TECHNO Arcade

Teacher Guide

Lessons for Elementary School Students

Technology Course
using
Scratch

Design arcade games with coding blocks.

In this course, students become game developers. They use Scratch coding blocks to create activities for kids. These include Jumble Tumble, Let's Jam, Mystery Island, and Lost Treasure. Upon completion, gaming fans visit an online arcade to share in the fun.

TECHNOKids®

Table of Contents

Introduction

This section provides valuable information about teaching TechnoArcade. It includes a description of the Teacher Guide, as well as an overview of the course. In addition, there are ideas for implementation and technology integration.

For additional guidance, open the course in TechnoHub and select Get Started to access preparatory steps, resource list, and scheduling timetable.

How to Use This Guide

This Teacher Guide contains the following three sections:

Getting Started – This section contains a course description, as well as ideas for implementation.

Course Instructions – The course is comprised of six sessions, each focused on a problem-solving task that aligns with the project theme. Each session includes assignments that break down the task into manageable steps. The components of each session are as follows:

- Overview – An explanation of the session activities and their purpose.
- Materials – A list of handouts, sample files, templates, and teacher resource materials needed to teach the session.
- Teaching Strategies – Instructional methods recommended for teaching the activities.
- Lesson Plan – A detailed list of each step in the session.
- Learning Objectives – A summary of the content knowledge and technical skills taught throughout the session.
- Assignments – A session consists of assignments completed by students. Actions to be performed on the computer by the student are indicated with a triangle (▷). Background information is indicated with a dash (–).
- Review – A session review contains a list of fill-in-the-blank, multiple choice, or short-answer questions intended to review Scratch commands and terminology (answers included).
- Skill Review – An additional assignment intended to review Scratch coding skills (includes completed sample).
- Extension Activity – An additional activity that relates to the skills presented in the session. Often tasks show students how to enhance their game created in the Session with additional, optional features.

Appendices – this section contains additional information or materials including the following resources.

- Assessment Tools – Skill summary and marking sheets for evaluation.
- Glossary – A definition of Scratch or coding terminology.
- Contact Information – How to contact TechnoKids Inc. for curriculum support.

TechnoArcade Overview

Introduction to TechnoArcade

In this course, students become game developers. They use Scratch coding blocks to create activities for kids. These include Jumble Tumble, Let's Jam, Mystery Island, and Lost Treasure. Upon completion, gaming fans visit an online arcade to share in the fun.

Students complete the following tasks:

- In session 1, students become arcade heroes. They prepare to build an online arcade for kids. To start, they register for a free Scratch account to gain access to the online coding platform. Afterwards, they explore the program to learn about common tools and terminology. By connecting blocks to make a script they discover how to control a sprite.
- In session 2, students build Jumble Tumble. In this game a press of a key creates a mish mash of characters dashing and rolling across the screen. This chaotic scene uses Motion blocks to control movement. By sequencing the coding blocks, students discover how to direct and loop action. For an extra challenge, they can use if-then logic to create a silly outcome when two sprites crash.
- In session 3, students put together a band. They will design a game that transforms the keyboard into a musical instrument. Players will enjoy leading a jam session as they tap away at the keys. Students wanting a personal touch can add a variable that allows the player to name the new music group.
- In session 4, students create Mystery Island. In this game, players explore an imaginary land. By tapping objects, they discover strange creatures. To build the code, Looks blocks are combined to change the appearance of sprites. Coders wanting to create an extra surprise can use random operators.
- In session 5, students begin to create the game Lost Treasure. In it, players collect items to score points. The player moves the mouse to pick up lost items and carries them to a specific spot. To start, students plan the theme of their game. Next, they insert a setting, hero, and treasure. With this complete, the game designers build code to control the movement of the hero. Sound and Looks blocks combine to add excitement to the game play.
- In session 6, students finish designing the game Lost Treasure. They create a variable to keep score. Using the wait until coding block, they build a script that ends the game when all hidden items are found. An optional activity has students create a timer to have players race against the clock. Upon completion, a tester plays the game.

Implementation and Technology Integration Ideas

Spark an interest in computer science with TechnoArcade. In this course, students create a series of games. By completing the block-based coding activities they develop an understanding of scripts, loops, conditionals, and variables. To support beginners, sample scripts are provided as a starting point for creativity. The primary goal is to have students enjoy programming. The activities are suitable for any teaching situation. Select the option that works best for you and your students:

Ideas for Implementation

- *STEM or Computer Science Class:* TechnoArcade has 18 assignments divided into six Sessions. Activities are designed to provide a basic understanding of programming concepts. Each Session focuses on a specific skill with activities gradually increasing in complexity throughout the course. For example, Session 2 *Jumble Tumble* is about basic scripts, loops, and Motion blocks. Session 3 *Let's Jam* is about the Sound Library and using the keyboard to control events. Session 4 *Mystery Island* is about Looks Block, repeat, and sequencing actions. Session 5-6 *Lost Treasure* is about using conditionals, operators, and variables to control game play. Together they provide a foundation for further learning.
- *Coding Unit for Beginners:* TechnoArcade assumes that students have no programming experience. For those new to coding Sessions 1-4 are ideal to teach. To support learners, each assignment provides detailed instructions with scripts. At the end, coding tips encourage students to personalize their games. Typically, this list of choices increases in difficulty. This is an excellent way to promote creativity, exploration, and independence. Jumble Tumble, Let's Jam, and Mystery Island are ideal for beginners.
- *Coding Unit for Advanced Beginners:* TechnoArcade provides enrichment opportunities to students with existing programming experience. Each Session has an extension activity. It is designed to enhance the game with extra code. For example, students are challenged in Jumble Tumble to build a script with a conditional. In Let's Jam they add a variable for naming the band, and in Mystery Island students learn how to use a random operator. These activities help to keep all learners engaged. However, Sessions 5-6, are designed especially for experienced coders. The Lost Treasure game has complex scripts. Moreover, the extension activities challenge students to edit a backdrop and construct a timer, which are advanced skills.
- *Digital Citizenship Outcomes:* Using Scratch does more than teach about block-based coding. It gives students access to an online community where they can become an active member. Creating a user account presents an opportunity to discuss privacy and security. Sharing projects with fellow Scratchers is an excellent way to contribute to a digital collection of games. Moreover, it provides students with a chance to comment about their experience. This can lend itself to further discussions about digital footprint, online communication, and cyberbullying.
- *Hour of Code*: If you only have one class to teach coding there are many activities in TechnoArcade that can be used for this purpose. One option is the Session 2 Skill Review in which students animate letters in a word. Another choice is the Session 3 Skill Review that combines sound with action. Or a third alternative is the Session 4 Skill Review that is a simple game of hide and seek.
- *Coding Workshop Series*: If you are running a workshop series as part of an after-school program or community event, then you will need to select assignments from TechnoArcade that fit the number of classes offered. As well, consider the age range and coding abilities of students. The games Tumble Around, Let's Jam, and Mystery Island can be completed in a shorter period. They provide ready-made scripts that can be used as a starting point for beginners. Whereas the game Lost Island is more advanced, has multiple coding blocks, and will likely require more time.

This is a preview of the teacher guide.
Pages have been omitted.

Session 3
Let's Jam

In this session, students put together a band. They will design a game that transforms the keyboard into a musical instrument. Players will enjoy leading a jam session as they tap away at the keys. Students wanting a personal touch can add a variable that allows the player to name the new music group.

Assignment 7: Meet the Band

Assignment 8: Design a Musical Keyboard

Assignment 9: Host a Jam Session

Session 3 Review: Play It

Session 3 Skill Review: Yikes! Run Away

Session 3 Extension Activity: Pick a Band Name

Session 3 Getting Started

Overview

In this session, students put together a band. They will design a game that transforms the keyboard into a musical instrument. Players will enjoy leading a jam session as they tap away at the keys. Students wanting a personal touch can add a variable that allows the player to name the new music group.

Materials

- Scratch
- Scratch Flashcards (optional): Stage, Events, Sound
- *Band_code* sample
- Session 3 Review: Play It (optional)
- Session 3 Skill Review: Yikes! Run Away (optional)
  - *Run_code* sample
- Session 3 Extension Activity: Pick a Band Name
- Let's Jam Marking Sheet (optional)

Teacher Preparation

(Refer to the Preparing to Teach section of this guide for instructions)

- View the sample game *Band_code* to gain an understanding of how the keyboard is transformed into a musical instrument.
- View the marking sheet for Let's Jam. It is customizable if you would like to adjust the grading scheme or criteria.
- (Optional) Print the Scratch flashcards listed in the materials list for this session. Download them from the Resource Center in TechnoHub. Use them to introduce the Sound and Event blocks. Build sample scripts as a model for students to replicate.

Teaching Strategy

In this session, students transform their keyboard into a musical instrument. Explain session scenario:

In this session, you design the game, Jam Session. In this game, you turn the keyboard into a musical instrument. By pressing keys, the player controls what band members do on the stage. Drums, guitar, and saxophone are just a few of the ways to create music.

The focus of this task is on learning how to access sounds from the library. By building the game, not only will you gain an understanding of the wide range of effects available, but also how to include them into a script.

It's time to jam!

Assignment 7: Meet the Band

In this assignment, students begin to create the game Let's Jam. In this game the keyboard becomes an instrument. Players will tap away at the keys to lead a band's jam session.

The first task is to pick the instruments and the band members. Adding sprites to the stage should be a familiar skill. To extend learning, students will discover how to resize. Moreover, they will practice adjusting object order to layer sprites.

The instructions have students add 3 instruments and 3 band members. To simplify the task, you can limit the sprites to only instruments. In this case, skip step 5.

Introduce the following terminology:

- *Sounds Library:* A collection of sound clips.
- *Sound blocks:* Scratch blocks used to play audio. They are pink.

To inspire students, you may wish to show them the *Band_code* sample game. Draw their attention to the Sound blocks to make connections between the script and the action in the game. Please note, this sample does include the extension activity *Pick a Band Name*.

Assignment 8: Design a Musical Keyboard

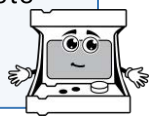
In this assignment, students continue to build the game, Let's Jam. They add code to turn the keyboard into an instrument. Keys A S D will play the instruments. Keys J K L will make the band members sing.

You may wish to use the Sound Scratch flashcards to introduce the following blocks:

BLOCK	FUNCTION
	Play a sound until it is finished.
	Set the speed of the sound.

Practice Coding Skills – Yikes! Run Away

Do your students need additional practice finding sounds in the library? Complete the Session 3 Skill Review. In this game, the player presses the SPACEBAR to save the character from something scary. Sound is used to enhance the action.

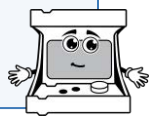


Assignment 9: Host a Jam Session

In this assignment, students share their game with others. To start, they view the project page. Next, they add instructions on how to play. There is the option to turn on commenting. This will allow other Scratchers to post feedback. If the files are not public, have students write down their comments on a piece of paper instead.

Take the Challenge – Pick a Band Name

For a brief introduction to variables, complete the Session 3 Extension Activity. It has students ask the player to input a name. This data is then used to announce the band.



Lesson Plan

Assignment 7: Meet the Band

- Login or open Scratch.
- Create a new project. Name the file Band.
- Delete the *cat* sprite.
- Insert an *instrument* sprite and position it on the stage.
- Resize the sprite by setting a value in the Sprites pane.
- Add two more *instrument* sprites.
- Apply skills to add three band members. Layer them to look as if they are playing.
- Close Scratch.

Assignment 8: Design a Musical Keyboard

- Login or open Scratch.
- Open Band.
- Build a script to have an *instrument* play a series of sounds when the letter a is pressed.
- Test the script by pressing the letter A on the keyboard.
- Apply skills to build a script for each instrument using the letters s and d.
- Search the Sounds Library to find a clip.
- Build a script that has a band member play a sound when the letter j is pressed.
- Apply skills to build a script for each band member using the letters k and l.
- Press the keyboard keys to jam.
- Close Scratch.

Assignment 9: Host a Jam Session

- Login or open Scratch.
- Open Band.
- View the Project Page.
- Add player instructions.
- Turn on commenting.
- Share the project. Copy a link and post it for others (optional).
- Have a friend play Let's Jam and post a comment about what they like.
- Read the comments.
- Close Scratch.

Learning Objectives

Computer Science | Coding

- create a script that include sequences and events
- modify a script to produce a unique outcome
- develop a game in parts by adding one element at a time
- debug code to identify and fix errors

Scratch Block-Based Coding

Manage Projects

- create a new project and name the file
- modify an existing project to add more features
- view a project page
- add notes to a project
- share a project and copy the link (optional)
- control commenting on a project

Working with the Scratch Interface

- add and remove blocks from the Code Area
- stack blocks in a sequence to build a script that controls a sprite
- create a scene by using the stage as a canvas

Add Characters to the Stage

- filter sprites in a Library to quickly locate a desired character
- delete a sprite from the sprite pane
- adjust a sprite's size
- rotate or flip a sprite's direction

Trigger a Script

- begin a script with an event block
- trigger a script to run when a keyboard key is pressed

Play Sound

- select an audio clip from a Library that matches the action
- play a sound until it reaches the end
- increase or decrease the speed of a clip (optional)

Working with Variables (optional)

- ask a question and wait for player input
- temporarily store player input
- output player's stored answer

Applied Technology | Digital Citizenship

- develop Let's Jam, a game that transforms the keyboard into a musical instrument
- play a game and provide feedback using a commenting system

Assignment 7 Meet the Band

In this assignment, you start to code Let's Jam. In this game the keyboard becomes an instrument. Players will lead a band's jam session as they tap away at the keys.

Your first task is to pick the sprites for the band and resize them so that they fit the stage.

Who will be in the band? What instruments will they play?

Create a New Scratch Project

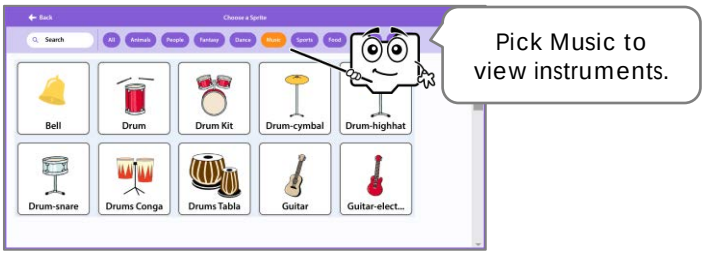
1. ▷ Sign into Scratch.
   ▷ Click *Create*.
   ▷ Name the file Band.

Pick an Instrument

2. ▷ In the Sprites List click *Delete* to remove the cat.

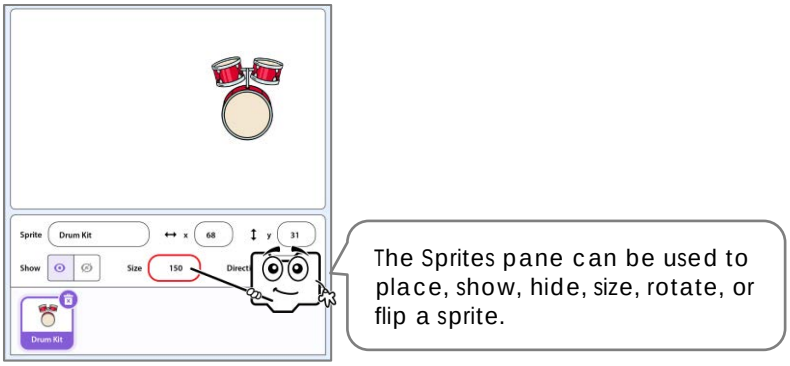
   ▷ Click *Choose a Sprite*.

   ▷ Click the *Music* heading. Pick an instrument:



Resize a Sprite

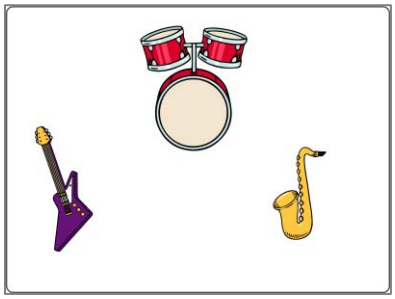
3. ▷ From the Sprites pane, set the size of the sprite:
   - In the Size box, type a number *more than 100* to make it bigger.
   - In the Size box, type a number *less than 100* to make it smaller.



Complete the Band's Instruments

4. ▷ Add two more instruments.

   ▷ Drag the sprites to place them on the stage. For example:



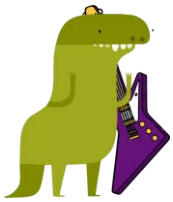
Add Band Members

5. You can adjust object order to make it look like a character is playing the instrument:

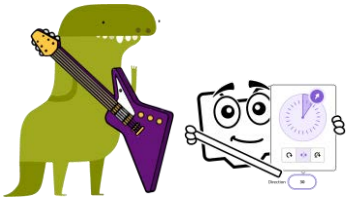
   ▷ Click *Choose a Sprite*. 

   ▷ Pick one you like.

   ▷ Place it over an instrument.

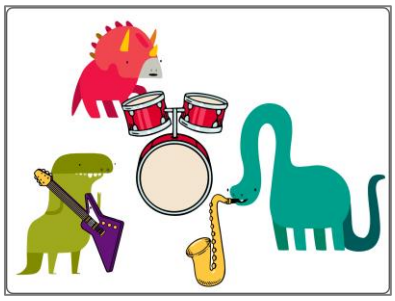


   ▷ Select the instrument. Drag it over the character. It will move to the front:



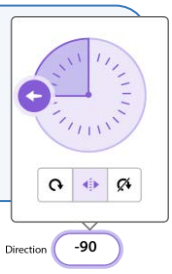
Use *Direction* to angle the instrument.

   ▷ Use your skills to add band members:



TIP - How to flip a sprite:

- From the Sprites pane, click *Direction*.
- Click *Left/Right*. 
- Turn the arrow to -90.

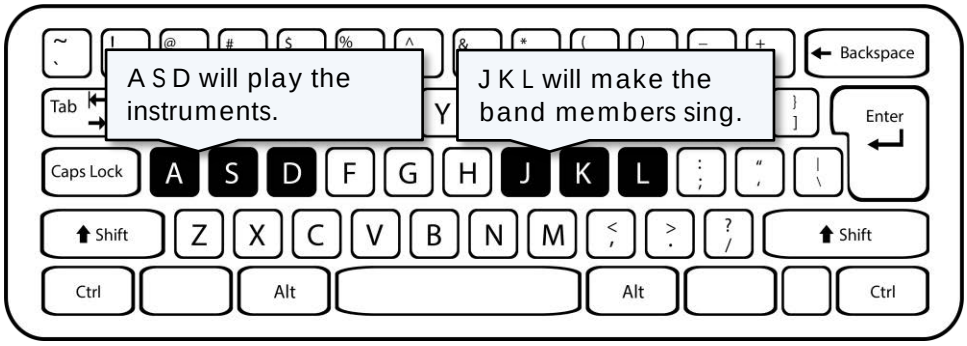


Save Project and Close Scratch

Assignment 8 Design a Musical Keyboard

In this assignment, you add code to Let's Jam. It will turn the keyboard into an instrument.

Players will tap away at the keys to make the band play.

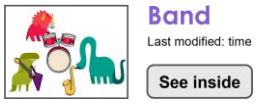


Open Band in Scratch

1. ▷ Sign into Scratch.

   ▷ Click *My Stuff*.

   ▷ Beside Band click *See inside*.



Build the Scripts to Make the Instruments Play

Sprites come with one or more sound effects. Use them to create music for each instrument.

2. ▷ Select an instrument in the Sprites List.

   ▷ Add 

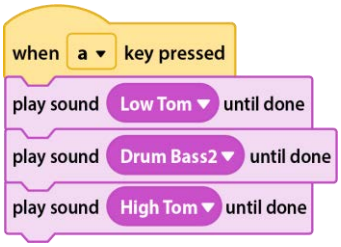
. Click the arrow and pick the letter a.

   ▷ Add 

. Click the arrow and pick a sound:

   ▷ Add more *play sound* blocks. Pick a different sound.

   ▷ Test it! Press "a" on the keyboard to hear the instrument.



SAMPLE SCRIPT

3. Use your skills to build a script for EACH INSTRUMENT using letters S and D.

Make the Band Members Sing

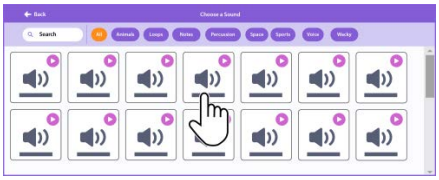
Scratch has a Sound Library. Use it to make each band member sing.

4. ▷ Select a band member in the Sprites List.

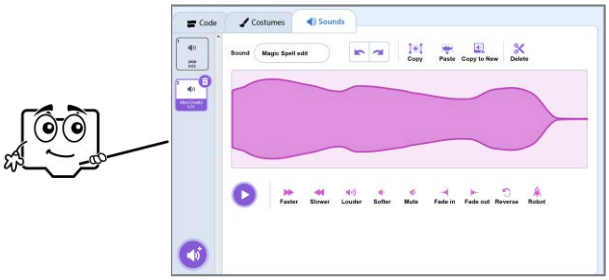
   ▷ Click the *Sounds* tab. 

   ▷ In the bottom left corner, click *Choose a Sound*. 

   ▷ Preview a sound  . Click on one you like to use it.



   – The Sound Editor shows the new sound in the list:



5. ▷ Click the *Code* tab. 

   ▷ Build a script that plays a sound when the letter j is pressed.

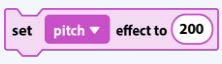
SAMPLE SCRIPT

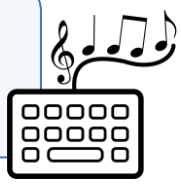
   ▷ Test it! Press J on the keyboard to hear the band member play.

Make Music

6. Repeat steps 4 and 5 to build a script for EACH BAND MEMBER using letters K and L.

7. Press A S D J K L to jam.

> Take the Challenge!
>
> - Build a script for the letter F.
> - Speed it up. Set pitch effect to 150 or 200. 



Save Project and Close Scratch

Assignment 9 Host a Jam Session

In this assignment, you host a jam session.

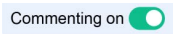
After the player is done making music, have them post a comment. What did they like about the game?

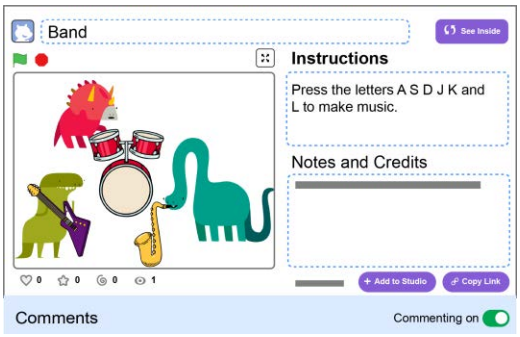
Add Viewing Instructions

1. ▷ Open Band in Scratch.

   ▷ Click *See Project Page*. 

   ▷ Add instructions. Type Press the letters A S D J K and L to make music.

   ▷ Turn *Commenting on*. 



Share the Project (Optional)

2. ▷ Click *Share*.

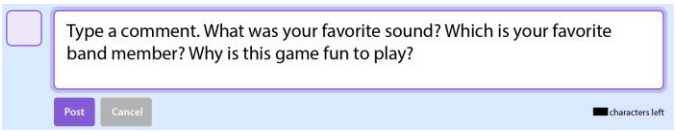
   ▷ Click *Copy Link*. 

   ▷ Share the link with others. You may want to:

   - send it in an email
   - post it on a class page

Ask a Friend to Post a Comment

3. When your friend is done, they should post a comment or write it on a piece of paper.



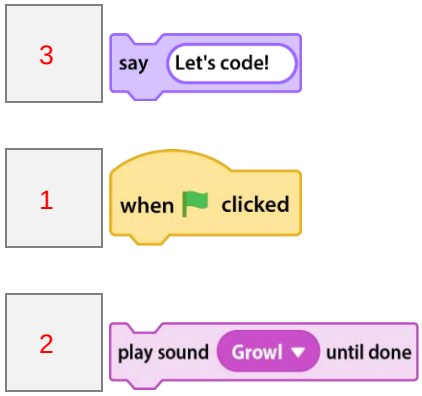
4. Read the comments to find out what players like the most.

Save Project and Close Scratch

Session 3 Review: Play It

Number the blocks to put them in order.

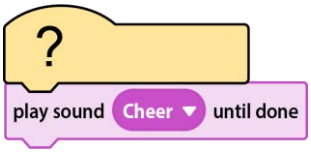
1. When the Go button is pressed, have the character growl, then say Let's code!



/3

Complete the script.

2. Play a cheering sound when the letter A is pressed.



a. 

b. 

c. 

/1

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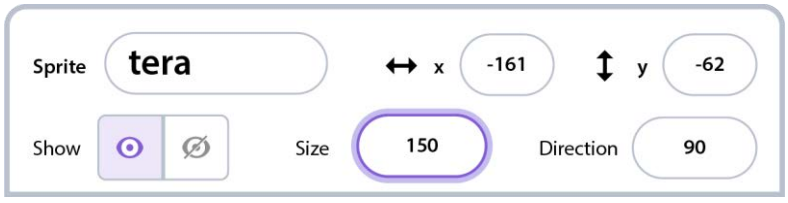
3. The size of the sprite has been set to 150. How does that change the sprite?



a. Keeps the sprite its original size.

b. Decreases the size of the sprite on the stage.

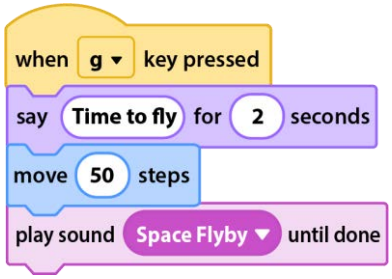
c. Increases the size of the sprite on the stage.

/1

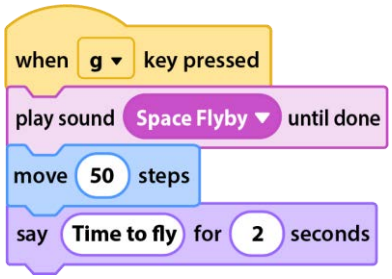
Pick the script that will complete the task.

4. When the letter G is pressed, move a spaceship 50 steps, say *Time to fly*, then play the sound *Space Flyby*.

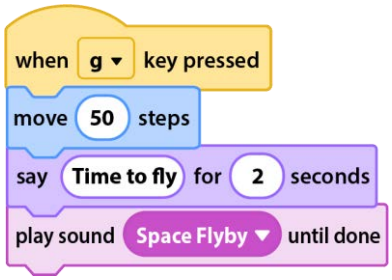
a.



b.



c.



/1

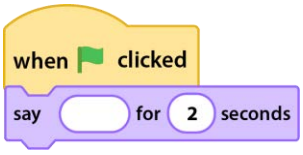
TOTAL: /6

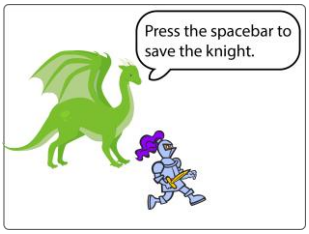
Session 3 Skill Review: Yikes! Run Away

Create a scene that shows a character running away from something scary. The player will press the SPACEBAR to save the character. The scene will use sound to enhance the action.

Sprite Ideas:	
Dragon	Knight
Shark	Fish
Ghost	Boy
Polar Bear	Penguin

1. Start a new Scratch project:
   a. Sign into Scratch.
   b. Click *Create*. Name the file Run.
   c. Delete the cat.
2. Add a *scary* sprite and a *running* sprite to the stage.
3. Select the *scary* sprite.
4. Build a script to have the *scary* sprite give instructions. For example:





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5. Find a scary sound:
   a. Click the *Sounds* tab. 

   b. In the bottom left corner, click *Choose a Sound*.
   c. Preview a sound. Click on one you like.

Sound Ideas:	
Bite	Chatter
Chomp	Crazy Laugh
Growl	Grunt
Hey	Suspense

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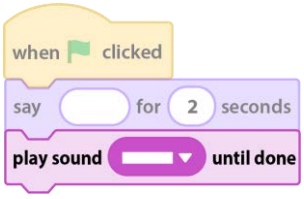
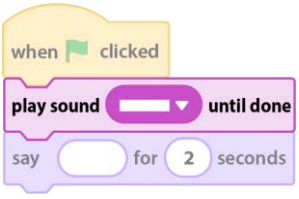
6. Have the *scary* sprite make a sound:
   a. Click the *Code* tab. 

   b. Add 

. Place the block where the action looks best.

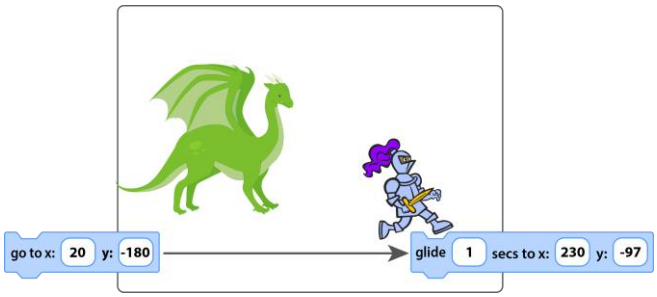


or



   c. Test the game.

7. Look at the stage. Where do you want the sprite to run?

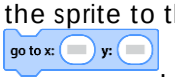


THE CHARACTER NEEDS TO RUN AWAY

8. Build a script to set the start point of the *running* sprite when is clicked.

   a. Select the *running* sprite.

   b. Drag the sprite to the start point on the stage.

   c. Add 

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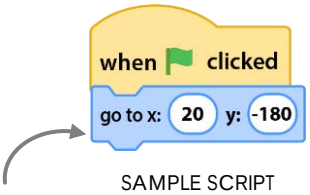
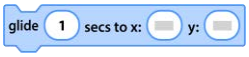
   TIP: The *go to* block uses the current spot for the x and y values.



SAMPLE SCRIPT

9. Build *another* script to set the end point of the *running* sprite when the SPACEBAR is pressed:

   a. Drag the sprite to the end point on the stage.

   b. Add 

SAMPLE SCRIPT

10. Test it. Press the SPACEBAR.

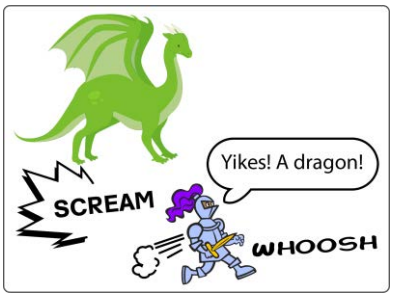
---

11. Get creative! What else happens when the SPACEBAR is pressed?

Play a sound to show the action.

Say why the character is scared.

12. Test the game. Click , then press the SPACEBAR.



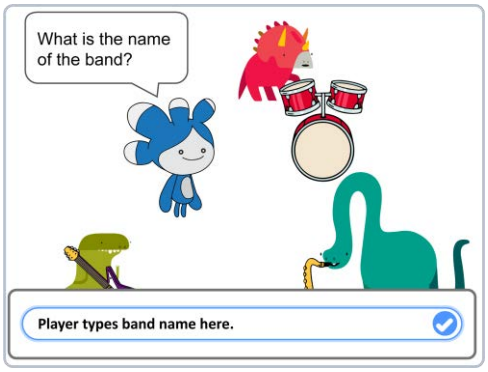
Sound Ideas:	
Car Vroom	Drum Boing
Head Shake	Low Whoosh
Ricochet	Scrambling Feet
Scream	Skid
Whiz	Whistle Thump

13. You may need to click *Save now*. Close Scratch.

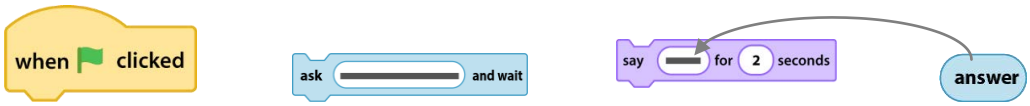
Session 3 Extension Activity: Pick a Band Name

A program can store data using variables. A variable is a value that changes.

Edit *Let's Jam* to add a sprite that asks the player to name the band. The band name will be stored as the variable *answer*. Each time the game is played the player can input a new name.



You will need the following coding blocks:

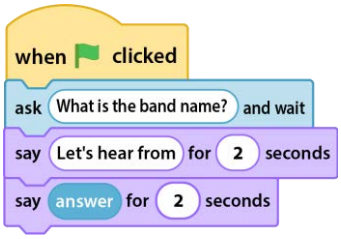


EVENT SENSING LOOKS SENSING

1. Open *Band* in Scratch:
   a. Sign into Scratch.
   b. Click *My Stuff*.
   c. Below Band click *See inside*.

2. Insert a new sprite.

3. Build the script:



Tips:

- Drag the *answer* block into the Looks block.
- Add a cheer sound. 
- To have the name stay on the screen use  .

4. Play the game to test it. Name the band.

Questions About the Script

1. What does the *ask* block do? 

   Displays a text box for the player to input data.

2. What does the answer block do? 

   Stores the band name typed in by the player.

This is a preview of the teacher guide.
Pages have been omitted.

Let's Jam Marking Sheet

Task: In Let's Jam the keyboard becomes a musical instrument. In the game, players lead a band's jam session as they tap away at the keys.

DESIGN	
Game includes at least three instruments and band members. Band members are sized and arranged to look like they are playing instruments. Player instructions are easy to understand.	/7
GAME PLAY | CODE	
Each instrument plays a sequence of sounds when a specific key is pressed. Each band member makes a unique sound when a specific key is pressed.	/6
CREATIVITY	
Extra code or design elements have been added to make the game original. (e.g., additional sprites, adjust speed)	/2
	TOTAL: /15

This is a preview of the teacher guide.
Pages have been omitted.