinations of images and words to send a message. The message can be funny or thought-provoking. The meme's purpose can be just for fun or to inspire people to act. By combining words and an image, you can also get people thinking about an important cause.



DOCKER DOG

STEP

3 Write pseudocode for a meme

Writing code in a specific computer language, like JavaScript, is complicated. When programmers are just beginning to work on a new program, they use human language instead of computer language. This is called **pseudocode**. It lets them map out their ideas before they spend time coding. Once programmers have an idea what they want to create, they share their ideas with each other to find out if their algorithms make sense.

Giving and getting feedback is an important part of the design process. Helping each other find weaknesses or mistakes isn't meant to be negative. Instead, it helps the creator make a better product. Constructive feedback helps programmers find confusing spots or errors in their code and fix them.

Check line 3.

Your code is very clear and concise.

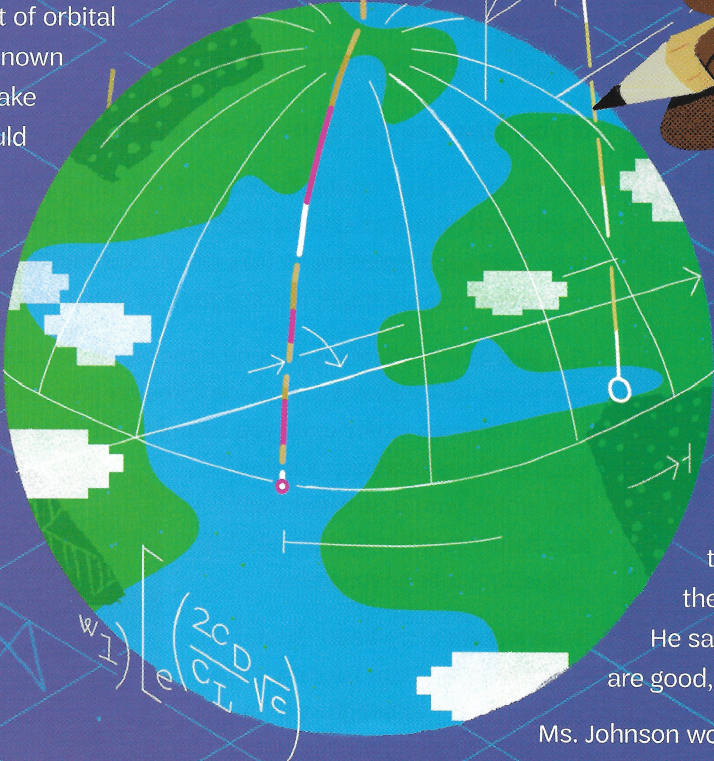
The pseudocode is missing the program definition statement at the beginning. Adding this statement will clarify what you want the program to do.



Computer Pioneers: KATHERINE JOHNSON

Katherine Johnson worked as a mathematician at NASA starting in 1953. The kinds of calculation Ms. Johnson did are part of orbital mechanics. She's best known for doing the math to make sure that astronauts could return safely to earth.

Before taking off on the Mercury 6 space flight, Astronaut John Glenn didn't trust the computers on the spaceship to calculate the orbital mechanics correctly.



He asked for Katherine Johnson to personally check the calculations by hand. He said, "If she says they are good, I'm ready to go."

Ms. Johnson worked at NASA for more than 30 years, on projects from the first human space flight to the space shuttle and planning a mission to Mars.

What Do You Meme?

When a story or meme spreads rapidly through social media, people say it has “gone viral” like a virus spreading quickly from person to person. Can you think of any super popular memes? What do you think made them so popular?

When you’re looking at memes or any other online content, think about where the message came from and what it is trying to do.

- Can you figure out who created the meme?
- What kind of message are they trying to send? Positive? Negative? Biased? Neutral?
- Is it just for fun? Is the creator trying to build awareness about a cause?
- Is the meme trying to influence your opinion?

STEP 4 Write shareable code

Pseudocode is great for planning your program, but computers don’t understand it. You have to turn it into shareable code.

When you use a programming language, like JavaScript, to write algorithms, you have to follow the rules of the language, or **syntax**. Syntax is like the grammar rules of a programming language. Just as there are rules about punctuation and capitalization in human languages, computer languages have rules, too.

For example, when you want to write a function with arguments, you need to follow this format:

```
functionName(argument, argument)
```

When you follow correct syntax, not only will other programmers understand your algorithm, the computers will, too.

STEP 5 Share your meme

If you want to get someone’s attention, use a meme!

The word “meme” comes from the Greek word *mimēa*, meaning something that is imitated. There are funny memes, like ones with dancing cats and talking dogs. Serious memes try to take on serious topics in a funny way, while mean or snarky memes might use surprise or shock to get people’s attention.

The goal of any meme is to send a message. Some memes are meant for everyone, while others are inside jokes created for a smaller group of people. Think about an experience you have as a Girl Scout that others might not have. You could make a meme about that which would be meaningful and funny to other Girl Scouts, but probably not to anyone else.

Once a meme has been shared on social media, it can take on a life of its own. If you’re trying to build awareness about an important issue, this could be a good thing, because lots of people will see it. But remember, memes can get changed or used in ways the creators didn’t expect.



Now that I've earned this badge, I can give service by:

- Making a video about how memes are made and spread.
- Holding a workshop to teach others how to observe social media more critically.
- Creating meme posters about Girl Scouts to recruit more girls to join our troop.

I'm inspired to: