

girls who
code

Girls Who Code At Home

The Friendship Code
Chapter 2

Activity Overview

In this week's Girls Who Code at Home activity you will read the second chapter of the Friendship Code, Coding Club's First Activity. After reading the chapter you can reflect and discuss what you read with a friend or family member before diving into the Chapter Challenge (with a plugged and unplugged option)! We also recommend taking a few moments to explore this week's featured women in tech, Ada Lovelace. Ada is considered the first computer scientist who worked to translate the first computer instructions and concepts in history.

Chapter Summary

It's the first Coding Club activity! Mrs. Clark instructs students to write directions for making a peanut butter and jelly sandwich. Mrs. Clark tests out Lucy's directions in front of the Club. It becomes clear that Lucy didn't include important instructions, like opening the jars before spreading jelly. Next, students work in groups to test out everyone else's directions. Even though most students forgot key directions, Sophia included all of the necessary steps. Many students are confused about why they did this activity. Mrs. Clark explains that the instructions for making a sandwich are like writing code. The instructions are the input, and the sandwiches – or piles of bread and jelly! – are the output.

Materials

- *The Friendship Code: Chapter 2 (included at the end of this activity)*
- Optional: Physical or Digital Copy of [The Friendship Code](#)*
- Optional: [Online Scratch](#) or [Offline Scratch](#)
- [Example Move Your Sprite with Arrow Keys Chapter Challenge Project](#)
- [Extensions Examples Move Your Sprite with Arrow Keys Chapter Challenge Project](#)
- Optional: Paper and Pen, Pencil, or Markers

***Note:** If you don't have a copy of the Friendship Code and you don't want to purchase one, you can rent the book from your local library! If your library doesn't have any copies of The Friendship Code, try submitting a request for an Interlibrary Loan or Recommend a Title. Most libraries have a simple online form to complete your requests.

Women in Tech Spotlight: Ada Lovelace



Image Source:

[Computer History Museum](#)

Born in the 1800s, Ada Lovelace is considered one of the first computer programmers ever. But you might be asking yourself - weren't computers invented in the 1900s?! Even though electronic computers were not available during Ada's lifetime, she helped pioneer the first modern computer science concepts.

As a child, Ada showed exceptional talent in mathematics and science. Eventually, her mentor Charles Babbage asked her to translate an article on his invention called the analytical engine, one of the first calculators. In her translation, she added her own commentary on the machine, which became some of the first computer instructions and concepts in history. Her instructions included many of the same ideas we use today - like variables and looping!

Watch [this video](#), learn more about how Ada began the computer science revolution as one of the first computer scientists!

Reflect

Being a computer scientist is more than just being great at coding. Take some time to reflect on how Ada and her work relates to the strengths that great computer scientists focus on building - bravery, resilience, creativity, and purpose.



CREATIVITY

How did Ada approach Charles's assignment in a different way than he expected? What are the advantages of approaching a question or request in an unexpected way?

Share your responses with a family member or friend. Encourage others to read more about Ada to join in the discussion!

Step 1: Read The Friendship Code Chapter 2 (10-15 mins)

Read the second chapter of The Friendship Code using your own copy of the book, or the copy on page 16.

Step 2: Reflect or Discuss Chapter 2 (10-15 mins)

If you read the chapter with a friend or family member, we recommend discussing the questions below together before completing the Chapter Challenge. If you read the chapter on your own, and don't want to discuss it you can reflect on these questions using the handout at the end of this activity or in a notebook or journal. You could also use your phone, computer, or a tablet to record a video with your own thoughts and reflection for the chapter!

Reflection and Discussion Questions

- What went wrong when Mrs. Clark and the students tried to make peanut butter and jelly sandwiches? Why?
- What kinds of things did Sophia consider when writing her own instructions? How were those different from what other students in the Club did?
- Why do you think Mrs. Clark began the Club by having the students follow each others' instructions to make sandwiches?

Step 3: Complete a Chapter Challenge (15-40 mins)

Choose to complete **one** of the challenges below. You can choose either the Unplugged challenge or the Scratch challenge.

Unplugged Challenge (15-20 mins)

Write your own detailed instructions for a familiar activity, such as how to do a popular dance, how to tie your shoes, or how to make a paper airplane. Switch directions with a partner and test it out! Remember to try to break down your instructions to small steps. Think about actions that you might assume a person following directions can already do (such as "fold paper in half") and try to break these steps down even smaller!

Scratch Challenge: Make Your Sprite Move with Arrow Keys (30-40 mins)

Detailed instructions are very important! Scratch is a free programming platform and block-based programming language developed by MIT that allows you to program interactive stories, games, animations. Introduce yourself and share some strategies for being brave and trying new things by Scratch to make an object, or **sprite**, say something about you!

Step 3: Complete a Chapter Challenge (Continued)

1. Sign up or login into [Scratch](#).

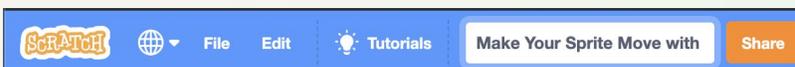
In order to save your work on Scratch's online platform you'll need to create an account if you don't already have one. Follow the instructions on the sign up form to create an account. If you are under 13 you'll need your parent's email address to sign up. If you don't want to create an account you can also download and use the [offline version of Scratch 3.0](#).

2. Create a New Project.

From the home page click **Create** to create a new project!

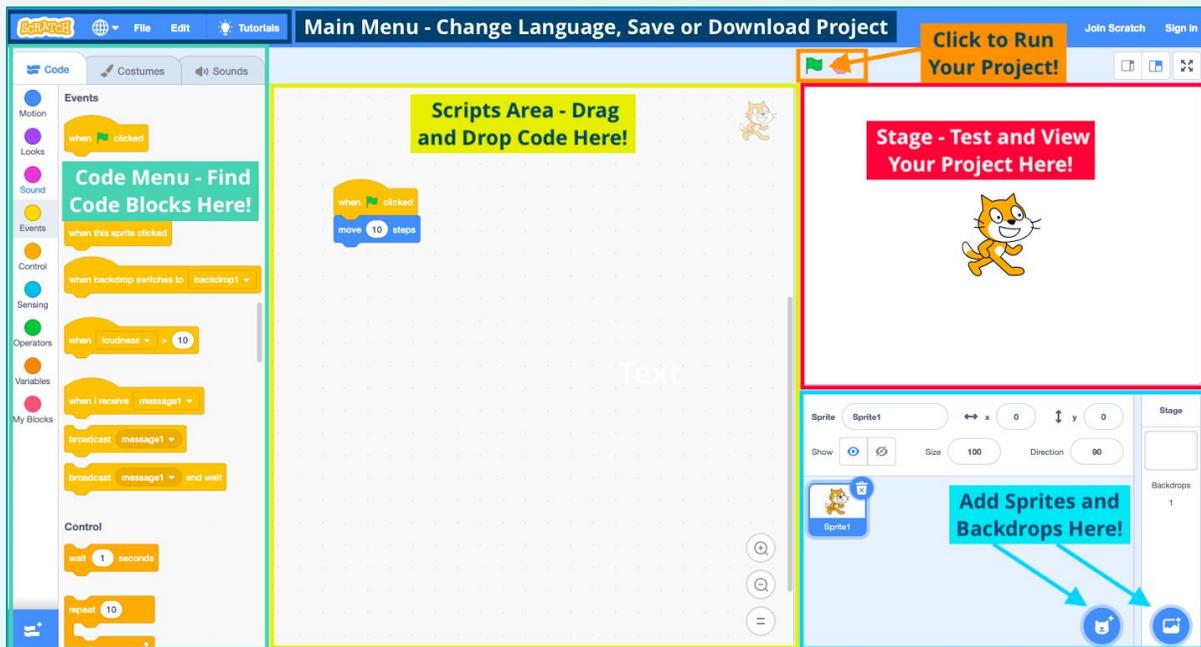


Give your project a specific name, like "Make Your Sprite Move with Arrow Keys".



3. Explore the Scratch interface.

If you are new to Scratch take a few minutes to explore the Scratch interface. You can also watch this [Getting Started](#) tutorial from Scratch!



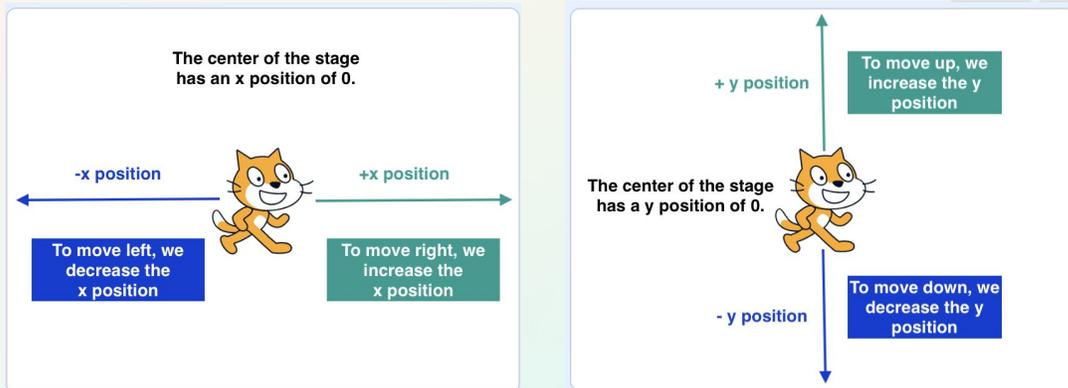
Step 3: Complete a Chapter Challenge (Continued)

4. Add a sprite and backdrop.

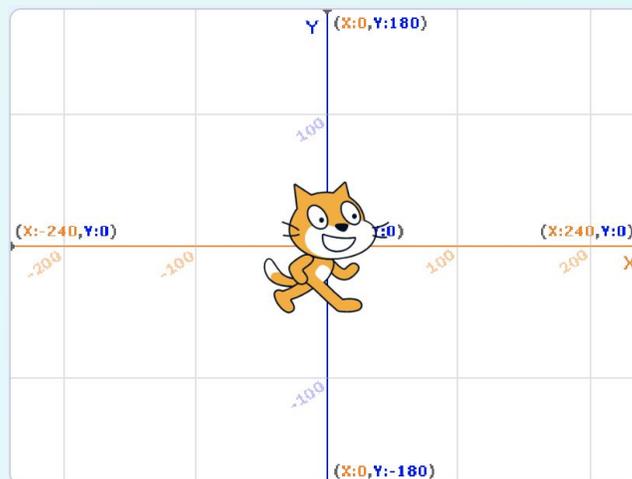
In Scratch we call all objects sprites. A sprite contains costumes, code, and sounds. Add a sprite or backdrop you want from the library by clicking on the sprite or backdrop icons in the bottom right hand corner of the editor.

5. Review movement in the Scratch stage.

Scratch uses a grid to determine where a sprite is on the Stage. The grid has an “x position” and a “y position”. The center of the stage has an x position = 0 and y position = 0. The x position shows movement horizontally, or left and right, while the y position shows movement vertically, or up and down.



The x position on the Scratch stage ranges from -240 to 240, while the y position ranges from -180 to 180. You may recognize that the stage acts similarly to the coordinate grid that you may have learned in math class!



Step 3: Complete a Chapter Challenge (Continued)

6. Code your Sprite to move left.

Scratch is an **event-based programming language**, which means that the code is run or triggered by different events. For example the **When __ key is pressed** or **when mouse moved** blocks can trigger scripts to run whenever that event takes place. In Scratch, event blocks are found in the **Events** menu. In many projects the event, **When Green Flag Clicked** is used to start most programs.

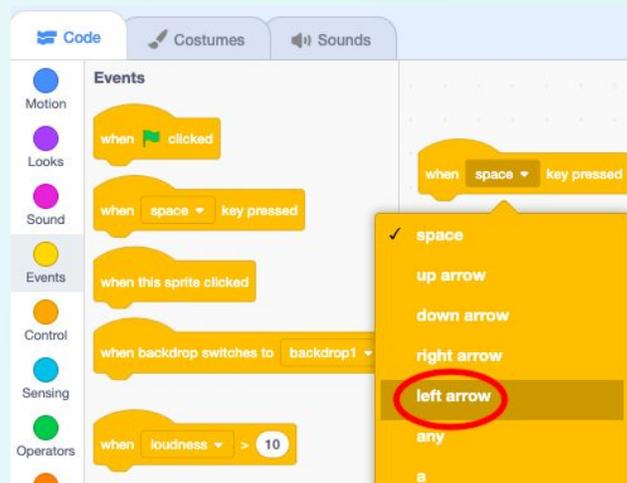


Let's try this in your project!

- Click on the **Events** menu from the Code Block Column on the left.
- Drag the **When space key is pressed block** to the coding area.



- Click on the small arrow next to **space** to change the key to the **left arrow**. You want your sprite to be able to move when you press the left arrow key.



- Click on the **Motion** menu from the Code Blocks Column on the left.

Step 3: Complete a Chapter Challenge (Continued)

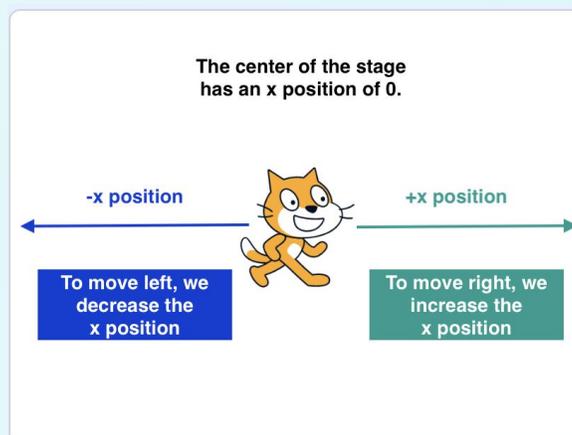
- Drag the **Change x by 10** block and attach it under the **When left arrow key pressed** block. You are changing x position because the x position goes from left to right on the Stage.



- Test this block of code by pressing the left arrow key. What happens when the number in the **Change x by** block is positive? What happens if you put a minus sign in front of it to make it negative?



When we change x by a **positive** number, the sprite moves to the right. When we change x by a **negative** number, the sprite moves to the left.



- Check that you **change x by -10**, when the left arrow key is pressed.

Step 3: Complete a Chapter Challenge (Continued)

7. Code your sprite to move right.

To code your sprite to move right, we will follow similar instructions in step 6. However, instead we will choose the event **when right arrow key is pressed** and change x by positive number.

- Click on the **Events** menu from the Code Block Column on the left.
- Drag the **When space key is pressed block** to the coding area.
- Click on the small arrow next to **space** to change the key to the **right arrow**. You want your sprite to be able to move when you press the right arrow key.
- Click on the **Motion** menu from the Code Blocks Column on the left.
- Drag the **Change x by 10** block and attach it under the **When right arrow key pressed** block. You are changing x position because the x position goes from left to right on the Stage.
- Test your project by clicking the left and arrow key and making sure that your sprite moves left and right correctly.



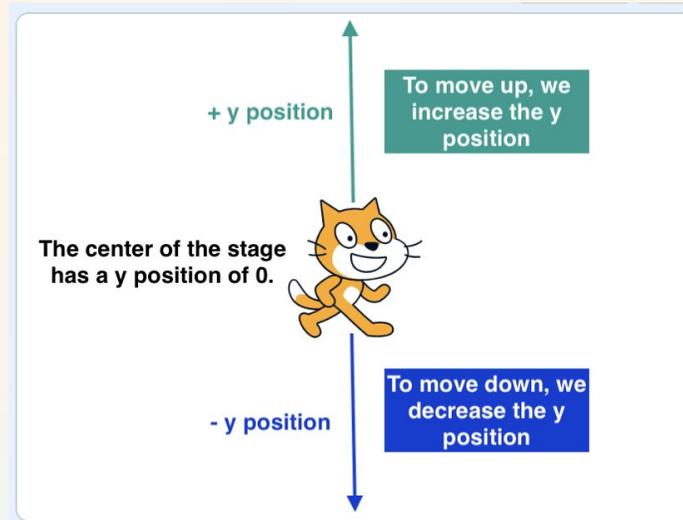
8. Code your sprite to move up and down.

To code your sprite to move up, we will follow similar instructions in step 6. However, instead we will choose the event **when up arrow key is pressed**. When choosing a Motion block, this time we want to change **y** because we want to move up and down on the Scratch stage.

- Click on the **Events** menu from the Code Block Column on the left.
- Drag the **When space key is pressed block** to the coding area.
- Click on the small arrow next to **space** to change the key to the **up arrow**. You want your sprite to be able to move when you press the right arrow key.
- Click on the **Motion** menu from the Code Blocks Column on the left.
- Drag the **Change y by 10** block and attach it under the **When up arrow key pressed** block. You are changing x position because the y position goes up and down on the Stage.

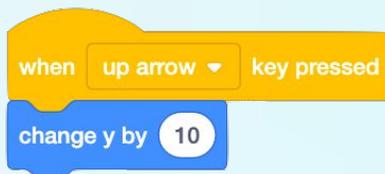
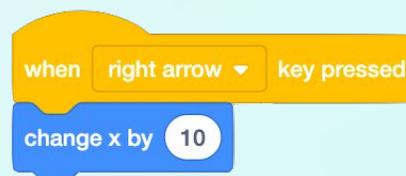
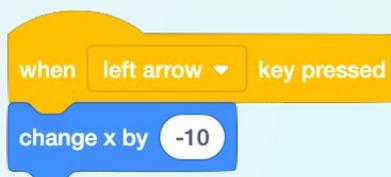
Step 3: Complete a Chapter Challenge (Continued)

- Test this block of code by pressing the up arrow key. What happens when the number in the **Change y by** block is positive? What happens if you put a minus sign in front of it to make it negative?



When we change y by a **positive** number, the sprite moves to up. When we change y by a **negative** number, the sprite moves to down.

- Check that you **change y by 10**, when the up arrow key is pressed and Test your project.
- To code your sprite to move down, choose the event **when down arrow key is pressed** and **change y by -10**.
- Test your project by clicking the up and down key and making sure that your sprite moves up and down correctly.



Step 3: Complete a Chapter Challenge (Continued)

9. Test your project.

Now that you have the first part of your project built, test it out by clicking the green flag or setting off whatever event you used to start your project. While you test your project ask yourself these questions:

- Does it work as you expected?
- Do all the actions happen in the right order?

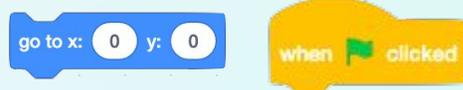
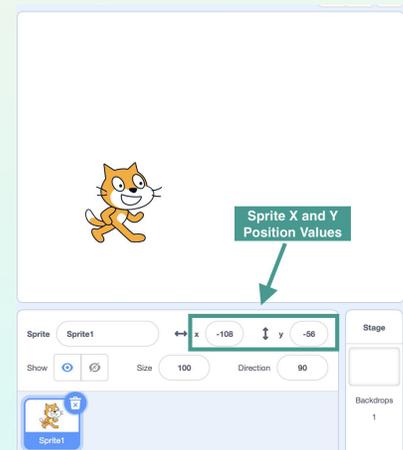
If not make adjustments and debug your code before moving on. If you want additional practice on debugging, check out our [Brave, Not Perfect Activity](#) for Scratch debugging strategies and practice!

10. Extend your project.

Once you have the first part of your animation working, continue your animation by sharing more facts about yourself or tips for being brave and trying new things. You could also enhance your project by trying out one of the ideas below.

- **Choose a starting location for your sprite.**

Right now your sprite always starts moving from where you last left off. We want to code a starting location so that every time a user presses the Green Flag, your sprite refreshes and starts back in the center. Under the **Events** menu drag the **When Green Flag is Clicked** block. Under the **Motion** menu drag the **go to x: 0 y:0**. You can choose any position for your sprite to start in. If you drag your sprite around the screen you can find its position in the Sprite description below the stage.



- **Add Costumes to your sprite.**

Want your sprite to look differently every time it moves left, right, up, and down? Use the costumes and add or create new costumes. Under the **Looks** Menu drag the **switch costume to costume1** block to assign a costume to your sprite. Click on the small arrow on the right to change the costume Options. Check out the [Code a Cartoon](#) tutorial on Scratch to learn more on how to utilize the **Motion** and **Looks** blocks to animate your sprite!

Step 4: Share Your Creation (5 mins)

- 1. Share your project on Scratch.**

Once your project is finished, or at least ready for you to share with others you can press the Share button in Scratch. We recommend you add instructions to the project page so users know how to view your animation. If you used other images or sounds give credit on the project page by updating the Notes and Credits section.

- 2. Share how you are tackling challenges with Girls Who Code at Home!**

Don't forget to share your projects on social media. Tag @girlswhocode #codefromhome and we might even feature you on our account!

Chapter 2 Reflection Questions

Questions	Your Reflection
<p>What went wrong when Mrs. Clark and the students tried to make peanut butter and jelly sandwiches? Why?</p>	
<p>What kinds of things did Sophia consider when writing her own instructions? How were those different from what other students in the Club did?</p>	
<p>Why do you think Mrs. Clark began the Club by having the students follow each others' instructions to make sandwiches?</p>	

Instructions Activity Brainstorm

Write your own instructions for a familiar activity, such as how to do a popular dance, how to tie your shoes, or how to make a paper airplane. Switch directions with a partner and test it out! Remember to try to break down your instructions to small steps. Think about actions that you might assume a person following directions can already do (such as “fold paper in half”) and try to break these steps down even smaller!

Activity:	
	Instructions
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Instructions Activity Brainstorm (Continued)

Activity:

	Instructions
11.	
12.	
13.	
14.	
15.	
16.	
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18.	
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22.	
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24.	

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Chapter Two

"Is Erin Roberts here?" Mrs. Clark asked, scanning the room as if someone might have slipped by her during the phone fiasco. I knew all the other kids, either from my classes or from around school. Mostly we were sixth-graders. Maya and Grace were the only seventh-graders.

"Hmm. Doesn't look like it," she said, setting the roll-call sheet aside. "Okay, then. Let's get started."

Finally!

The computer lab rules said students couldn't turn on the computers until the teacher gave permission. I raised my pointer finger and hovered it over the power button. I was waiting for Mrs. Clark to tell us to "boot up." I could tell some other kids were doing the same thing.

Instead, what we heard was: “I’ve set out some tables in the back. Gather around.”

Mrs. Clark hefted three big brown paper bags into her arms. They’d been tucked in a corner where I hadn’t noticed them. “This way.” She walked toward the back of the room.

Wait. What? My finger twitched. I must have misunderstood.

I swiveled my chair toward Mrs. Clark and raised my hand.

“Come along, Lucy,” she said as most kids got up and went to the tables she’d arranged at the back of the room.

I stayed at the computer station and raised my hand higher, this time waving it.

“Lucy,” Mrs. Clark said. “You can’t have a question already . . .”

“But—” I did. I had a thousand questions, the first one being, “Am I in the right place?” Maybe coding club met somewhere else, because I’d expected to be sitting at computers, not at empty tables in the back of the room. How was I going to be the first black girl to win a Turing Award—it’s like a Nobel Prize for coding—for my coding skills if we didn’t actually use the computers?

I opened my mouth to say all that, but Mrs. Clark cut me off. “Hang on to your question, okay?” She looked at me over her glasses. “There will be time at the end of our club time to answer everything.”

“But . . . I . . . We . . . App . . .” My pointer finger felt heavy, as if it had a brick attached. I pulled it from the power button and walked slowly to the back of the room. Some of the other kids who’d stayed at their computers shuffled along with me—it wasn’t like we had a choice.

Mrs. Clark broke us into groups, setting a brown bag in front of each cluster. “Sophia, Maya, and Lucy—you’ll be partners. You can take the middle table.”

Ugh. Now I was being grouped with people who didn’t even care about coding (well, Sophia said it was important to her, but I didn’t believe her). I thought maybe this was a cruel joke. Or a dream. In a few minutes, I was going to wake up and discover that I’d fallen asleep in math and that coding club hadn’t started yet.

Unfortunately, I was wide awake.

First no computer, then no coding, and now my group was made up of one girl who was my mortal enemy and one who intimidated me . . . what more could happen?

The computer lab door opened.

The principal walked in, followed by a girl I didn't recognize.

"You must be Erin," Mrs. Clark said warmly. "You're joining the seventh grade today, right?"

The girl nodded, her blond hair falling over her glasses. When I looked a little closer, it seemed as though she might have been crying. She didn't say anything.

"Welcome to coding club." Mrs. Clark led her over to my table. "We're just getting started. You can join this group." We had three people while the others all had four. Now we were even.

Just because I was mad that we weren't coding yet didn't mean I couldn't be polite. I imagined it would be hard to start at a new school after classes had already begun. Plus, Erin looked like she needed someone friendly, and I didn't trust the others at my table to be that person.

"Hi," I said.

Erin smiled faintly at me and then looked away toward the door. I think if Principal Stephens hadn't closed it when he left, she might have made a run for the hallway.

"All right." Mrs. Clark rubbed her hands together just like she did in math class when she was excited about introducing something new. "Don't touch the bags.

That's for later. We're going to start today's session with a writing assignment." She handed out pencils and index cards. "On your own, without help from your group, write down instructions for how to make a peanut butter and jelly sandwich."

She pulled out a stopwatch. "You have two minutes." She set the timer. "Go."

Um, what? A peanut butter and jelly sandwich? What did this have to do with coding? I raised my hand.

Mrs. Clark gave me a look that unmistakably meant, "Later, Lucy." So I dropped it, figuring the faster we did her activity, the faster we'd get back to the computers.

I grabbed the card and scribbled:

Take two pieces of bread. Open the peanut butter. Spread it on one side of the bread. Open the jelly and spread it on the other side. Put the halves together. Ta-da, peanut butter and jelly sandwich.

I was done in about three seconds. I sat back from the table and watched the others in my group. Maya was drawing a picture to accompany her instructions. She was a really good artist. Sometimes she did drawings to go

with her articles in the paper. I wanted to say something to her, but what? She probably didn't even notice I was in her group.

Sophia had written "Rules" on the top of her card and was writing a novel-length book in very small letters about the sandwich. I thought she'd never finish . . . and then she asked for another card.

Erin was sitting back in her chair, like me. But unlike me, she hadn't filled out her card. Instead, she contemplated the ground while biting a fingernail.

I turned away so she wouldn't think I was staring at her.

Other than the scratch of pencils on paper, the only sound in the room was the ticking of the clock. After what seemed like a million ticks, Mrs. Clark collected our index cards.

She shuffled them, saying, "I'm going to make a sandwich. I just don't know how . . ." And after an overly dramatic pause, she added, "Oh, look, I'll use Lucy's instructions." She held up my card, putting the rest aside. "Bradley, come help me."

Bradley was a joker, but he was also the second best student in my math class. As he went to stand by Mrs. Clark, I wished we were in the same group. He was with Maddie

and Mark, really funny twins. That group was bound to be more exciting than mine. Plus, with Bradley being so good at math . . . I bet he could help me with my app.

Mrs. Clark handed him my instructions. “Read them step by step,” she said.

“Take two pieces of bread.” He over-emphasized the words.

She raised one of the paper bags and pulled out a brand-new loaf of bread. She stared at the loaf, turning it around in her hands.

I wanted to hurry this along. It was a waste of precious coding time.

“Two pieces . . .” Mrs. Clark tore the plastic bread bag down the middle and picked out one slice of bread and a bit of crust from a second slice. “A crust is a ‘piece of bread.’ Isn’t it?” she asked Bradley.

I blurted out, “I meant that you should undo the twist tie to open the bag and take the first two slices. No one likes the crusts.”

Mrs. Clark stared at me as if I was speaking an alien language. She turned back to Bradley. “What’s next?”

“Open the peanut butter.”

She took a jar out of the paper bag and set it on the

table. “We are using sunflower butter,” she explained. “In case anyone has allergies. But we’ll pretend it’s peanut.” She turned to Bradley. “How should I open it?”

He gave her a blank look.

“You mean Lucy’s instructions don’t say?” she said.

Bradley got a twinkle in his eye. “You could slam it on the desk!” Kids chuckled.

“Other ideas?” Mrs. Clark asked.

Taking their cue from Bradley, kids started spouting out crazy ideas. Sammy suggested dropping the jar from the school roof. Maddie and Mark came up with a plan that involved pliers and a hammer. Another girl at Sammy’s table, Leila, had an idea that involved ropes and pulleys and a sharp battle-ax. Mrs. Clark had to cut her off because she was taking forever to describe it.

I heard a small chuckle next to me and saw that Erin had raised her head. Now she was interested.

“No. No. No,” I said when I couldn’t take it anymore. “What I meant was to use your wrist to open the jar.”

Mrs. Clark hit the lid with her wrist and frowned. “It didn’t work.”

“You have to wrap your fingers around the lid and turn it,” Sammy said.

She wrapped her fingers loosely but didn't clasp the jar. The lid swiveled around under her palm.

It went on like this for a while, until Sophia said, "Put your hand over the lid, lower it until the jar touches your palm, tighten your fingers, and now rotate the lid counterclockwise while holding the jar still."

Mrs. Clark did exactly what Sophia said, and it worked! I was annoyed that she'd figured out how to get Mrs. Clark to open the jar, but at least we were making progress.

With the jar finally open, Mrs. Clark asked Bradley what was next. "Lucy said, 'Spread it on one side of the bread.'"

"With what?" she asked. When he shrugged, Mrs. Clark stuck her fingers in the jar and scooped out a glob. She spread it along the crust edge.

"I meant . . .," I started, but I was getting the point. My instructions weren't very good.

In the end, Mrs. Clark handed me a sandwich with one plain piece of bread and a smear of sunflower butter on the bit of crust. I'd only said to spread jelly on the "side," so she'd spread it on the side of the sunflower butter jar. Since I hadn't made it clear which halves went together, she'd rolled the bread and crust together like a burrito. I took the "sandwich" from her sticky fingers, wondering if anyone

in the club had thought to mention a knife. Or a napkin.

Now it was our turn. Using what was in the paper bags at each of our tables, we had to make a sandwich following someone else's instructions. Since Erin hadn't filled out her card and mine was already used, Maya and I read Sophia's instructions while Sophia and Erin read Maya's. Turned out, Sophia had done everything the rest of us missed. She mentioned a knife *and* a napkin. *And* she'd suggested putting the sandwich on a plate. Her index-card novel was perfect, and so was the sandwich we made.

When Mrs. Clark asked her what her method was, Sophia explained, "Writing rules for sports isn't so different. You have to think of every way someone might misunderstand and cover for that."

When had Sophia gotten so smart? I felt disappointed and a little angry that she had done better than me. This was supposed to be *my* club. Sophia had her own clubs.

I hoped at least the groups were temporary. Maybe next week I could be with Bradley or Leila.

"Okay, kids, that's all for today," Mrs. Clark said as she wiped the sunflower butter and jelly off her fingers with a napkin. "I want you to think about what today's exercise might mean, and tell me what you came up with at our

next club meeting. See you all next Monday.”

Whoa. I raised my hand. “This is coding club, not cooking, right?”

Mrs. Clark nodded.

“So when are we going to make an app?”

“Slow down, Lucy,” Mrs. Clark told me. “It’s not that easy. Plus, you’ve just taken your first step.”

“But I *need* to make an app. How is this,” I said, waving my hand at the jars of sunflower butter and jelly, “going to help?”

Apparently I wasn’t the only one who thought making sandwiches was not what we had signed up for. Other kids started speaking up.

“Yeah—I want to make an app to track hockey scores.”

“And I need an app to find ice-cream trucks!”

“I want to make something that can do my homework for me!”

I chimed in. “My uncle has cancer, and I *have* to make an app to help him.”

The room fell silent, and everyone turned toward me.

Mrs. Clark took a long look at me. “Lucy, that is important, but we need some basic skills before we try to help cancer patients—or find ice cream.” She had that look

she got when she changed her mind about something. She pointed at each of our groups. “Look at your sandwiches.”

“Mine is a jar of peanut butter sitting on a folded loaf of bread,” Sammy said, looking at the mess on his table.

“You’re lucky you got a loaf of bread,” Bradley snorted. “I got two jars and no bread. I can’t believe I forgot to mention bread!”

Mrs. Clark smiled. “Now you know about input and output. Your instructions are input, and the sandwich is output. What you put into your coding in a computer determines exactly what comes out the other side—just like your instructions for how to make a sandwich.” She gathered her things and held the door open for us to leave. “That’s it for today.”

I smiled at Mrs. Clark. I had a feeling this coding thing was going to be a bit different than what I’d imagined.