Facilitator Guide

Amazon Fulfillment Center Tour

For Cadette, Senior, and Ambassador Girl Scouts

girl scouts | amazon

Amazon + Girl Scouts of the USA Collaboration

Amazon and Girl Scouts of the USA (GSUSA) have partnered to develop customized in-person and video tours of Amazon Fulfillment Centers. Girl Scout programming has long introduced girls to critical STEM concepts such as algorithms, computer coding, robotics, and engineering. Now Girl Scouts will have the opportunity to see these concepts come to life as Amazon employees work side by side with robots in Fulfillment Centers to pack and ship customer orders. By having the opportunity to meet and/or see female employees in STEM roles at Amazon, girls will leave the tour imagining how they can build the future with STEM.

Amazon is also providing grants to 23 select Girl Scout councils to help even more Girl Scouts take part in this unique, real-world STEM experience. Thanks to Amazon's support, the in-person tour will be available at select Fulfillment Centers around the country in Fall 2022, and the video tour will be available on Girl Scouts at Home Activity Zone in Fall 2022. Girl Scouts attending the tours may also have an opportunity to receive a free, limited-edition patch.

Girl Scout Programming

At Girl Scouts, we believe in the power of every girl to change the world. We're the preeminent leadership development organization for girls. And with programs from coast to coast and across the globe, Girl Scouts offers every girl a chance to practice a lifetime of leadership, adventure, and success.

We introduce Girl Scouts of every age to STEM to help them see how they can actually improve the world—whether they're discovering how a car's engine runs, learning to manage finances, or caring for animals. We'd like girls to explore different aspects of STEM every year, so we've developed a unique, "fun with purpose" K–12 curriculum to inspire them to embrace and celebrate scientific discovery in their lives.

By inspiring girls to discover more of what they really care about, they explore a wide variety of interests—everything from the arts to the outdoors to, of course, STEM—through skill-building badges and leadership Journeys. Learn more about Girl Scouts here.

Short activities sprinkled throughout the tours relate what Amazon does to connect with Girl Scout values and programs. Girl Scouts will leave the tour with ideas to build the future with STEM. Also, by completing the optional activity associated with the tour, Girl Scouts can fulfill the following badge requirements:

- Cadette Programming Robots Steps 4 & 5
- Senior Programming Robots Step 5
- Ambassador Programming Robots Steps 4 & 5

Get Involved

One-time Opportunities to Volunteer With Girl Scouts

One-time volunteers can serve as experts for council and troop events, assist in facilitating Girl Scout badge and Journey activities, and provide pivotal support to troops by lending expertise in a variety of program areas. Visit us online for a list of short-term volunteer opportunities.

Amazon Employees Who Are Also Girl Scout Alums

If you were a Girl Scout at any point in your life, consider signing up for the Girl Scout Network, a powerful community of adults—both Girl Scout alums and supporters from across the country—who believe in preparing girls to be our future leaders.

Tour Script

Welcome (5 minutes)

Location: Welcome Room

Steps:
Introduce yourself to the Girl Scouts.

SAY:

- Hello, everyone! My name is [NAME]. You can refer to me using [PRONOUNS] pronouns.
- You may have noticed that I told you my gender pronouns, which are [PRONOUNS].
- Does anyone know how many gender pronouns there are in English?
  [Let Girl Scouts guess.]
- The estimate is 78! You have probably heard of she/her, he/him, and they/them. Any others?
  [Girl Scouts may say, "Ze/hir, etc."]
- When we introduce ourselves, I am going to ask everyone to share with us what gender pronouns you use.

Note to Tour Leader:

If Girl Scouts ask for a longer explanation on pronouns, here is some recommended language to share:

- We tell each other our gender pronouns because someone's gender identity—whether they feel they are a girl, a boy, neither of those, or something else—is a very internal, personal feeling.
- However, it is very common for us to assume, or to guess, someone's gender identity based on what they look like, such as how long their hair is or what clothes they're wearing. We might automatically choose a pronoun we think matches what we assume is their gender.
- The problem is that we could be wrong, and we could cause harm to the person by misgendering them. The reality is that you actually cannot tell someone's gender just by looking at them.
- So, it's important not to make any assumptions and remember that someone's appearance is not the same as their gender identity.

Introduce Girl Scouts to "fulfillment."

SAY:

- I am the Tour Leader here at the [SITE], and I'll be your guide on an adventure into the world of Amazon Fulfillment Centers!
- But what is fulfillment? **Fulfillment** means completing customers' orders—doing everything it takes to get the items to our customers starting from the moment they order them online.
- Our Fulfillment Centers, or "FCs" for short, are where we store, pack, and ship millions of items to our customers.
- Before we begin our tour, I'd love to hear from a few of you. What grade are you in? Where do you live? Before you answer, please tell me your name and pronouns.

Give Girl Scouts the opportunity to introduce themselves. If the tour group is large, you may opt for just a few people to introduce themselves; if it's a smaller group, you may opt for everyone to give an introduction.

SAY:

- Today we're going to learn how Amazon uses technology to deliver packages to customers all over the world.
- Does anyone know someone who works in a Fulfillment Center? Or maybe you know someone who delivers the packages once they're ready to be shipped?

Let Girl Scouts share any personal connections they may have with people who work in shipping or fulfilling orders.

SAY:

- We use computer science and robots to help our employees do this quickly and efficiently. Does anyone know what "efficient" means?
  [Girl Scouts may say, "Doing things quickly; doing things without wasting time or resources; I don't know; etc."]
- **Efficient** means doing something using the least amount of time and resources, like energy, people, or materials.
- This means doing things quickly but also without errors. We use robots and people to get it done!
- How are you efficient in your everyday life? How do you balance time and getting things done?
  [Girl Scouts may say, "I make a to-do list; I multitask; I keep a schedule; etc."]
- During the tour, we'll explore how Amazon efficiently gets purchased items to customers.
- Along the way, you may notice some things that are familiar to you as Girl Scouts. For example, Amazon is committed to sustainability and protecting the environment. **Sustainability** is using the resources we have today to meet our needs without taking away from what people will need in the future. For example, it can mean using fewer natural resources or using renewable resources, like wind and solar energy. Something can be made sustainably, like "eco-friendly" products, or it can be packed and shipped sustainably, such as using fewer boxes or delivering with electric vehicles.
- There are only so many natural resources on this planet, like trees, which are used to make boxes. In some places, trees are being cut down faster than they can regrow. So, it's important we find ways to be more sustainable to maintain the balance of resources within our ecosystem.
- Caring for nature and the environment are Girl Scout values too. How do you care for the environment?
  [Girl Scouts may say, "My troop participated in the Girl Scout Tree Promise; I try not to use single-use plastics; I help with environmental programs in my community; etc."]
- At Amazon, we're also committed to excellent **customer service,** which is how a business helps the people who buy its products. We want our customers to have a great experience when they order items from Amazon.
- As Girl Scouts, you know something about customer service too! If you sell cookies, how do you make sure your customers have a good experience?
  [Girl Scouts may say, "We answer their questions; we suggest cookies they might like; we're careful when adding up their total cost and making change; we're polite and friendly; etc."]

Go over logistics and safety for the tour.

SAY:

- Before we get started, let's go over a few things. Today's tour will be about an hour long.
- Safety is key in all our buildings. As we go out into the Fulfillment Center, please make sure to stay together in our group. If you see we are in a green walk lane, please stay within that lane. For your safety, we ask that you do not run while in the FC.
- During our tour, we will go up and down some stairs. Please maintain three points of contact when you're

on the stairs. This means that you should always have one hand on the handrails and your feet should be facing the direction you're going in.
- You'll see a lot of equipment on the tour today. For your safety, it's important that you don't touch any equipment and always follow the directions of the tour staff. We're here to help you.
- Also, you may not take pictures or record anything while on the tour. We have a place where you can have your photos taken at one of our tour stops.
  *[**Note to Tour Guide:** Please make sure to alert your tour group when you reach the location for photos! Also let the tour group know how to access restrooms and water if needed.]*
- You can ask questions as we go and at the end too. We will certainly stop to ask you your opinions and take a few polls along the way.

Stop: Inbound (5 minutes)

Location: Receiving

Steps:
Introduce "Receiving" and explain how the cloud works.

SAY:

- Before we can ship items to our customers, the items first need to travel from the people and businesses who make them to the FC. We call these people our **vendors**. These items come from all over the world and are made by all types of people.
- All the items in the FC that we sell and ship to customers are called our **inventory**.
- Trailers full of vendors' items arrive at these giant bay doors by appointment.
- Our employees unload the items from the trailers in our Receiving area and get them ready to be put away. Then other employees will check the items into our inventory and put them on shelves. We carry tens of millions of items at this FC, and use our own cloud, or internet-based, computer system to keep track of our inventory and customer orders.
- Does anyone know what cloud computing is, or have you ever heard of "the cloud"?
  [Girl Scouts may say, "I don't know; the internet; things that happen on the internet like communication or information storage; etc."]
- The **cloud** is a network of large computers where information, or **data**, is stored online.
- **Cloud computing** includes all the kinds of things that happen through the internet, such as sending, storing, and analyzing information.
- Do you use the cloud to store any data?
  [Girl Scouts may say, "No; photos; music; videos; documents; etc."]
- At Amazon, our system uses cloud computing to provide information about our inventory to all our FCs around the world.

Move to view Stowing from viewing area on the second floor. Introduce "Stow." Note that some Girl Scouts may have read a book or seen a movie where a character is a "stowaway." If this comes up, explain that the word relates to objects and not people.

SAY:

- **Stow** means "put away." At this station, our employees receive products and place them into our inventory.
- Stow is one part of the process we call "Inbound" because it's where products come into the FC. What do you think we call it when we send products out to customers?

Let Girl Scouts answer.

SAY:

- That's right, "Outbound!"
- Nearly all items are stored in these aisles on shelves, in spaces designated by bin barcodes, similar to items in a hardware store.
- This is a Non-Sortable Fulfillment Center, where we use PIT equipment to stow items. "PIT" stands for "powered industrial truck." Another type of PIT equipment you might recognize is a forklift. I call the equipment we use for stowing a PIT stower.

Ask Girl Scouts the "Poll question" below and invite them to raise their hand for the answer they choose.

Poll Question:

Amazon FCs can be equivalent in size to 28 football fields! We store tens of millions of items on shelves. How do you think we arrange all of our inventory in the warehouse and on shelves? What do you think is the best way to organize our inventory to ship customers' orders as fast as possible?

A. Alphabetically by name
B. By their purpose (cleaning supplies, art supplies, sports items, clothes, etc.)
C. By their color (orange items, green items, blue items, etc.)
D. Randomly—we don't organize them in any way

Share the answer to the question: D. Randomly—not organized in any way. Explain how information about all the items in the inventory is stored in the cloud.

SAY:

- Surprise—we don't use any kind of order! We physically store most products in our FCs randomly, or without an order, on shelves. We do this because we discovered it's faster to have items spread out than it is to have them in one spot.
- When new inventory arrives a stower will use the PIT stower equipment to go to an assigned area to stow items. Next, the stower scans the barcode of the item, places that item in a bin on a shelf, and scans the barcode on the shelf.

Show Girl Scouts an item with a barcode.

SAY:

- A **barcode** is a group of different-sized lines that represent numbers. Each barcode is a special ID number for a product. When an employee scans a barcode, information about the product or the shelf pops up on their screen.
- All that information—what the item is and where it is on the shelf—goes into a database. A **database** is a collection of information, or data, that has been organized. This helps us know exactly where the item is.
- Once the stowing process is complete, that item is stored until it has been ordered.
- Did you know that at some of our FCs, called AR Sortable FCs, there are robots called drive units that move big yellow storage pods? Our newest type of drive unit is called Hercules.
- You may know that Hercules is a character from Roman mythology—he's called Herakles in Greek mythology—who's famous for being very strong. I can't say for sure that Amazon's Hercules was named after him, but I think the name fits.

- And that's it for "Inbound." Now our system has the information it needs to help the employees fill customer orders.
- As we move to our next stop, chat with a partner about why you think storing items randomly may be more helpful for our goal of being efficient.

Stop: Outbound Intro (15 minutes)

Location: Picking

Steps:
Introduce the "Outbound" process and algorithms.

SAY:

- Here we are able to see the picking area, and guess what? It's at the exact same location as the stow area!
- We just learned how the items we sell online arrive at our FC and how information about them goes into the cloud.
- Now let's explore what happens when a customer orders an item from our website.
- Has anyone ordered from Amazon before? What did you buy?
  [Girl Scouts may say, "Clothes; food; books; everything; etc." If needed, show or describe a sample item.]

Ask Girl Scouts the "Poll Question" below and invite them to raise their hand for the answer they choose.

Poll Question:

Computers help speed up our fulfillment process from the time a customer orders an item to when we send it out. So what do you think is the shortest amount of time it's taken Amazon to deliver an item, from the customer clicking "Buy" to the product being in their hand?

A. 3 minutes
B. 13 minutes
C. 33 minutes
D. 53 minutes

Share the answer: B. 13 minutes. Introduce algorithms.

SAY:

- The correct answer is 13 minutes! That's superfast. Our average time is around 24 hours.
- But how do computers help Amazon deliver our customers' orders so fast? How do computers know what to do? By using algorithms!
- An **algorithm** is a set of step-by-step instructions for how to do something. When an algorithm is written in a language computers can understand, or "coded," the algorithm becomes a computer program.
- Programs can tell computers to do everything from turning on and off to playing a video to getting our customers their orders.
- Let's do a quick activity now to explore algorithms in small teams of three or four.
- Do you think you can create an algorithm to tell another team member how to complete a familiar task, like putting up a tent or wrapping a present? With your team members, pick a simple physical task to turn into an algorithm. Then brainstorm the steps needed. Try to choose a simple task that could be completed in ten steps or less.

- Once you have your steps in order, test your algorithm by having a team member act out the algorithm, with other members telling them the steps one at a time. As you test your algorithm, pay attention to any problems you find.
- Let's take a few minutes now to create and test algorithms!

Give teams five minutes to brainstorm and act out their algorithms. If they need ideas for simple tasks, offer suggestions like vacuuming a room, feeding a pet, or making a sandwich. If they have trouble testing, ask questions like, "Do you just need to rearrange the steps or did you leave something out?"

After five minutes, have each team share the steps of their algorithm, one by one, while other teams act it out. As the others act out each algorithm, remind them to look for places where steps could be changed or added to make it work better.

After teams have shared, encourage reflection and allow Girl Scouts to talk about their experience.

Ask questions like:

- What was it like to create an algorithm?
- Did you have any challenges? Was it harder or easier than you thought it would be?
- Did you have to make changes?

SAY:

- Now let's take a look at how our system uses algorithms. It all starts with a customer.
- When a customer buys something from our website, our system uses algorithms to figure out which FC has the item in stock.
- Then it uses another algorithm to analyze the customer's address for delivery, and chooses the best FC to deliver from. Our system takes into account a combination of what's fastest, how an item will travel best (such as by air or by land), and who is available to bring it to its destination.
- Once the system chooses a Fulfillment Center for the order, the "Outbound" process begins. It has four steps.
- First is **"Pick,"** where we gather the items for customer orders from storage.
- Then there's **"Pack,"** where we place the items into boxes for delivery.
- Next is **"SLAM,"** where each package is checked and labeled with the customers' addresses.
- Finally, there's **"Shipping,"** where we load the packages onto trucks and send them out for delivery to our customers' doors.
- This whole process can be very fast. A customer's item can arrive at their doorstep as soon as an hour after they order. Sometimes, we've managed to do it even faster than that!
- And as I said before, we wouldn't be able to achieve those sorts of speeds without the help of all the amazing people and technology (and algorithms!) that are woven into this process.

Stop: Pick (10 minutes)

Location: Picking

Steps:
Introduce "Pick" and explain how robots are used in the fulfillment process.

SAY:

- Welcome to our next stop, Pick! Here you can see our OPs, or order pickers, in action. OPs are just another type of PIT equipment used in this building to pick customers' orders.

Have Girl Scouts examine the "Pick" station.

SAY:

- Our "Pick" stations are loaded with technology to make the process efficient and keep the employees safe.
- How do you think cloud computing, shelves, and pickers work together to get you your item?
  [Girl Scouts may say, "Robots get directions from the cloud; robots help the pickers find the items; etc."]
- Our system uses data about the items to guide our scanners and pickers. I have a scanner here so you can all see what it looks like.
- The data from the cloud helps us figure out where the item we need is stored.
- Since items are stored randomly, the item we're looking for may be on more than one shelf. We use data from the cloud to find each item we're looking for so our employees can pick them.
- The system uses an algorithm to figure out the most efficient combination of picker, aisle, and shelf to process each customer order.

Explain what people do at "Pick."

SAY:

- The picker drives the order picker PIT equipment into the aisle where the customer's item is stored. The picker knows which aisle to go to because their scanner shows them the exact aisle, shelf level, and bin location to pick from.
- When the picker arrives at the correct location, they check their scanner, which will show them the item they're looking for. The screen on the scanner gives information to help our picker find the exact item they need, including the product's name and type.
- Once the picker finds the item, they use the scanner to scan its barcode.
- Then the picker places the item into a plastic box, or tote.

Show Girl Scouts some of the sensors at the Pick station.

SAY:

- The picker continues putting items into this tote until it's full, either by volume or by weight. Who knows the difference between volume and weight?
  [Girl Scouts may say, "How heavy it is; how full it is; I don't know; etc."]
- **Volume** is how much space something takes up, while **weight** is how much something weighs or how heavy it is.
- For example, a tote could be full with one really big but light item, like a giant pillow, that has lots of volume. Or a tote could have a few really heavy items, like bowling balls. Or a tote could have 50 smaller items, all belonging to 50 different customers!
- For safety, the weight limit for a tote is 25 pounds. That's how much an employee can safely carry a short distance. The employees decide when a tote is full by volume—like with that great big pillow.

Stop: Pack (8 minutes)

Location: Pack Station

Steps:
Introduce the "Pack" stop to Girl Scouts.

SAY:

- Welcome to Pack! This is where all of the items that have been picked by our team go into our smile boxes.
- At Amazon, we care about the environment, so we try not to use more materials for packaging than we have to. And we want the packaging materials to be recyclable.
- It's important to remember that there is a finite number of natural resources on this planet, like trees, which are used to make boxes. In some places, trees are being cut down faster than they can regrow. We need to be mindful of the resources we use, and we do what we can to reuse and recycle as much as possible!
- To help, we created the Frustration-Free Packaging Program, which works with sellers to use packages that are 100% recyclable and ready to ship. Since 2015, the program has allowed us to eliminate the equivalent of 2 billion cardboard boxes!
- This FC has large items, like bicycles or kayaks. We even have a machine that automatically builds the boxes around items, to make sure we use the least amount of cardboard needed!
- When a customer buys something that does fit into our smile boxes, the employee packing it has to choose a box.
- When customers place an order, they can decide if they want faster shipping of their items in many boxes or everything shipped together in fewer boxes—it may take us a bit more time to deliver everything at once, but we save resources and help the planet!

Ask Girl Scouts the "Poll Question" below and invite them to raise their hand for the answer they choose.

Poll Question:

How does a packer choose the most efficient box for packing?

A. They get years of training with the experts at our Special Packing School.
B. They follow on-screen commands based on information about the item's size.
C. They measure each item with a ruler or tape measure and compare that measurement with the available box dimensions.
D. They simply pick the box that looks big enough.

Share the answer: B. They follow on-screen commands based on information about the item's size.

SAY:

- The correct answer is B. The packer follows on-screen commands based on information about the item's size.
- To ship orders efficiently, we need to pick the smallest box possible while also protecting the items.
- Remember how we learned in "Inbound" that data about each new item that arrives at the FC is added to the cloud? This is how the cloud knows things like an item's height, width, and weight.
- At "Pack," we use this same data to look up the item's size and weight. Then the system uses an algorithm to automatically figure out which box will be best (even when combined with other items!).
- Our database helps us ship orders efficiently by figuring out the package size for our employees.

Optional: Efficiency Experiment

Materials:

- Three shirts or sweaters with buttons

Steps:

Show Girl Scouts the sweaters/button-up shirts.

SAY:

- Now let's do a quick efficiency experiment.
- When you button a shirt, do you usually start at the top, at the bottom, or in the middle? Do you think one way is faster than the other? If you do, which one?

Allow Girl Scouts to answer. Then have them vote on which method they think is the fastest by raising their hand when that method is named.

Then ask for three participants to wear the items. Give each one a shirt or sweater to put on. Ask one to button from the top, one from the bottom, and one from the middle.

SAY:

- Let's find out. We want the shirts to be buttoned up correctly—with all the buttons in the proper button holes.
- When I say go, start buttoning. 1, 2, 3...GO!

Watch to see who finishes first. Usually, buttoning from the bottom is the quickest method, with the fewest mistakes, but it doesn't matter which one is fastest.

Then have Girl Scouts reflect on the experiment.

SAY:

- Why do you think this method was the most efficient—the quickest with the least mistakes? *[Girl Scout answers will vary.]*
- Instead of buttons, what could we use on the shirt to make putting it on more efficient? *[Girl Scouts may say, "A zipper; snaps; Velcro; nothing—a pullover; etc."]*

Discuss with Girl Scouts why efficiency and sustainability are important.

SAY:

- How do you think Amazon figured out the most efficient way to package boxes?
  [Girl Scouts may say, "Trial and error; maybe they did an experiment with different ways to find out which way was best; I don't know; etc."]
- Why do you think all of this—packing efficiently—is important?
  [Girl Scouts may say, "Plastics use up fossil fuels and don't decompose well in a landfill; extra boxes means cutting down extra trees and using resources like electricity to make them; recyclable materials can be used again and that means new resources aren't needed; etc."]
- This helps us fulfill our commitment to protect the environment, just like the Girl Scouts work to help the environment. We reduce what ends up in landfills and protect important resources.
- As a business that sends out a lot of packages, we have a responsibility to ensure that we are doing everything we can to limit ways we might hurt the environment. So we try to be as efficient as possible and use as little time, electricity, cardboard, gasoline, and other resources to deliver orders to customers.
- To help make sure all of this happens, we also have a Sustainability Team. They look for more sustainable ways to improve our process, use recycled materials, and invest in renewable energy.
- The Sustainability Team founded the Climate Pledge and has a goal for us to be completely carbon neutral by 2040. **Climate** is the average weather conditions in a place over a period of time—say, 30 years. What does "carbon neutral" mean?
  [Girl Scouts may say, "I don't know; when you do things to absorb the same amount of carbon as you release, like planting trees; etc."]
- **Carbon neutral** refers to a time when the combination of all your activities, like how you travel, what you buy, and what you eat, releases the same amount of CO2 as they absorb. An excess of CO2 in the environment causes global warming. Many other companies are making this commitment, too, so we can all work together to protect the planet!

Explain how Amazon makes packing orders efficient.

SAY:

- At Amazon, we studied the most efficient way to package customers' purchases and used what we learned to create the pack process.
- We have empty boxes, a paper dispenser [or site equivalent], a tape machine, a screen, and a scanner at our packing stations. The **scanner** captures images of the orders as they're packed, so employees can see them on computers. There's also a conveyor belt that moves the orders from stop to stop.
- To start the packing process, an employee takes a tote or large cart filled with items and scans its barcode. This tells the system which tote or cart we are working with. Remember, our system already knows which items are inside this tote or cart because our picker scanned the items into it!
- Next, the employee takes an item, double-checks that it's in good condition, and scans the product barcode. The system tells the employee which box to use.
- After that, we come to the tape machine! There are two taping systems used in this FC. One is for small to medium sized boxes and the other is for larger boxes. Let's talk about the small to medium sized boxes first. The tape in this machine is different from the types of tape we use at home.
- At first, the tape isn't sticky at all. For larger sized boxes, we use a tape machine with clear tape that we can apply to the box as it moves down this conveyor belt or we can apply clear tape manually using a hand-held tape gun. But at the press of a button, the machine cuts the correct length of tape for the box, and, at the same time, wets the adhesive, or glue, to make it sticky, just like licking an envelope.
- In goes the item, along with any padding that's required, and the box is taped shut.
- Then a new barcode label is scanned and put on the box to identify it, like the license plate on a car. At this point, it's just a bunch of numbers and letters with a barcode that only the system understands.

- You see, we don't place the customers' details on the box; we don't even tell the packer who it belongs to. That's because we think it's important to protect our customers' privacy.
- Once packed, the package goes onto the conveyor belt, joining all the other packages that our team of packers has assembled.
- And that's all for packing!
- As in all other areas of our FCs, we continue to find ways to improve this process so it's even more efficient and friendlier to people and the environment.
- What ideas do you have for how we could improve our process?

Let Girl Scouts share ideas before moving to SLAM.

Stop: SLAM (7 minutes)

Location: SLAM Station

Steps:
Introduce the stop and explain what SLAM means.

SAY:

- Welcome to SLAM. **SLAM** stands for Scan, Label Apply, and Manifest.
- This is the station where our system checks to make sure the box has the correct item and gives it a shipping label. This is important because we want to send the exact item our customer ordered. This is called quality control.
- **Quality control** happens when we check to make sure the products are well made and every order is correct.
- Imagine you're getting ready to go on a camping trip. Before you leave for your trip, you want to be sure you're well prepared. Where or when would you stop and check to make sure you had what you needed for your trip to be safe and successful?
- Turn to the Girl Scout next to you and brainstorm some places you'd do quality control to prepare for a camping trip.

Give Girl Scouts a few minutes to brainstorm quality control points. Then ask teams to share one of their ideas. *[Girl Scouts may share ideas like, "Check to make sure I have all my gear; check the weather to make sure I have correct clothing and gear for the expected conditions; check to make sure I've told people where I'll be hiking and camping in case of an emergency; check guidelines at campground and hiking trails to make sure what I want to do is possible; etc."]*

SAY:

- There are lots of opportunities for quality control when you're planning a camping trip!
- And just like making sure you're prepared for a camping trip, we want to make sure our customers' orders are correct. Why? Because we want our customers to be happy, and we want our process to be efficient and sustainable.
- Next, you'll learn how SLAM works at this stop, but first, that's right! Let's do a quick poll!

Ask Girl Scouts the "Poll question" below and invite them to raise their hand for the answer they choose.

Poll Question:

When the SLAM system performs one final check to make sure the item is correct, what does it do?

A. Weighs the item as it goes over the conveyor belt.
B. Uses an X-ray machine to scan the box and check if the item inside is correct.
C. Uses a robotic arm (a mechanical arm that lifts and moves things) to rattle the box and microphones to listen for the correct sound.
D. It doesn't perform any more checks—this is a trick question.

Share the answer: A. Weighs the item as it goes over the conveyor belt.

SAY:

- The correct answer is A. Weighs the item as it goes over the conveyor belt. The package is weighed, and the weight is compared with data in the cloud about how much the item should weigh.
- I am going to ask you in a bit about the last step in SLAM, the M, so make sure you are following me at the start.
- First, at **Scan**, the label is scanned and tells the system what is supposed to be in the box.
- The box is also weighed so it can compare the box's weight with the item's weight, using information from the cloud.
- If the weights match, then the mailing address is printed and put on the box. That's **Label Apply,** or the L and A part of SLAM.
- As the name suggests, the robotic arm slams down onto the box, sticking the label. Well, actually, it kind of stops just before touching it, and a tiny air hose blows it the rest of the way. This helps us avoid air bubbles.
- If the weights don't match, the box gets sent to another station where an employee can fix the problem.
- That leaves us with the Manifest part of SLAM. A **manifest** lists information about the package, like what's in it, its weight and measurements, how it's being shipped, and who it's going to.
- At Manifest, the shipping label is scanned one more time. This puts all of the data about the package into our database.
- Why do you think the Manifest step is important?
  [Girl Scouts may say, "I don't know; if the package gets lost, they can track it; if the item is damaged or is not what the customer ordered, they can figure it out; etc."]
- If everything works as planned, SLAM happens without any humans involved. Can you believe that? Using all the data we have stored on the cloud, the system can check the order, apply a label, and send the package to shipping.
- Of course, people—like engineers and programmers—make that possible by designing the machines and algorithms that tell the system how to do it all. And if there IS a problem, only a human being can fix it!

Stop: Ship (5 minutes)

Location: Area overlooking Shipping

Steps:
Introduce Girl Scouts to "Shipping."

SAY:

- Welcome to "Shipping," the last stop and final part of the journey our items take before leaving the FC for our customers' addresses.
- Here we have a bunch of trucks that our packages are loaded into, each going to a different place based on the item type and the customer's address.
- Before we explore how shipping works, let's do another poll!

Ask Girl Scouts the "Poll Question" below and invite them to raise their hand for the answer they choose.

Poll Question:

How are packages organized for loading onto the trucks?

A. They aren't organized; just as in our storage locations, we randomly load our trucks with packages.
B. The packages are presorted using a high-tech conveyor system, like the roller-coaster conveyor belts and ramps that move products and boxes throughout the FC.
C. Robotic arms pick up each item and sort it into the truck.
D. Packages are sorted by hand, with each address label being read by an associate.

Share the correct answer: B. The packages are presorted using a high-tech conveyor system, like the roller-coaster conveyor belts and ramps that move products and boxes throughout the FC.

SAY:

- As packages make their way from SLAM, they travel onto the sorter conveyor belt where another sensor will scan each box. Then the system will figure out exactly which truck each package needs to be loaded into.
- Once a box reaches the off ramp closest to that truck, the conveyor will move that box into the truck.
- Then they're either loaded into cages or rolled directly into the trucks.
- For the packages rolling directly into the trucks, our employees pack them just like you might fit your camping supplies into your backpack. They don't know what size box is coming to them, but they need to make it fit within the walls of the truck.
- Once the truck is full, it leaves for the customers' addresses.
- Along the way, the trucks go to delivery stations where the packages are loaded into smaller delivery vans.
- Otherwise, huge trucks would have to deliver customer orders—that wouldn't be very efficient at all! Using a huge truck to deliver individual packages would waste fuel and be a waste of all that space on the truck!
- So what do you think would be a better way to deliver packages?

Invite Girl Scouts to brainstorm other ways to deliver packages.

SAY:

- So what do you think would be a better way to deliver packages?
  [Girl Scouts may say, "Cars instead of trucks; use other delivery services in the area; self-driving cars; etc."]

Ask Girl Scouts the "Poll Question" below and invite them to raise their hand for the answer they choose.

Poll Question:

What does the future of Amazon delivery look like?

A. Electric delivery vehicles, like cars, trucks, and vans powered by electricity instead of gas or diesel fuel.
B. Delivery robots that move on wheels and have boxes or coolers to deliver products to customers.
C. Drone delivery, using a flying vehicle that's controlled remotely and has no human pilot onboard.
D. All of the above

Share the correct answer: D. All of the above.

SAY:

- The correct answer is D. All of the above. We use all of those delivery methods already!
- Remember how Amazon has committed to being net carbon neutral by 2040? That means we want to decrease our carbon footprint (how much carbon we put into the atmosphere) by as much as we can so that the combination of all our activities releases the same amount of CO2 as they absorb.
- As part of this, we plan to have 100,000 custom-built electric delivery vehicles, fueled by electricity instead of gasoline. Why do we want to use electric vehicles instead of ones fueled by gasoline or diesel fuel?
  [Girl Scouts may say, "I don't know; gas-fueled cars cause pollution; electric vehicles don't create pollution; etc."]
- Electric vehicles don't create carbon dioxide and electricity is a renewable fuel. They're expected to save 4 million metric tons of carbon per year by 2030. Using electric vehicles will reduce our carbon footprint and help us be carbon neutral. Some of these vehicles are already being used to deliver orders today!
- We also use a robot called Scout to deliver packages in many cities in the U.S. Just like the Girl Scouts, Scout is helpful! Wouldn't it be fun if Scout delivered Girl Scout cookies that people buy through your virtual cookie booth?
- But possibly most exciting of all is the development of our Prime Air delivery drones. A **drone** is a remote-controlled flying vehicle. It will be able to deliver smaller items to customers within 30 minutes of orders being purchased! Can you imagine a little flying machine bringing the birthday present you ordered for your friend to their house?
- So the answer to the last question was "All of the above!"

Closing (5 minutes)

Location: Welcome Room

Steps:
Review the fulfillment process with Girl Scouts.

***Note to Tour Leader:** If you're doing the optional activity at the end of this script, complete it before moving ahead with the tour wrap-up below. Alternatively, you can distribute the* **Hercules Robot Challenge** *handout to each Girl Scout to complete the activity after the tour.*

SAY:

- So that's how we get customers the things they order from Amazon. Did you enjoy learning about how we do it?
- Do you remember the four steps? (**Answer:** Pick, Pack, SLAM, Ship.)
- What was your favorite step? Why?
- Do you have any questions about robots, the cloud, or sustainability?

Invite Girl Scouts to reflect on what career(s) they may be interested in.

SAY:

- Do you think you'd like to work with robots, like the robotics engineers? Or design workstations to be safe and efficient? Engineers do that too. Did you like creating algorithms or seeing how our system uses algorithms to guide Hercules or help employees? You might like to write computer code! We also always need more people to think creatively about how to protect the environment.
- If you had fun today, you can continue to learn about robotics, engineering, computer coding, and the environment with Girl Scouts.
- Thank you all for attending!

Optional Activity: Hercules Robot Challenge (35–45 minutes)

***Note to Tour Leader:** If you're doing this activity, complete it at the beginning of the Closing section before wrapping up the tour. Alternatively, you can distribute the* **Hercules Robot Challenge** *handout to each Girl Scout to complete the activity after the tour.*

Materials for each team of 3–4 Girl Scouts:

- **Hercules Robot Challenge** handout
- Pencil
- Paper
- **Optional:** To create a life-size grid, you'll need masking tape or 36 sheets of scrap paper AND 5 boxes or books to represent pods

Prepare Ahead: To do this activity with a life-size grid:

1. Create a 6x6-inch grid with sheets of paper or masking tape for each team. Make sure the boxes are big enough for a child to act as Hercules during the activity and follow their teammates' instructions to navigate the grid.
2. Following the grid on the **Hercules Robot Challenge** handout, mark one box with a star or sign—this will be the special pod for Hercules to retrieve. Then mark Hercules's starting point with tape in the box and the Pick Station with tape or a sign in the box.

Steps:
Introduce the activity.

SAY:

- Remember how the Hercules robots move the pods to the picker? How do the robots move around on the floor and not bump into each other?
  [Girl Scouts may say, "They move on a grid and use sensors to know where they are and not bump into things; they use scanners and the cloud; I don't remember; etc."]
- Hercules robots move around the robotic field on a grid or checkerboard. They use sensors to scan each square of the grid to tell the system in the cloud where they are in the grid. They also have sensors to tell them if there are obstacles, like pods or people, in their way. Our system identifies which pod they need to take to the picker.
- Next, working in small teams, you're going to write an algorithm to navigate the Hercules robot through the FC. Your goal is to use a set of commands to move the Hercules robot around every obstacle, to pick up the correct pod, and to move the pod to the picker.
- To help, we have a grid, like a checkerboard, as a map of the robotic floor. The grid shows both where the Hercules robot starts and the pick station where it needs to bring the correct pod. It also shows other pods that might be in the way.

Next, go over the commands Girl Scouts can use to direct the Hercules robot (also found on the handout):

- **Forward:** Move one square forward. The Hercules robot cannot move off the grid.
- **Back:** Move one square backward. The Hercules robot cannot move off the grid.
- **Right:** Turn to the right, do not take a step, and stay in the square.
- **Left:** Turn to the left, do not take a step, and stay in the square.
- **Pick Up**: When you reach an object, pick it up.

SAY:

- Now, to play, study the grid and create an algorithm using the commands. For example, where's the Hercules robot? Where's the pod? Where's the picker?
- First, notice where the Hercules robot starts: on the square in the grid opposite the pick station.
- The picker's station is along the side of the robotic field—that's where the Hercules robot will bring the special pod. That's your goal.
- So, how can you move the Hercules robot to the pod, command it to pick up the pod, and bring the pod to the picker?

Let Girl Scouts share their initial ideas. Then introduce pseudocode and debugging.

SAY:

- When you're writing code for a computer program, spelling and punctuation must be perfect. Otherwise, the computer won't understand what you're trying to say.
- However, when you're just trying to figure out the steps in your program and what order they should go in, it's OK to make up your own **pseudocode**. Pseudocode is writing out the commands using real words to make it easier to understand.
- Some examples of pseudocode that uses everyday language and can tell the Hercules robot how to move around include: FORWARD 3 = move ahead 3 squares; RIGHT = turn and face right; and PICK UP = pick up an item.
- Now, let's get started! Divide into teams of 3–4, and write pseudocode to navigate the Hercules robot through the FC!
- Write down each command, step by step. Then, after you write your code, test it by moving the Hercules robot through the grid. If you find problems, rewrite your algorithm to fix it. This is called **debugging**.
- Remember, you can use the commands: FORWARD (plus the number of squares), BACK (plus the number of squares), RIGHT, LEFT, and PICK UP.

Divide Girl Scouts into small groups of 3–4 for the activity and distribute supplies. Answer questions and provide support as teams create and test their algorithms.

Next, help teams adapt their programs to include information for how the Hercules robot gathers and shares with the cloud.

SAY:

- A robot is a machine that can Sense, Think, and Act. That means the robot gathers information about its surroundings by using its sensors; decides whether the information meets certain conditions by using its "brain"; and takes different actions depending on what it finds.
- For example, a proximity sensor tells the Hercules robot when there is an object in front of it and an edge sensor tells the robot if it is about to move off the robotic field.

Introduce conditional statements.

SAY:

- When you're writing a program, **conditional statements** can be used to tell a robot to check whether a condition is true or false or equal to a certain amount. The robot can get that information from its sensors.
- Conditional statements usually include words like "IF," "UNTIL," or "WHILE." For example, to tell a lawn-mowing robot to turn around when it reaches a fence, you could write, "IF you are at the fence, THEN reverse direction."

- Now, for your pseudocode, add conditional statements with instructions for proximity, edge, and/or "people" sensors so the Hercules robot will know how to respond to different obstacles.

Give teams time to add a conditional statement(s) to their pseudocode programs. As they work, share tips for writing code, like loops and functions.

SAY:

- You can use shortcuts to avoid writing the same set of commands again and again. Instead, you can write a "mini-program" and tell the main program to run them over and over.
- One kind of shortcut is a **loop**. It can run as many times as you tell it to. For example, to run a loop three times, you can write REPEAT 3, then list the steps within the mini-program. Write a command like END LOOP to show where the robot should move on to the next command.
- To make a loop repeat as long as the robot is running, you can write REPEAT forever. A loop can also keep repeating until a certain condition is met. For instance, you can tell a robot to keep bouncing a ball in the driveway until it is dark out.
- Another kind of shortcut is called a **function**. It is also a mini-program, but you can drop it into different places in the program. Whenever you want to insert the function, you just call its name. For example, if you have a robot that makes ice cream sundaes with three different flavors of ice cream, you can create a function named SCOOP that tells the robot how to scoop the ice cream out of a carton. Then you can just write SCOOP each time the robot moves on to a new flavor.

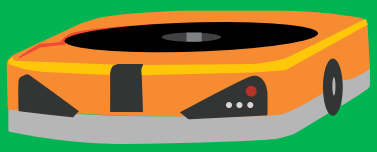
Answer questions and provide support as teams add conditional statements to their pseudocode programs.

After Girl Scouts have completed the activity, let them reflect on their experience.

SAY:

- How did it go writing code to guide the Hercules robot?
  [Girl Scouts may say, "It was fun; it was hard; it was easy; etc."]
- How does adding sensors change what the Hercules robot can do?
  [Girl Scouts may say, "It can react to changes on the robotic floor; it can make decisions; it makes the Hercules robot smarter or more efficient; etc."]
- Do you think you'd like to be a programmer or a robotics engineer?
  [Girl Scouts' answers will vary.]

Hercules Robot Challenge



Computer programs can do everything from turning a computer on and off to playing a video to instructing robots how to help get customers their orders from Amazon. **Robots** follow programs to sense, think, and act. They use their sensors to gather information about their surroundings; decide whether the information meets certain conditions; and take different actions depending on what it finds.

At Amazon FCs, Hercules robots move around the robotic field and on a grid or a checkerboard. They use sensors to scan each square of the grid to tell the system in the cloud where they are in the grid. They also have sensors to tell them if there are obstacles, like pods or people, in their way. The system identifies which pod they need to take to the picker.

Your Challenge:
Use the set of commands to navigate the Hercules robot through the FC. Move the Hercules robot from the starting point around every obstacle to pick up the correct pod and move it to the picker. Then add a conditional statement to account for a sensor.

Tips for Writing Pseudocode

When you're writing a computer program, spelling and punctuation must be exact or the computer won't understand what you're trying to say. However, when you're just trying to figure out the steps in your program and what order they should go in, it's OK to make up your own pseudocode, writing out the commands in everyday language.

Some examples of pseudocode that can tell the Hercules robot how to move around include:

- FORWARD 3 = move ahead 3 squares
- RIGHT = turn and face right
- PICK UP = pick up an item

Other Tips for Writing Computer Programs

- **Conditional statements** can be used to tell a robot to check whether a condition is true or false or equal to a certain amount. The robot can get that information from its sensors. They usually include words like "IF," "UNTIL," or "WHILE." For example, to tell a lawn-mowing robot to turn around when it reaches a fence, you could write, "IF you are at the fence, THEN reverse direction."
- **Loops** can run as many times as you tell the program to. For example, to run a loop three times, write REPEAT 3, then list the steps within the mini-program. Write a command like END LOOP to show where the robot should move on to the next command. To make a loop repeat as long as the robot is running, you can write REPEAT forever. A loop can also keep repeating until a certain condition is met. For instance, you can tell a robot to keep bouncing a ball in the driveway until it is dark out.
- **Functions** are a kind of shortcut that can be defined and then reused at different places in the program by "calling" the function. For example, if you have a robot that makes ice cream sundaes with three different flavors of ice cream, you can create a function named SCOOP that tells the robot how to scoop the ice cream out of a carton. Then you can just write SCOOP each time the robot moves on to a new flavor.

Navigate the robotic field on the next page!

COMMAND SET

- **Forward: Move one square forward. The Hercules robot cannot move off the grid.**
- **Back: Move one square backward. The Hercules robot cannot move off the grid.**
- **Right: Turn to the right, do not take a step, and stay in the square.**
- **Left: Turn to the left, do not take a step, and stay in the square.**
- **Pick Up: When you reach an object, pick it up.**

	POD with item for customer's order 				
			POD 		
POD 					
				POD 	
		POD 			
START					PICK STATION 

Write your program on the next page!

Tip: Use a ball of paper to represent your robot! Move it around the grid to test your program.

My Hercules Pseudocode: