# Daisy Coding for Good

**Learn what makes computers work and explore how to create apps and video games that help others by earning these three badges!**

## Badge 1:
Coding Basics

## Badge 2:
Digital Game Design

## Badge 3:
App Development

This booklet gives girls an overview of the badge requirements and badge steps for all three Daisy Coding for Good badges. It also includes interesting background information to spark girls' interest in coding. Volunteers can access the Volunteer Toolkit (VTK) to find complete meeting plans, including detailed activity instructions and handouts.

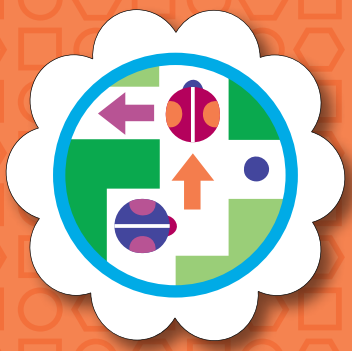
# Welcome to the world of coding.

When you've earned these three badges, you'll know how people tell computers what to do and how computers solve problems.

- You'll know how to give a computer step-by-step instructions.
- You'll know how video games are created.
- And you'll know how people make apps.

You'll also learn about important female computer scientists and how you can help make the world better with coding.

Volunteers can access the Volunteer Toolkit (VTK) to find complete meeting plans, including detailed activity instructions and handouts.



# Badge 1: Coding Basics

Computers are all around us. They help us every day. When you know how computers work, you can use them to help people. Find out how people tell computers what to do, create your own instructions for a computer, and learn about the first person to ever write directions for a computer.

## Steps

1. **Create algorithms for a computer that follow a sequence**
2. **Learn about women in computer science**
3. **Explore sorting algorithms**

## Purpose

**When I've earned this badge, I'll know how programmers use algorithms and sequencing to make computers that solve problems.**

STEP

# 1 Create algorithms for a computer that follow a sequence

**Computers are machines that follow directions.** Computer scientists, called programmers or coders, use a special language to tell the computer what to do.

The programmers write a list of steps, called an **algorithm**. The order the steps are in is called the **sequence**. The computer follows the steps exactly.

Can you create an algorithm for something you know how to do?

## What's a Programmer?

A long time ago, people were the first "computers." They were called "computers" because they *computed* math problems.

Today, a **computer** is a machine that can remember information and follow directions. A laptop is a computer, but so is a smart watch.

**Code** is a special language people use to tell a computer what to do. For a computer to work, it needs instructions that have been written in a code it understands.

**Programming** is when people write directions in code that tell a computer what to do.

### Hi, I'm Kayla!

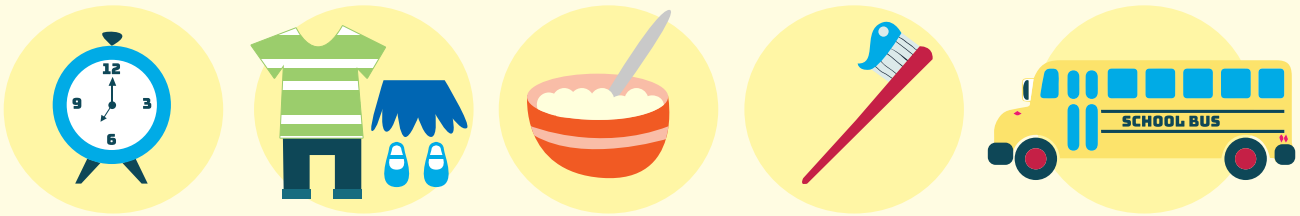
*I'm a programmer. I create code that tells a computer how to do complicated things, like play a game or make a robot move. The code uses algorithms. Algorithms are step-by-step directions. They're like a recipe for baking cookies that tells you what to do, step by step!*

# WORDS TO KNOW

**Algorithm** This is a set of step-by-step instructions for how to do something. A recipe is an algorithm. It tells you all the steps you need to take to cook something. When a friend gives you directions to her house, that's an algorithm, too. She's telling you the steps you need to take to get to her house.

**Computer scientists** They're the people who create computer programs and write code that tells computers what to do. They're also called coders or programmers.

**Sequence** This is the order in which things happen. The routine you have for getting ready for school is a sequence. Wake up. Get dressed. Eat breakfast. Brush teeth. Walk to school bus.




**Sorting algorithm** This is the type of algorithm computers use to organize information in a specific order.

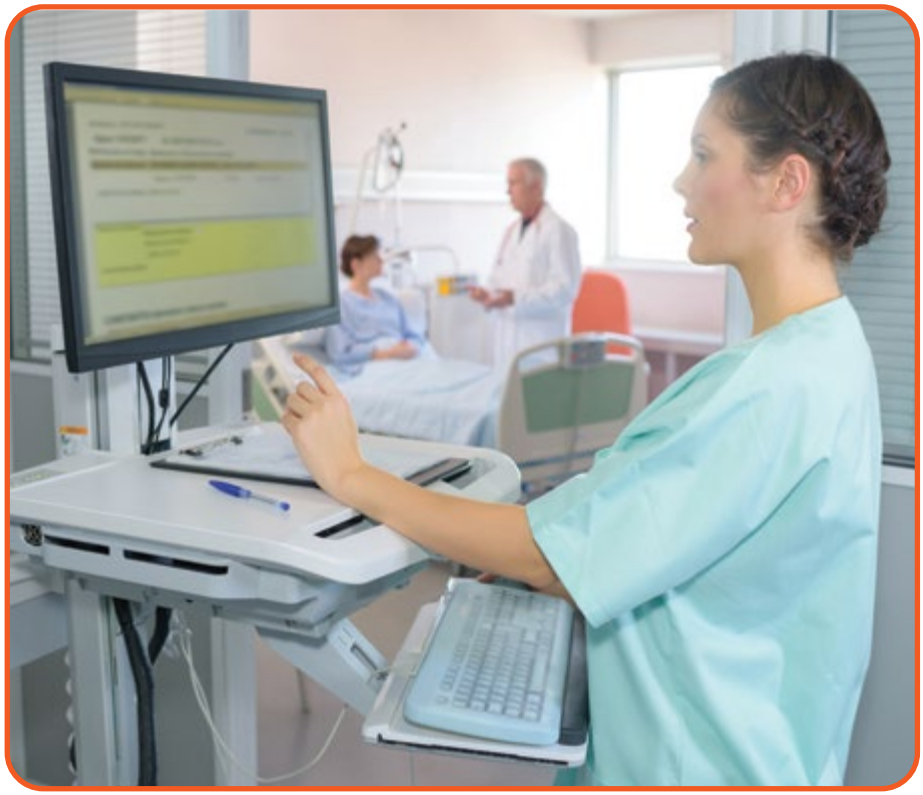
STEP

# 2 Learn about women in computer science

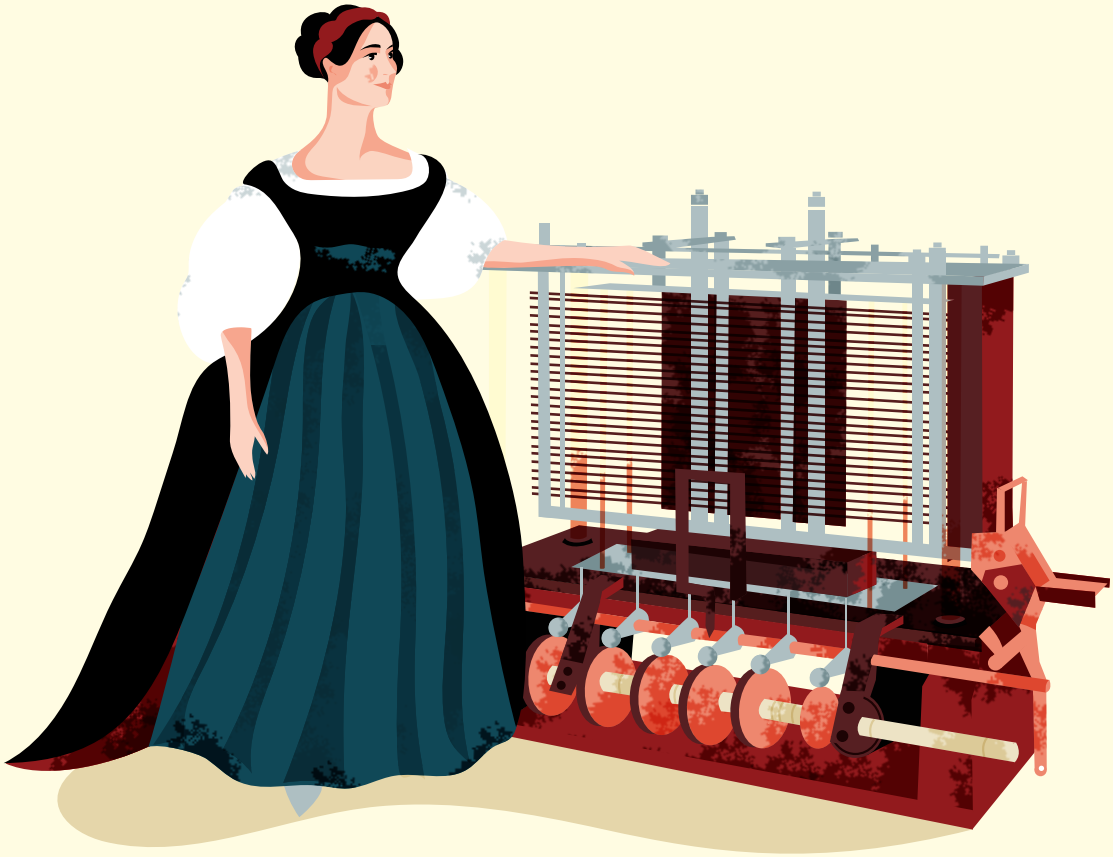
**Nearly 200 years ago, the very first computer program was written by a woman named Ada Lovelace!**

Women have been involved in computer science and coding since the very beginning. They're still creating new computers and computer programs today.

How would you use a computer to help someone solve a problem?



# Computer Pioneers:
# ADA LOVELACE



Ada Lovelace was born over 200 years ago. When she was little, she discovered that she loved math and science. Ada created the first computer code, working with her friend, Charles Babbage. They made a machine that could do math. Ada also imagined how computers could do much more than just math. She dreamed that someday computers could make music or show pictures.

## Computers are All Around Us

Computers are everywhere!

Did you know that computers control stoplights? Computer code makes lights change colors when there are lots of cars on the road.

Farmers who grow veggies use computers to help keep their greenhouses at the right temperature.

Some running shoes even have little computers in them! They send information to smartphones about how fast and far you run.

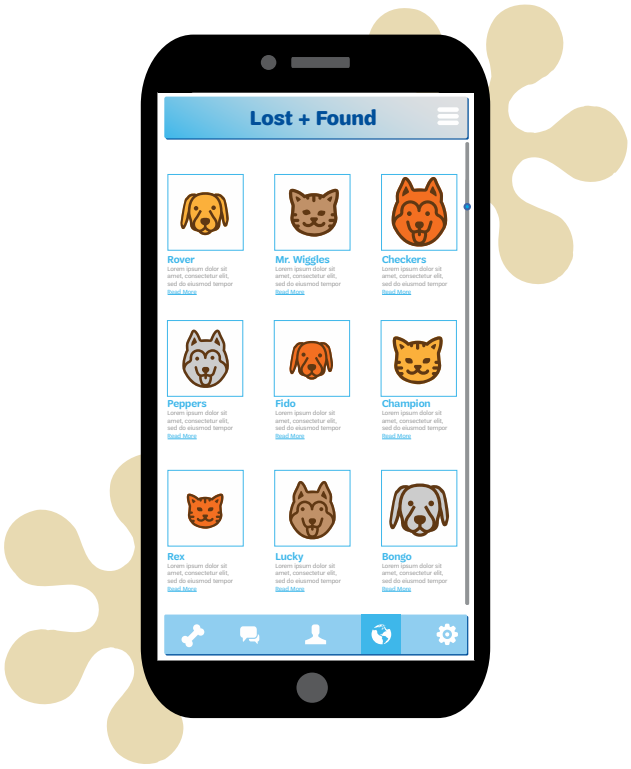
STEP
# 3 Explore sorting algorithms

**Computer scientists use sorting algorithms to tell a computer how to put information into a list that follows a certain order.**

Imagine you want to find a photo of a golden labrador puppy. You type “golden labrador puppy” into a search bar. Photos of puppies appear on your computer screen—lots and lots of puppies!

The photos you wanted—the golden labrador puppies—are all shown first before pictures of other dogs like pugs or collies.

This happened because a programmer used a sorting algorithm to show you all the puppy photos and to show you the golden labrador photos first.



**Now that I've earned this badge,**
**I can give service by creating an algorithm to teach my family or friends how to do something new!**

## I'm inspired to:

# Badge 2: Digital Game Design

Playing video games is fun. They can also help you learn new things or make the world a better place. Programmers use algorithms and sequences to make games for computers. Once they design a game, they test it and look for ways to make it even better. Explore the world of digital game design and design your own maze game.

## Steps

1. **Explore tools used to develop digital games**
2. **Plan a maze game**
3. **Build, test, and improve your maze game**

## Purpose

**When I have earned this badge, I'll know how video games are designed.**

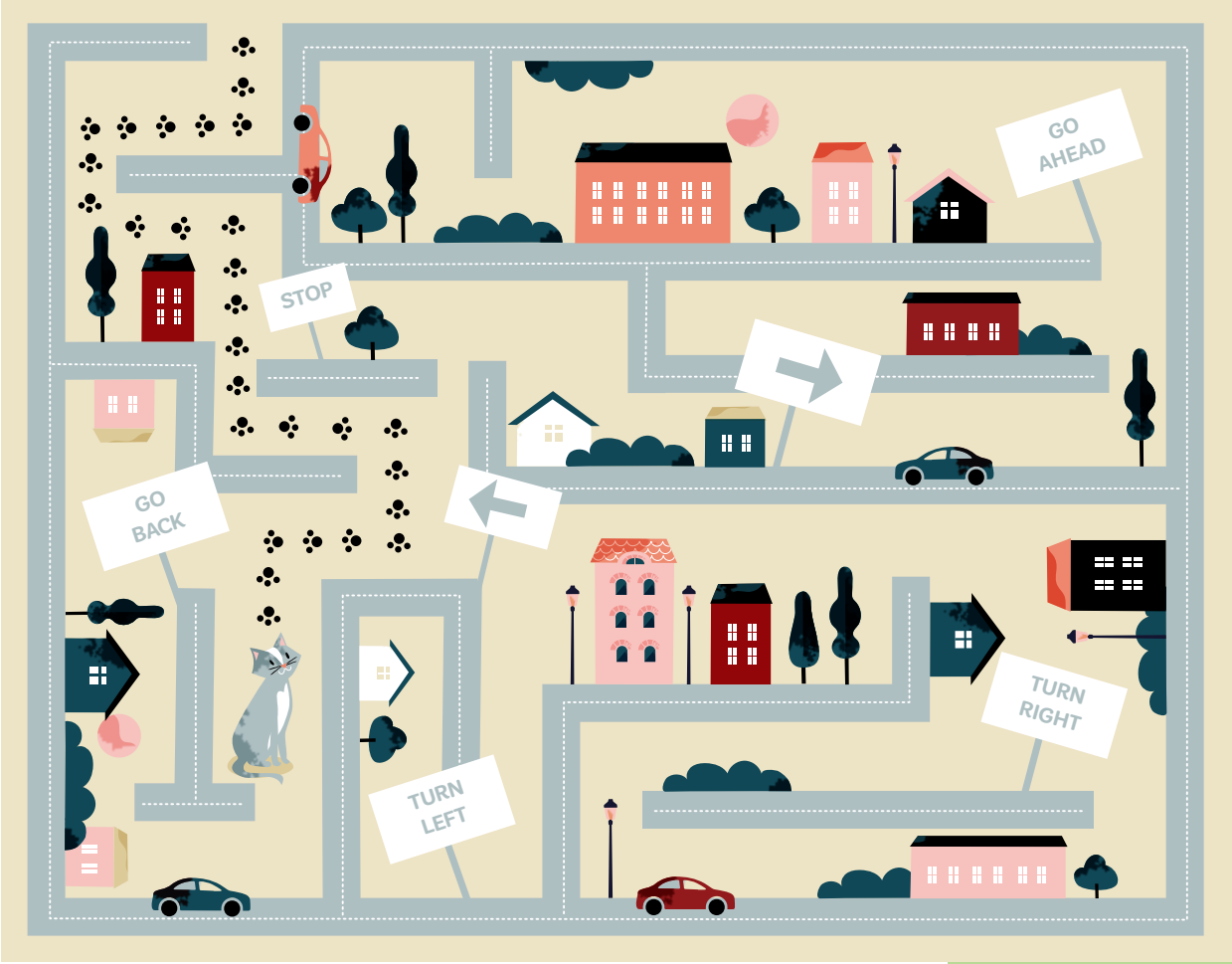
STEP

# 1 Explore tools used to develop digital games

**All computers need directions, or algorithms, to follow.** When a game is played on a computer, it's called a digital or video game.

When you design a digital game, you decide what kinds of challenges the players face. You also decide what the characters in the game can do. Then, you write code for the computer to run the game.

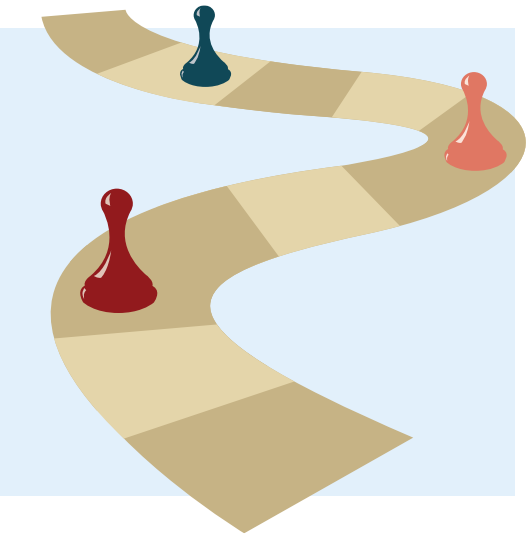
Learn how maze games work and write an algorithm to move a character through a maze.



# FROM BOARD TO SCREEN

**Sometimes your favorite board games get made into video games.**

Some parts of a game are the same in both a board and video game. When you and your friends play a video game, you follow certain rules, just like you do playing the board game. The video game's rules are an algorithm.




When a board game is turned into a video game, programmers have fun making other changes. For example, in video games, the characters can have a personality. They can talk and say silly things. That's all done with computer animation. Animation uses code to make characters in cartoons and video games move and talk.

STEP

# 2 Plan a maze game

**When you create something new, like a cupcake recipe or a video game, you use your imagination.**

First, you think about what you want to make and what it will look like when it's done. Then, you plan the steps it takes to make it.

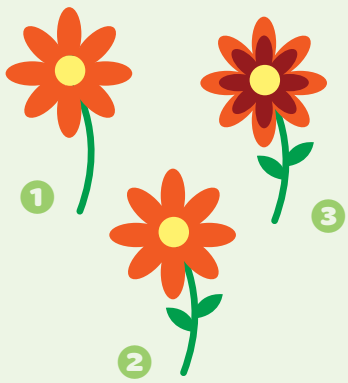
Computer programmers use this same process to design video games. They plan the steps to make the game. Then, they build and test the game. That's how you can find your *best* ideas, not just your *first* ideas.

BRAINSTORM

## Words To Know

**Digital games**
These are games you can play on your phone, computer, TV, tablet, or gaming console. They're also called video games.


**Iteration**
This is when you do something many times to make it better. Think about drawing a picture of a flower. You may draw it once, then decide to add leaves. So, you draw it again with leaves. Each time you draw it, you'll make it a little better.



STEP

# 3 Build, test, and improve your maze game

**How can you know if your video game works?**

Test it!

When programmers design video games, they "playtest" them. They try out the games to see if and how they work.

Sometimes they find mistakes to fix.

Sometimes they discover ways to make the game even more fun.

Each time they playtest and make changes, they make their game better. Testing and improving your game with your friends is fun and smart!

IMPROVEMENTS

# BUILDING BLOCKS

If you've played Minecraft, you know that it's fun to build cities and castles out of blocks.

But what if you could design your neighborhood using a video game?

Some people asked that same question. They knew there were towns that wanted to create parks and meeting places, but they needed help.

So Mojang, the creators of Minecraft, teamed up with Microsoft and UN-Habitat to make a computer program called Block-by-Block.

All kinds of people, including kids, used the program to make computer models of what they wanted their town to look like. They added parks, community centers, and marketplaces.

Once the models were done, everyone voted for the computer model they liked the best—and the town put the plan into action!

Now that I've earned this badge,
I can give service by creating a game to bring joy to others.
My games can bring a smile to my friend's face.

## I'm inspired to:

# Badge 3: App Development

Computers used to be big enough to fill a whole room—but now they can fit in your hand! Today, smartphones and tablets are more powerful than the NASA computer that sent the first astronauts to the moon!

Most devices have programs on them, called applications or apps. Some apps are just for fun, but others help people. Learn how programmers tackle big problems and make great apps.

## Steps

1. **Decompose your problem into smaller steps**
2. **Design an app that solves the problem**
3. **Share and improve your app**

## Purpose

**When I've earned this badge, I'll know how computer scientists develop apps.**

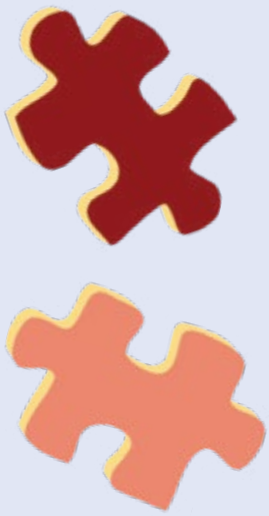
## Helping Kids

Lots of apps have been created just to help kids!

Some apps have puzzles that help you learn about science. For example, in one puzzle app, you find out what happens to water when it flows in a river.

Other apps can help you learn to read, take care of your pet, or make friends.

If you can think of something kids need help with, you can make an app for it!



STEP 1

# Decompose your problem into smaller steps

**What would you do if you had to build a sand castle?**

You could try to pile up sand, but quickly find out that wouldn't work very well.

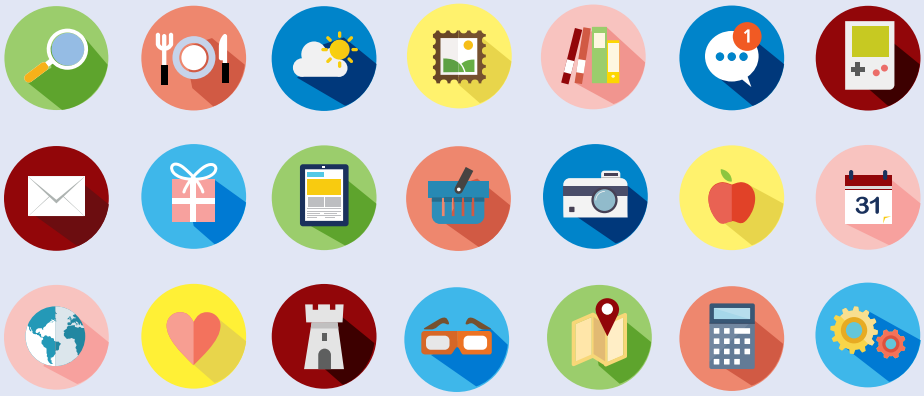
Here's a better way to build a sand castle:

1. First, you decide to build the castle away from where the water could wash it away!
2. Then, you gather your shovel and bucket.
3. Next, you fill up your bucket with sand and pat it down tight.
4. Then, you build your sand castle, bucket by bucket until it's tall and strong!

What did you just do? You took a big problem and broke it into smaller steps. This is called **decomposition**. Computer scientists also use decomposition when they write programs.

# WORDS TO KNOW

**App** App is short for application. This is a program that runs on your computer, tablet, or phone. Apps can be entertaining, like when you play a game or watch a movie. They can be helpful, like giving you directions from your house to the soccer field. They can also teach you something new, like a language you want to learn.




**App features** These are the parts of an app. They could be things like using the camera, a welcome video, a help page, or a way for people who use the app to connect with friends.

**Decomposition** This is when you break down a problem into smaller steps or pieces to solve.

**Development** This is when you create something new. When you develop something, you create a plan before you begin building. Then, after you build it, you test to see how it works and find ways to make it

# STORYBOARDING

Do you love playing video games or watching cartoons?

The people who make games and cartoons use storyboards. Storyboards are pictures that are put in a certain order, or sequence. A storyboard helps game makers see how the game will look before they start creating it.

One of the first storyboards was used in the 1930s to make a cartoon. Now, people use storyboards to make books, movies, plays, cartoons, comic books, and video games.

STEP

# 2 Design an app that solves the problem

**Imagine you're going to build a house.** You wouldn't just start putting up walls. You'd make a plan first.

When app developers have a new idea, they first draw what the app could look like on paper and ask others how it could be even better. This helps programmers test different ideas before coding!

When programmers create apps, they make storyboards that show how someone would use the app.

For example, they'll sketch their screens and app features with buttons, pictures, and words. They'll also put them in the order, or sequence, that shows how the user moves through the app.

## MY STORYBOARD

STEP

# 3 Share and improve your app

**Testing is an important step in creating an app!** When you ask other people to test your app, you get all kinds of different ideas about how to make your app even better.

You also find out how well the app works and see how users move through it. That helps you make your app better, too.

Most programmers don't ever say they're done with their apps. They keep working on ways to make them better and better.

**Now that I've earned this badge,**
**I can give service by teaching friends how to solve**
**big problems by breaking them down into smaller parts.**

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## I'm inspired to:

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