Activity: Programming Cartoons

**Grade Range:** 2→8  **Concepts:** program, sequencing, software, software engineering  
**Length:** 45 minutes  **Materials:** computer, internet access

**Background Information:**

**What is a program?**

A computer program is instructions and rules for the computer to follow for a specific task. Computers need programs for them to operate and function. Details matter when programming. You have to be very specific with your instructions so that when it is used, nothing goes wrong. For example, if you were writing instructions to make a peanut butter and jelly sandwich, what would you include? Since most computers can’t think on their own, you may need tell the computer where to find the ingredients, exactly how to spread peanut butter, what silverware to use, and even what peanut butter and jelly are. Computers need very detailed instructions to ensure it does exactly what you want it to do and in the correct order. This is called a **sequencing** (putting details in the specific order). You wouldn’t want it to spread the peanut butter before getting the peanut butter out of the cupboard (what a mess!).

**Program in History**

The first moon landing occurred July 20, 1969, and you may have heard the famous quote, “That’s one small step for man, one giant leap for mankind”. This was made possible by a program coded by Margaret Hamilton and her team from MIT. While the rover was landing, an error message came up indicating that there was a problem with the landing sequence. However, due to Margaret Hamilton’s preparation, the lander was able to prioritize the more important instructions and ensure lower priority instructions were bypassed. Because of her thoughtfulness and software, they were able to proceed with the landing and successfully step out onto the moon.

**Software engineering**

Margaret Hamilton was the first software engineer helping design and develop the software (set of instructions or programs) for NASA’s Apollo 11 Mission. Software engineers design, create, and improve these sets of instructions or programs to help the computers multitask. Think about a computer for a second. A software engineer helps with everything you can’t physically touch. It tells the computer how to act and interact with you. In the picture of Margaret Hamilton above, you can see all the programs or code she created for the Apollo 11 Mission. That’s a lot! For over 50 years, these engineers continue to make computers even more powerful and impressive than we could ever imagine in order to continue exploring and learning.

**Learn more** about how the world’s first software engineer! [https://youtu.be/kTn56jJW4zY](https://youtu.be/kTn56jJW4zY)
Think about it!
Where do you see other things that are programmed around you? TVs, music or movies? Heaters and air conditioning units? Dishwashers? Apps on smartphones? Stoplights and streetlights? There are computers everywhere! What else could you program to do a specific task?

Activity:
Start by reading through the Background Information and handout below.
What’s the Problem: You need to create a story and program it! Try to make your cartoon at least 10 seconds long!
Explore: Start by learning more with Scratch using the tutorials:
Design your Solution: Brainstorm, plan, and decide what you want your characters to do! Maybe you could have them throw a party or solve a problem!
Program and Innovate: As you go, you may have great ideas with the scenes! Continue to add these as you go. Be creative and try new programs!
Try it Out: Once you have created your cartoon, share it with someone!
Make it Better: Keep working to improve your design! Did it run as expected? Do you need to change the timing of events? How might you make it even better? What can you add? Could you use a loop in your program? Share your thinking with each new improvement!
Need help? Check out these helpful video tutorials from Scratch!
https://scratch.mit.edu/help/videos/

Definitions
• Program: very detailed instructions and rules given to a computer to follow and do a specific task
• Sequencing: putting the instructions in a specific order in order to have a successful program
• Software: a set of instructions or code used for the computer to perform its functions or tasks
• Coding: creating the statements in a program
• Loop: a tool used in a program that tells the computer to repeat something a specific number of times or until a rule is met.

Reading and Resources
Books and Articles
• Hello Ruby By Linda Liukas
• How to Code a Sandcastle by Josh Funk
• Girls Who Code: Learn to Code and Change the World by Reshma Sanjuni
• Margaret and the Moon by Dean Robbins
• Intro to Computer Science Terminology https://codeburst.io/intro-to-computer-science-terminology-f9ae64e75d27

Videos
• Software Engineering: Crash Course https://youtu.be/O753uuutqH8
• A delightful way to teach kids about computers by Linda Liukas https://youtu.be/vcxwcWuq7KQ
• Invention Of Software Programming https://youtu.be/UPAkeZBxb0l
• Programming Basics: Crash Course https://youtu.be/l26oaHV7D40
• Scratch Tutorials https://scratch.mit.edu/help/videos/

Check out more great resources at www.isek.iastate.edu!