Student Sheet: "HOPportunities"

Name: ________________________________ Date: _______________ Session #: ___

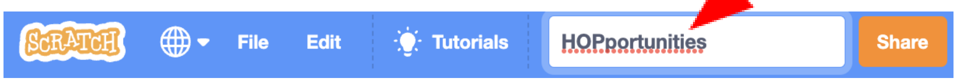
Part I: Backyard Drama

Now that you are fluent in designing new characters (called sprites) in Scratch, let's see how you can continue to make them do different activities. Before starting this, you will now learn how to add a backdrop in your project.

Log onto your Scratch account by typing the following link into an Internet browser.

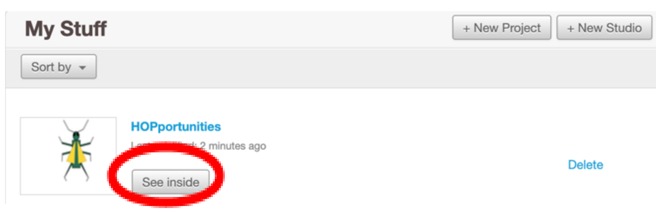
scratch.mit.edu

1. Select "Create". Be sure to give your project a name in this box.

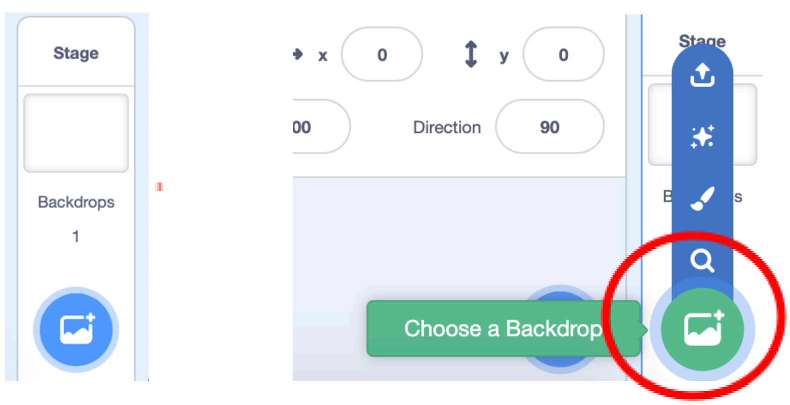


In the upper right corner, click on the "Folder" icon.

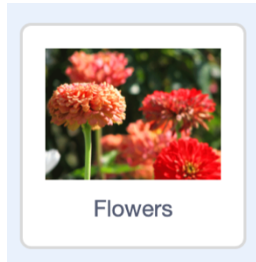
Once in the "My Stuff" box, find the project you just created and click on "See inside".



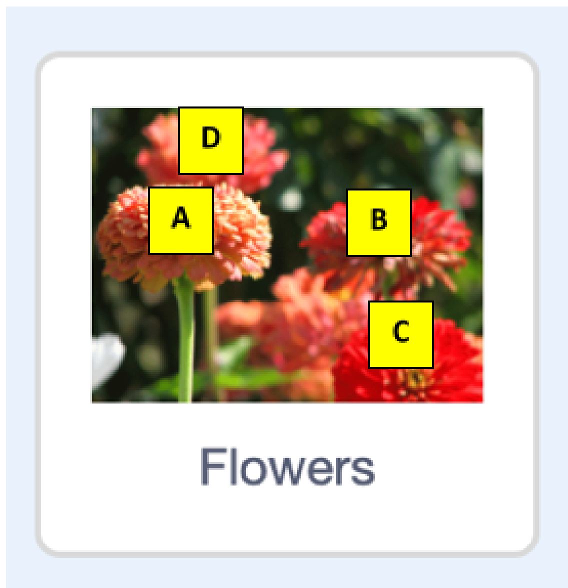
2. Now that you are back in the "Create" window, navigate to the lower right corner until you see the "Backdrops" button. Select "Choose a Backdrop".



3. Scroll through and examine all of the backgrounds that are available. Then, choose the “Flowers” background.



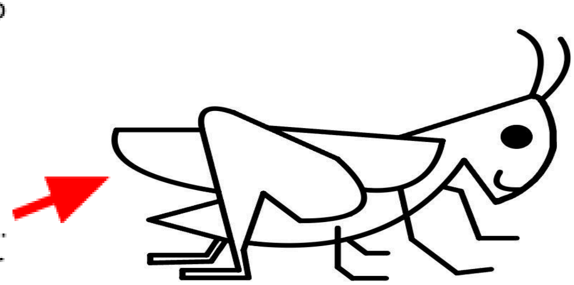
4. In the image below of the “Flowers” background, the flowers are labeled A, B, C and D to help you understand this lesson.



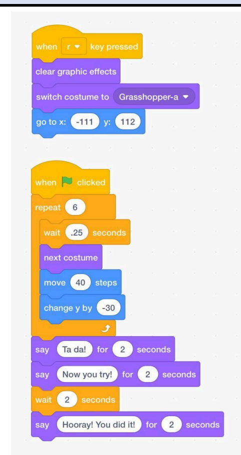
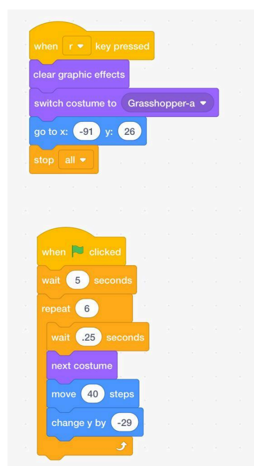
Imagine teaching someone younger than you how to do something. In the last lesson, “iGRASSHOPPER”, you learned how to make your own sprite and control it using short segments of blocks (called programs).

Now you will create two new grasshopper characters—one that is older, and one that is younger. Assign both grasshoppers a name. You will animate the older grasshopper teaching a younger grasshopper how to hop from one flower top to another.

Since you already know how to create new sprites, you will create a sprite of on older grasshopper and a sprite of a younger grasshopper. For this lesson, both grasshoppers should be shown from the side. You are welcome to make your two grasshoppers any color you'd like!



Follow the instructions below to create your program. Create the code for both the older and the younger grasshopper's actions described in the left side of the table below. Don't forget to show them talking to each other! Place a screenshot of your block segments (your program) in the box to the right.

Movements/Actions	Screenshot of Program Code (Your Assembled Blocks)
To begin, position both grasshoppers standing on top of flower A. To show the younger grasshopper how it's done, the older grasshopper hops to flower B and says, "Ta da!". The older grasshopper now says, "It's your turn; now you try it." The younger grasshopper then successfully hops to flower B. As it lands on flower B, the older grasshopper yells, "Hooray! You did it!" The younger grasshopper responds, "This is fun!" and hops back to flower A with the older grasshopper. Design the code to make all of this happen. Don't forget to make the grasshoppers speak!	 Code for bigger grasshopper  Code for smaller grasshopper

Were there any parts of the code that you could just copy? Explain.
I could copy and paste my "restart button" and the code to make the sprite jump

<u>Part II</u>: Grasshoppers in Petal Pursuit

Now that the young grasshopper has learned how to hop from one flower to another, it says "Let's play 'follow the leader', and I'm the leader!"

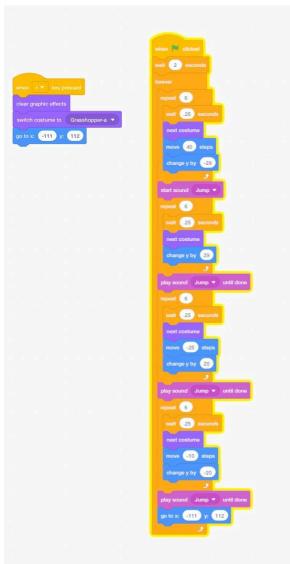
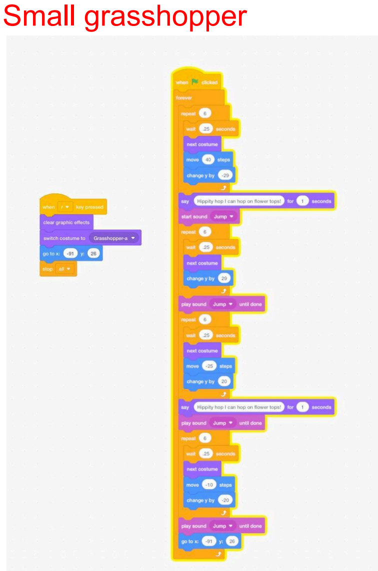
Modify your previous code so that the two grasshoppers hop from one flower top to other flower tops, with the younger one leading the way. As they hop, the young grasshopper sings:

"Hippity, hop, hippity, hop… I can hop on flower tops".

Be sure to make both grasshoppers hop on all four flowers (A-D) at some point.

Feel free to add hoping sounds in your program!

When you have finished your program, and the grasshoppers do all of the required tasks on the previous page. When you are finished, follow the instructions to the right to share the link.

	Screenshot(s) of Project Blocks/Code
NOTE: You will have two codes, one for the older grasshopper, and one for the younger grasshopper.	Big grasshopper  Small grasshopper 
Shared Project Link	xx

Sharing Project Link

Click on the following in order.

Paste the link in the "Shared Project Link" in the table and wherever else you'd like to share it.

Once you have shared your link, make sure your instructor can open it. Once you have confirmed this, ask your instructor to write their initials in the box below.

Instructor's Initials:

<u>EXTEND YOUR THINKING</u>: Innovations' Computing Roots

Go to an Internet browser and type in the following link.

https://www.computerhistory.org/timeline/

You will be taken to the online "Computer History Museum", and you will be able to view a "Timeline of Computer History".

The table below contains important dates/events for the development of computers that are used today.

In the timeline online, click on the years listed in the left-hand column of the table below. Add that event to the middle column in the table below. Read the paragraph describing the event in the online timeline. In the right-hand column of the table, summarize why that technology was an important invention in one sentence.

Year	Computer History Event	Why This Technology Was An Important Invention
1933	Telex messaging network comes online	See below.
1934	"World Brains" is developed.	See below.
1937	George Stibitz at Bell Laboratories uses relays for a demonstration adder.	See below.
1939	Elektro makes an appearance at the World's Fair.	See below.
1940	The Complex Numbers Calculator (CNC) is completed.	See below.
1941	Konrad Zuse finishes the Z3 computer.	See below.

1933:
Military Communication: Initially designed to distribute military messages, the Telex system played a crucial role in the coordination and strategy of military operations during World War II. Efficient and secure communication was vital for success in the war, and Telex provided a faster and more reliable method than previous technologies.
Global Connectivity: The Telex network laid the groundwork for global communication. By connecting teleprinters over voice telephone lines rather than relying on dedicated and expensive telegraph lines, it made messaging more accessible and cost-effective. This innovation helped establish a global communications infrastructure that would persist for decades, influencing the development of modern communication networks.

Commercial Use: After the war, Telex transitioned from a military tool to a commercial and governmental communications network, allowing businesses and governments around the world to send text messages across vast distances. This capability was crucial for the globalization of business and the growth of international trade.
Precursor to Modern Networks: The Telex system is an early example of networking technology that connects multiple devices over a shared infrastructure, a concept that would later be foundational in the development of the internet. Its use of modified telephone switches to route messages between teleprinters was a precursor to the packet-switching technologies that underpin the internet.
Longevity and Impact: The fact that the Telex system remained in use in some countries into the 2000s underscores its importance and effectiveness. It shows how this World War II-era technology had a lasting impact on global communication practices well into the late 20th century.

1934:
Visionary Approach to Information Organization: Paul Otlet, H.G. Wells, and Vannevar Bush were among the earliest visionaries to imagine a comprehensive system for organizing and sharing the world's knowledge. Their work laid the intellectual groundwork for what would eventually become the World Wide Web. By envisioning a system where all human knowledge could be collected, organized, and accessed by anyone, they set the stage for the modern era of information sharing.
Foundational Concepts for the Internet and Web: The ideas developed by Otlet, Wells, and Bush included concepts that are fundamental to the internet and the Web today, such as the use of cross-references (hyperlinks) to connect pieces of information. Bush's Memex, for example, was an early concept of a personal information management system that allowed users to store and retrieve information using associative links, a precursor to how hyperlinks function on the Web.
Early Search and Indexing Systems: Otlet's Mundaneum was an early attempt to create a massive "search engine" using card catalogs and other media to index vast amounts of information. This was a revolutionary idea at a time when information was largely siloed and difficult to access. The Mundaneum can be seen as an early attempt to solve the problem of information overload, a challenge that the internet would later take on.
Interdisciplinary Integration: These thinkers were ahead of their time in recognizing the potential of integrating different media—text, images, sound, and even emerging technologies like television—into a unified system of knowledge. This interdisciplinary approach anticipated the multimedia nature of the Web and the digital convergence that characterizes modern information systems.
Influence on Future Technologies: The ideas of Otlet, Wells, and Bush influenced later developments in computing and information technology, including the creation of digital libraries, hypertext systems, and ultimately, the World Wide Web. Their work demonstrated the importance of structured information management and provided a conceptual framework that innovators like Tim Berners-Lee would later build upon.
Legacy of Global Knowledge Sharing: The notion of a "World Brain" reflects an ideal of global knowledge sharing, where information is democratized and accessible to all. This vision has become increasingly relevant in the digital age, where access to information is more widespread than ever before, thanks to the internet.

1937:
Proof of Concept for Boolean Logic in Computing: Stibitz's "Model K" Adder was one of the first practical applications of Boolean logic in the design of electronic circuits. By successfully using relays to build a simple adder circuit on his kitchen table, Stibitz provided tangible proof that Boolean algebra could be applied to create reliable, automated computing devices. This was a foundational step toward the development of modern computers.
Pioneering Use of Relays in Computation: The "Model K" Adder demonstrated the feasibility of using relays—electromechanical switches commonly used in telephone exchanges—to

perform binary arithmetic operations. This was a significant advancement because it showed that existing technology, such as relays, could be repurposed for computational tasks. This paved the way for more complex relay-based computers like the Model I Complex Calculator and Zuse's Z2.
Foundation for Future Digital Computers: The success of the "Model K" Adder led directly to the construction of the Model I Complex Calculator in 1939, a more sophisticated relay-based computer that could perform complex calculations. These early relay-based machines were critical precursors to later digital computers, influencing their design and development.
Parallel Developments in Computing: The work of George Stibitz in the United States and Konrad Zuse in Germany highlights the global nature of early computer development. Both engineers independently recognized the potential of using relays for computation, illustrating a convergence of ideas that would accelerate the advancement of computer technology during and after World War II.
Influence on Modern Computing: Stibitz's demonstration laid the groundwork for the transition from mechanical and electromechanical devices to fully electronic computers. The principles demonstrated in the "Model K" Adder—such as the use of binary logic and the automation of arithmetic operations—are still fundamental to the operation of modern digital computers.
Historical Significance: The "Model K" Adder is an early example of a prototype that had a significant impact on the trajectory of technology. Its creation marked a shift in how engineers and scientists approached the design of computing machines, moving from purely mechanical designs to ones that incorporated electronic components, which would eventually lead to the development of the first generation of electronic computers.

1939:
Public Introduction to Robotics: Elektro was one of the first humanoid robots to be showcased to the public on such a grand scale. The World's Fair provided a platform for millions of people to witness a robot in action, sparking the public's imagination about the possibilities of robotics and automation. This exposure helped to popularize the concept of robots and human-robot interaction, influencing both public perception and future developments in robotics.
Demonstration of Early Robotics Technology: Elektro was a sophisticated piece of engineering for its time, incorporating relay-based technology to respond to voice commands. Although its responses were pre-programmed and limited, Elektro demonstrated the potential for machines to interact with humans in a lifelike manner. This was an early step toward the development of more advanced, responsive, and autonomous robots.
Advancement in Human-Computer Interaction: By responding to voice commands and performing simple tasks, Elektro showcased early efforts in human-computer interaction (HCI). This was a precursor to modern voice-activated systems and AI assistants, illustrating an early attempt to create machines that could understand and respond to human language, even if in a very rudimentary way.
Symbol of Technological Progress: Elektro symbolized the technological optimism of the era, particularly during the late 1930s when the World's Fair was a showcase of futuristic innovations. Elektro's presence at the Fair represented the potential for technology to transform everyday life and pointed to a future where robots might assist humans in various tasks, from industrial work to household chores.
Cultural Impact and Legacy: Elektro became a cultural icon and is often referenced as an early example of humanoid robotics. Its ability to move, "talk," and even "smoke" cigarettes made it a memorable and entertaining exhibit that left a lasting impression on those who saw it. This helped to embed the idea of robots into popular culture, influencing how future generations would envision and develop robotic technology.
Inspiration for Future Robotics: While Elektro was not an autonomous robot in the modern sense, its design and capabilities inspired future engineers and scientists to push the boundaries of what robots could do. It demonstrated that complex tasks, such as voice recognition and motor control, could be achieved with the technology of the time, paving the way for more advanced robotics research in the decades that followed.

1940:

Pioneering Remote Access Computing: The demonstration of the CNC in 1940 is widely regarded as the first instance of remote access computing. Stibitz's ability to perform calculations on the CNC, located in New York City, from a Teletype terminal at a conference in Dartmouth College, marked a significant milestone in the evolution of computing. This event foreshadowed the future of networked computing, where users could interact with computers remotely, laying the groundwork for the development of modern internet and cloud computing technologies.

Advancement in Complex Number Computation: The CNC was specifically designed to handle complex number calculations, which are essential in many fields of engineering, physics, and mathematics. The successful operation of the CNC represented a significant advancement in the ability to automate complex mathematical processes, making it an early example of a specialized computational device.

Integration of Telecommunication and Computing: By connecting the CNC to a Teletype machine via telephone lines, Stibitz demonstrated the potential of integrating telecommunications with computing. This was a groundbreaking concept at the time, showing that computers could be accessed and operated over long distances, an idea that would eventually lead to the creation of distributed computing systems and the global internet.

Influence on Future Computing Models: The CNC's remote operation model provided an early example of the client-server architecture, where a user's input is processed by a central computing system located elsewhere. This concept is fundamental to modern computing, where servers process requests from clients (such as personal computers or smartphones) over a network.

Historical Significance in the Development of Computing: The CNC's completion and subsequent demonstration at the American Mathematical Society conference were pivotal moments in the history of computing. The event showcased the practical application of computers for complex mathematical tasks and highlighted the potential of computers to revolutionize various scientific and engineering disciplines.

Public and Academic Impact: The successful remote operation of the CNC captured the imagination of both the public and the academic community, illustrating the immense potential of computing technology. It contributed to the growing recognition of computers as powerful tools for scientific research, which helped to spur further investment and innovation in the field.

1941:

First Fully Functional Programmable Computer: The Z3 is widely regarded as the world's first fully operational, programmable digital computer. Unlike earlier machines that were either purely mechanical or had limited programmability, the Z3 could perform automated computations using a sequence of instructions stored on punched film. This made it a significant milestone in the evolution of computers from simple calculating devices to programmable machines.

Innovative Use of Floating-Point Arithmetic: The Z3 was one of the first computers to implement floating-point arithmetic, which allows for a much wider range of numerical calculations, including those involving very large or very small numbers. This capability was crucial for complex scientific and engineering calculations, such as the aerodynamic computations for which the Z3 was used. The use of floating-point arithmetic remains a foundational concept in modern computing.

Demonstration of Relay-Based Technology: The Z3 used 2,300 electromechanical relays to perform its calculations. While relays were not new technology, Zuse's use of them to create a fully functional computer capable of complex operations was groundbreaking. This demonstrated the potential of relays for building sophisticated computing devices before the advent of electronic components like transistors.

Independence from Global Developments: Konrad Zuse developed the Z3 in relative isolation from other major computing projects happening elsewhere in the world, such as those in the United States and the United Kingdom. His independent development of a working computer

system highlights the global nature of innovation in computing, with significant advances being made in different parts of the world, often without knowledge of each other's work.
Impact on Post-War Computing: Although the original Z3 was destroyed during World War II, its reconstruction in the 1960s and subsequent display at the Deutsches Museum in Munich allowed it to serve as an important historical artifact. The Z3's design and concepts influenced later developments in computer science and engineering, particularly in Europe, and Zuse's work is now recognized as a critical contribution to the field.
Pioneering Computer Science in Germany: Zuse's work with the Z3 and his subsequent projects established him as a pioneering figure in computer science, particularly in Germany. His contributions laid the groundwork for the development of computing in Europe, and his company, Zuse KG, was one of the first to produce commercial computers after the war.
Legacy and Recognition: The Z3’s design and functionality have earned it recognition as one of the most important early computers. Its legacy is preserved not only through the reconstructed model but also through the acknowledgment of Konrad Zuse's role as a key innovator in the history of computing.