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WHY CODING?

WELCOME!

Yes, you! The one reading this book. So glad you made it.

What brings you to coding?

Maybe you're already into **COMPUTER SCIENCE** and want to learn how to do more.

If so, that's great!

Maybe a parent or grandparent or teacher told you that coding is a

valuable skill for your future and made you sign up for a class, but you're not really sure if it's for you.

That's okay, too.

Maybe you don't know anything about coding and just liked our cover art.

That works for us!

Whatever the reason, we're glad you've picked up this book, and we're glad you're here. And you're in good company!

The first thing to know about coding is that it's about way more than just computers.

It's about having fun.

It's about collaborating with your friends.

Erin

Maya

Lucy

Sophia

Leila
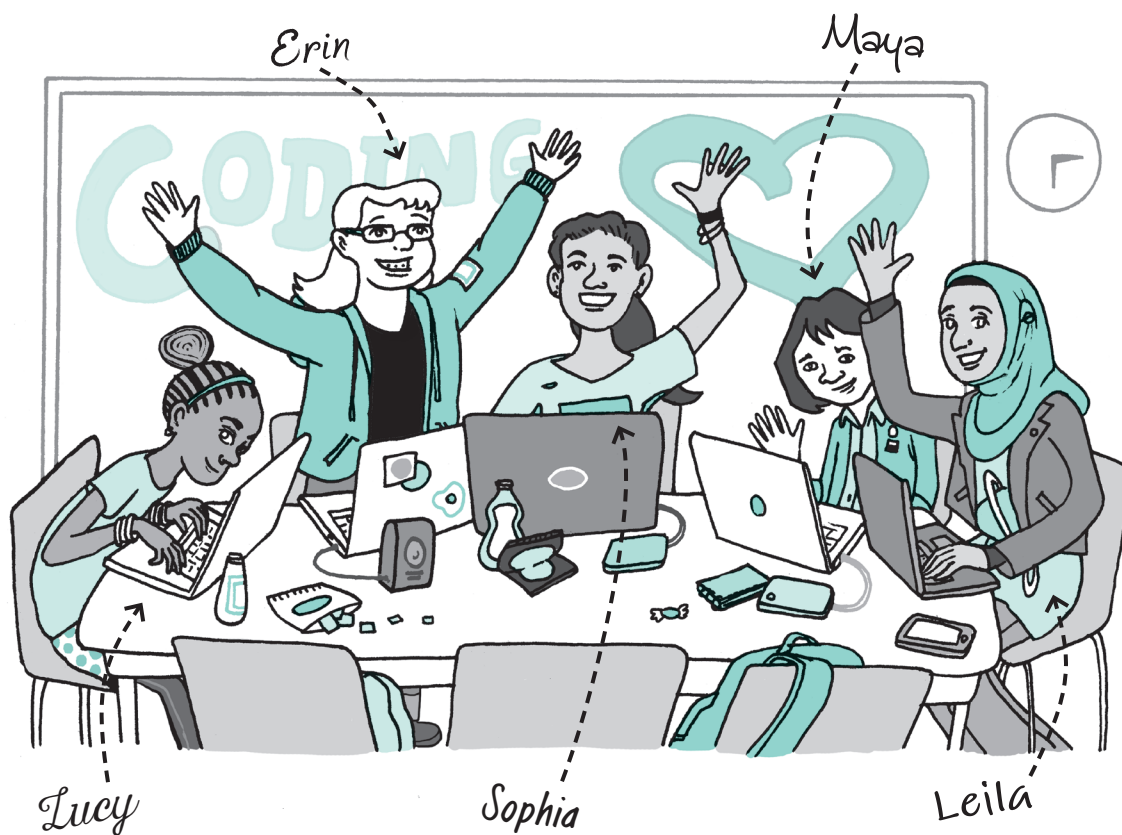
It's something *everyone* (not just boys) can do.

And it's about creating, imagining, and inventing awesome new stuff based on whatever you're interested in.

REALLY? LIKE WHAT?

Like turning a toy car into a robot. Or making a **WEBSITE*** for your dog-walking business. Maybe you want to **DESIGN** a smart bracelet that can remind you when to do your home-work or practice the piano. Or an app to keep track of your sprint times when you're training. How about an interactive sound and light display for the next school play? Or an LED headband that can change color to match what you're wearing?

You can do all this stuff, and a whole lot more, by learning to code.

*When you see a word that looks like **THIS**, it means you can find a definition of it in the glossary on pages 158-162!

And I've got some news for you:

The major, earth-shattering trick to **COMPUTER CODING** is . . .

. . . it's mostly problem-solving!

The actual code-writing part is just a small piece of a process that uses the thinking and planning skills you already have and use every day in your life.

So let's get started.

First of all, who can tell me what coding is?

OOOH, I KNOW THIS. IT'S HOW YOU TELL A COMPUTER WHAT TO DO.

That's right.

Coding is, very simply, writing commands to instruct a computer to do something in a programming language it can understand.

There are actually hundreds of different programming languages used to give instructions to a computer. Which one you use depends on what you need the computer to do. When you learn to code, you learn to "speak" one of these languages so that you can communicate directly to the computer.

YEAH, BUT DON'T WE ALREADY TELL OUR COMPUTERS WHAT TO DO BY CLICKING ON THE MOUSE AND NAVIGATING DIFFERENT MENUS AND APPS? *WHY DO I NEED TO KNOW CODING, TOO?*

Because coding is an amazing tool that will allow you to use your computer in ways you haven't even dreamed up yet. Sure, you can already do stuff on your computer, your tablet, or your phone, but that's because at some point, somewhere, a programmer had an idea for that app or program, then wrote the **CODE** to make it work. That person's code created the icons and buttons and shortcuts you use to control your device. This is the software that runs the machine. But using software is not the same as writing code.

By learning to code, you no longer have to just use the programs and apps that somebody else created—you can build them yourself! Like a best friend birthday reminder app, or a website for your drama club.

SOFTWARE VS HARDWARE

SOFTWARE is the set of programs and applications that make a computer run. It's a collection of code, designed and written by programmers. Software includes everything from apps that let you put fun filters on your photos to games that let you take care of a virtual dog or fight villains. Software also includes the computer programs that let you write your English essay.

HARDWARE refers to the physical parts of the computer itself: the screen, the keyboard, the camera, and more. These are usually designed and built by engineers. Your phone and tablet are also examples of hardware.

Another great reason to learn to code: it helps you understand, design, and work with the technology of the future.

There's a computer in almost every-thing, including cars, games, medical devices, and clothes. There are even smart toothbrushes!

If an object doesn't rely on a com-puter right now, chances are good that, in a few years, it will. And every one of these digital devices depends on a programmer writing code to tell the ma-chine what to do and how to do it.

THE NUMBER PI SQUARED IS 9.86960440109 . . .

SO WRITING CODE IS A REALLY IMPORTANT JOB?

Yes! Without a programmer writing code, a computer would just be a big box. Because even though today's computers can do amazing things, they are still machines that, at some level, need to be instructed by a person.

WHAT COMPUTERS DO

Think about the microwave in your kitchen. It won't just randomly start heating up your leftover mac and cheese because you want it to. You

have to put your dish in the microwave, close the door, set the timer, and push Start. The machine performs the task you instructed it to, and at the end, you pull out your warmed-up snack. The whole sequence happens because *you* decided you were hungry and programmed the machine to do what you wanted.

At a really basic level, a computer works the same way. You put something in, instruct the computer to do something with it, and you get the result.

The steps look like this:

INPUT ⇉ PROCESS ⇉ OUTPUT

There are a lot of ways to input information into computers. The most obvious way is with the tool used to write these words: the keyboard. A keyboard lets you input letters and numbers. The output is typed text, like this book you're reading. But a keyboard isn't the only way to get information into a computer. Digital pens, video cameras, microphones, scanners, and sensors also let you input information for your computer to interact with in tons of different ways.

And "information" doesn't always mean facts or figures. It can be music, video clips, brushstrokes, or photos. You can use software to edit your movies, manipulate a vocal track, fill in colors, add brightness and shadow, animate a game, drop filters onto a selfie, and upload it to your profile. You can do all this thanks to someone who had an idea for a program.

The program is what the computer will do with the information you've put in. It's basically the job you are asking the computer to do, or the **PROCESS** you are asking the computer to run on the data you have **INPUT**.

The **OUTPUT** is the result. An enhanced photo, a Word document, a calculation, an edited movie, an animation—it's what you get after the computer has run the program.

For every smart device or computer program you use daily, a programmer with an idea got together with other programmers and figured out exactly what they wanted the computer to be able to do. They thought about how the person using the computer would need to operate it. Then they designed the software, wrote the code to run it, tested it to be sure it worked, and *voilà*!

Thanks to some of those coders, you can cover your social media feeds in endless versions of awesome emojis.

When you learn to code, *you* will be able to do the same thing. And you might already have a ton of great ideas for useful and important programs that could change the world.

What do you think about that, emoji?

WOW, SO I COULD WRITE PROGRAMS THAT CAN MAKE A COMPUTER DO WHAT I WANT? *LIKE MAKE MY OWN GAMES? OR APPS?*