



Senior Coding Basics Badge

Pillar: STEM

Outcomes: Strong Sense of Self, Challenge Seeking

When you've earned this badge, you'll know how computer programmers write code to make computers perform tasks, and develop games and apps to teach people and mobilize communities.

Seniors will earn their badge by:

1. Use functions to create a self-portrait

- a. Programmers write code for computers to solve all types of problems from telling the time to researching disease. But for computers to do anything, they need clear and precise instructions on how to perform a task.
- b. An **algorithm** is a series of specific instructions, followed in-order that can be completed several different ways. Algorithms are often used to tell computers what to do, but humans can also follow algorithms to accomplish a goal such as cooking a recipe or completing a daily routine. Watch [this video](#) to learn more.
- c. In coding, the individual steps or actions in an algorithm are called **functions**. Functions perform tasks. For example: **drawNose();** or **drawEyebrow();** are both functions. The function **drawNose();** gives the instruction to draw the nose in your portrait, but it's still really general. In programming, you add **arguments** to make the functions more specific. When drawing your eyes, the specific code would be **drawEye("hazel");**. It's important to note that there shouldn't be spaces in your function, and your function can never begin with a number.
- d. All this background knowledge will help you in your next step. But first, you'll need to draw a self-portrait to have as a guide when writing your code. Grab a paper and your favorite drawing utensil and create a self-portrait however you need (from a photo on your phone, a physical picture, or looking at yourself in the mirror!). [Here](#) is a video on how to draw a quick self-portrait.
- e. Use [this website](#) to learn more about these words: algorithm, argument, function, sequence, software, syntax, Boolean expression, code, IF statement, JavaScript, Pseudocode, X-Y coordinates, control flow.

2. Write code to create a portrait

- a. Now that you have drawn your self-portrait, you'll figure out how to code it! Use a pencil and draw 2 lightly dotted lines. One will go directly down the center of your face, and the other will go through the middle of your face (approximately just underneath your nose, but everyone's face is different 😊). Continue the lines so they reach the edges of your paper. You have drawn an [x- and y-axis](#)! This will help you create a grid, so you can find coordinates where your eyes, lips, nose, ears, and face should be drawn!
- b. Mark on your paper both ways on the x- and y-axis. Mark at least 10 lines on the x- and y-axis. Because there are only five tick marks on the lines in each quadrant (while there is the x- and y-axis that are really only two lines, do you see how it looks like there are four lines because of the sections?), your code won't be super precise. However, this is tough stuff to grasp, so even just knowing how to write the coordinates (x, y) in your code is a huge first step in learning how to use programming language to help someone create a portrait of your face. Find the x- and y-values of all the wonderful unique features on your face.
- c. The x-value is how far you move horizontally to the right or left (notice that left of the y axis are negative numbers). Count the tick marks. The y-value is how far up or down (vertically) you move on

your face (notice that below the x axis are negative numbers). Think about your lips, chin, nose, forehead, and the line they create up (or downward) on your face. You should have an x- and y-value for every feature on your face. Write them like this: (x, y). In your code, it will look like this: **drawEye("hazel", x-value, y-value);** or **drawNose(0, 0);** Now, using ALL that you just learned, write the code for someone to draw your face using the examples provided above. For your hair, you'll write your code like this: **drawHair("color", "style", x, y);**. Notice how you're using functions and arguments to describe yourself! Don't forget the semicolon after each command –it's JavaScript's period, acting as the end of the command.

3. Learn about computer logic

- a. In Steps 1 and 2, you were actually writing code in one of the most popular coding languages on the internet – **JavaScript**, a popular computer programming language. The way you wrote without spaces, used functions and arguments, added the quotes to characteristics, used the x- and y-values to place your facial features, closed the parentheses, and ended with a semi-colon are all part of the JavaScript **syntax**. Syntax is the rules for how a program is written. In programming, the syntax needs to be exactly correct for a computer to know what to do. For example, it probably would not be super helpful for you to write the code for your ear before you write the code for your face, which is why Control Flow is so important.
- b. **Control flow** is a term that refers to the order a computer will execute functions, or other operations. It's the sequence in which the algorithms are done and the order of the different decisions computers can make. Now that you have written the code for drawing your portrait (hopefully you have all of your features individually coded), we can be sure to put them in a logical order for the computer to follow. Computers are smart, but sometimes we have to be way more specific with them. Write your code out starting with your face/head, then nose, eyes, mouth, eyebrows, ears, and then hair. Play around with it and try to decide which order feels the most natural.
- a. Now, draw your self-portrait again using the x and y axis, but this time follow your code in order. Does it look the same? [Here's](#) a video from Khan Academy about drawing and putting the code into a computer. Remember, this is computer programming, which is a whole new language and a little different than drawing it on paper.
- b. Learn how [coding can save lives and make the world better](#).

4. Explore "IF" statements

- a. Computers use **Boolean logic** to determine **IF** a condition (situation) is either true or false, and nothing **ELSE**. It helps computers make choices and respond to different conditions.
- b. To code a condition or a question so a computer can answer it, you can use **IF/ELSE statements**. IF/ELSE statements in code tests whether some "condition" is true or false. An example of this is: IF statement is TRUE, THEN say this/ELSE say that. To translate this to JavaScript syntax you would do the following:

```
if (Boolean expression) {  
  do something when true  
} else {  
  or do something else when false  
}
```

To see how this is created in JavaScript, watch [this video](#).

5. Use computer logic to create a quiz show

- c. Complete some research and create true/false statements about the following famous women computer programmers: Ada Lovelace, Grace Hopper, Hedy Lamarr, Katherine Johnson, Limor Fried, Maddy Maxy, Margaret Hamilton and Raye Montague. Below are examples of how to create the code for your questions:



True or false: Ada Lovelace was born before Limor Fried
AdaLoveLaceBirthDate < LimorFriedBirthDate
TRUE - Ada was born before Limor Fried.

True or false: Maddy Maxey is older than Grace Hopper
maddyMaxey > graceHopper
FALSE - Maddy is younger than Grace.

True or false: Grace Hopper Invented COBOL
graceHopperInvention == 'COBOL'
TRUE - She worked on COBOL while working for the navy.

d. Using your questions and answers you created, use either one of the following websites to create a quick true/false quiz show for free and try it out with members of your household!
<https://www.quizshow.io/> or <https://kahoot.com/>

6. **Learn about [Hedy Lamarr](#)** who created the basis for Wi-Fi! She was a self-taught engineer and inventor, and also a famous actress!

7. **Share your self-portrait** on the [GSKSMO Virtual Art Show](#) if applicable

When you're finished: Congratulations, you have earned your badge! You can purchase by emailing shopdept@gksmo.org or at <https://www.girlscoutshop.com/SENIOR-CODING-BASICS-BADGE>

No shipping charges apply at this time.

