



Computer Science at Home:

Loopy Moves

Activity Book



Try computer science as a family!

Tricia and her cousin Eddie have a problem. They are writing down all of their dance steps, but it is taking a long time. Tricia uses her knowledge of computer science to help them solve their problem. **Computer scientists are people who figure out ways for computers to solve problems.** Try this activity as a family and you'll be thinking like computer scientists too!

Loopy Moves challenges you to write the steps of a dance that contains repeated patterns. Can you make it easier to write your dance steps? Here's what you'll need to get started:

- **Materials** – You'll need some music, paper, and some tools to write or draw with, such as pens and pencils.
- **Test It Out** – You'll need space to dance a little, and a place to write your steps, such as a desk, a table, or the floor.
- **Your Dance Style** – Before starting this activity, think about how you like to dance. What are your favorite moves? When do you use the same move multiple times? Are there parts that you do multiple times? Your favorite dance can be a great place to get ideas.



Computer scientists use a variety of tools, including loops, when they design solutions to problems. A **loop** is a way to tell a computer to do something multiple times. This activity supports an understanding of computer programming, logic, and creativity. It's also a fun way to connect as a family!

You might be surprised by the similarities between a loop in a dance and a loop in a computer program! A program is a set of instructions for a computer to follow. You could tell a dancer to repeat a pattern a few times, or a computer to repeat an action thousands of times without getting tired. Either way, loops allow you to simplify and shorten your instructions.

Children as young as four can participate, though they may need a bit more support. Older children can use their imaginations to come up with more complex solutions. You can read this activity book with your child, or, if they're ready, let them read it to you!

For more fun computer science and engineering resources, visit families.eie.org.



Turn the page to help Eddie and Tricia record a repetitive dance!

Computer scientists are people who use computers to solve problems.

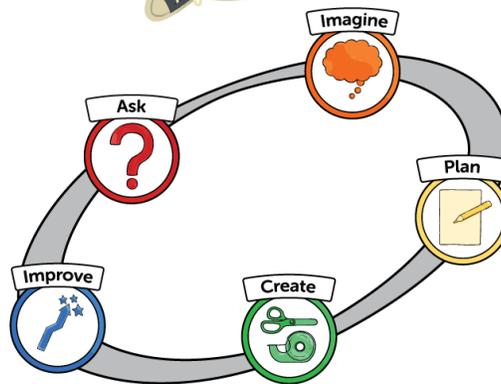


First, they **ask** questions about the problem . . .



Then, they **imagine** possible solutions. One of the tools they can use to solve a problem is a loop.

Next, computer scientists make a **plan**.



Then they **create** and test their solutions. When they run into problems, they **improve** them to make them better!



Let's think like computer scientists! We'll use loops to write our dance steps.

We can work together. Let's start by asking questions.

What do I need to know about loops before we get started?



Well, a loop can repeat just one step, like this:



Or it can repeat a pattern of steps, like this:



There are so many ways to move! What will our dance be? Which parts will repeat?



Make up your own dance. Include plenty of repeated moves! Loops will make it easier to write repetitive dance steps.

Imagine



What are some different ways we could write or draw the steps of our dance?



Computer scientists imagine lots of creative ideas to solve a problem before they pick one.

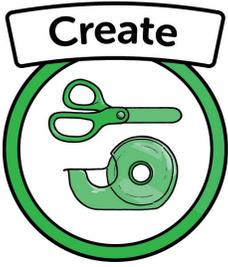


It's time to **plan** our dance.

Draw pictures or write your dance steps here.
Use loops to show which steps are repeating.



We can use loops in our plan. Computer scientists use loops to write instructions more quickly.



Create



It's time to give our program to cousin Alex.



If she does the same dance as us, we'll know the program has all the right steps!

Have someone test out your dance steps.
If you don't have another dancer, you can pretend you haven't done your dance before.
Try to follow it exactly as written.



Improve

Well, that didn't go the way we expected. And it still took a while to write it down.



Computer scientists LOVE to improve! When they find and fix errors, it's called **debugging!**



Could someone else read your dance instructions and follow the steps?
Are there more places where you could use loops?
Talk about it together. Which parts need to change?
Then try writing your dance steps again.



It can take a lot of tries to write instructions that someone else can follow. We can't give up!

Congratulations!

Now you know that loops make it easier to write repetitive dance steps. You are thinking like a computer scientist!



When you do computer science activities like *Loopy Moves*, you practice thinking like a computer scientist. Computer scientists use loops to solve problems with repeated steps. A dance pattern is a creative way to try this! Like dancers, computer programmers may try several times before they get the result they want. Here are a few ways that you can extend the activity and continue the fun as a family.

- 1. Do you like to dance?** Computer scientists discuss their projects to get feedback and improve. Share your dance with friends and other family members. Ask them for tips on how to make your dance better, or maybe loopier!
- 2. Do you want to program a dance using a computer?** Ask an adult to help you make an animated dance with a website such as code.org or an app such as ScratchJr. What happens when you change the number of loops in your program? Does it change how the dance looks?
- 3. Do you like to sing?** Just like dances, songs often repeat the same part several times. Use loops to write down the words or notes in a repetitive song. Then test if you have the right number of repeated parts.
- 4. Do you want to start your own dance class?** Computer scientists have other tools, including conditionals, that help them write more complex instructions. Interested in learning more? Try out the *This Game Rules* activity on families.eie.org.
- 5. Do you like solving problems?** Think about a new problem that you can solve by using loops.
 - What's the problem?
 - How could loops help you solve the problem?
 - How will you test your solution?
- 6. Do you want to learn more about computer scientists?** Check out EiE's [Careers for Engineers](#) to learn more about the types of problems that computer scientists solve. Watch "[Illuminating the Creative Side of Code](#)" to find out how one computer scientist followed her passion for dance.
- 7. Do you have questions about Tricia's ankle braces?** Tricia has cerebral palsy, and the ankle-foot orthotics she wears help her balance and move around more easily. Watch "[Walking, Standing, and AFOs](#)" to learn more about these devices.



Scan for links

Keep doing computer science together!

Visit families.eie.org for more free computer science and engineering activities from the Museum of Science, Boston.

Families: Share your designs with us!
Tag us on social media.
Twitter & Instagram: @eie_org #eiefamilies
Facebook: @eie-mos #eiefamilies

Comic and illustrations by Melanie Demmer, USA

We can use a computer to program another dance!

Next, we can send it to all our friends!

