This is a preview. Some pages are omitted.
https://www.technokids.com/store/elementary-school/technorace/scratch-coding-for-kids.aspx

TECHNORace

Teacher Guide

Lessons for Elementary School Students

Technology Course
using
Scratch

Program a racing game.

In this course, students become game developers. They build an imaginary world using Scratch coding blocks. This online rescue mission has players race against time to collect points. Loops, conditionals, and variables combine to produce original game play. Upon completion, gaming fans test the story action. For coders wanting an extra challenge, they can customize animation, create flashing backdrops, or increase difficulty level.

TECHNOKids®

Copyright © 1993 – 2024 TechnoKids Inc.
All Rights Reserved

Table of Contents

Introduction

Introduction i
How to Use This Guide ii
TechnoRace Overview iii
Implementation and Technology Integration Ideas iv
Ideas for Implementation iv
Technology Integration Suggestions v

Session 1 Start from Scratch

Session 1 Start from Scratch 1
Session 1 Getting Started 2
Assignment 1 Register for a Scratch Account 10
Assignment 2 Explore the Scratch Program 11
Create a New Scratch Project 11
Label the Scratch Window 11
Explore the Blocks Palette 12
Build a Script 12
Close Scratch 12
Assignment 3 Start from Scratch 13
Create a New Scratch Project 13
Apply a Backdrop 13
Insert a Sprite 13
Animate a Sprite 14
Pick a Sound 14
Get Creative! 14
Assignment 4 Race Against Time to Win 15
Open Race in Scratch 15
Play the Game to Answer the Questions 16
Assignment 5 Remix a Game 17
Open Race in Scratch 17
Edit the Player's Movement 17
Say "Oh No" When Touch Fire 18
Adjust the Speed of the Fire 18
Change the Points for the Star 18
Control the Logic to Win the Game 19
Pick a New Soundtrack for the Game 19
Set the Timer 20
Take the Remix Challenge 20
Close Scratch 20
Session 1 Review: Scratch Basics 21
Session 1 Skill Review: Code and Chat 23
Session 1 Extension Activity: Digital Footprints in Scratch 25

Session 2 Become a Game Developer

Session 2 Become a Game Developer 27
Session 2 Getting Started 28
Assignment 6 Develop a Story Map for the Race 34
View Sample Games to Get Ideas 34
Tips to Spark Creativity 35
Plan the Game 35
Assignment 7 Sketch the Game Board 36
Assignment 8 Paint the Game Board 37
Create a New Scratch Project 37
Insert and Resize Sprites 37

Copyright © TechnoKids Inc.

Place Sprites on the Stage 38
Open the Paint Editor 38
Create the Game Board 39
Test the Design 40
Convert Game Board to a Bitmap 40
Save the Changes and Close Scratch 40
Assignment 9 Loop a Soundtrack 41
Open My Race in Scratch 41
Show the Stage Code Area, Then Pick a Sound 41
Build a Script to Loop the Sound 41
Session 2 Review: Create and Code 42
Session 2 Skill Review: Sound Studio 44
Session 2 Extension Activity: Upload a Sprite 46

Session 3 Let's Get Moving

Session 3 Let's Get Moving 48
Session 3 Getting Started 49
Assignment 10 Come and Get Me 54
Open My Race in Scratch 54
About X and Y Values 54
Explore Motion Blocks by Clicking them in the Palette 55
Build A Script to Create A Sequence Of Movements That Repeat 56
Take the Coding Challenge 56
Save Changes and Close Scratch 56
Assignment 11 Build Player Controls 57
Move the Player Using the Arrow Keys 57
Save the Changes and Close Scratch 57
Assignment 12 Control Movement Using Color 58
What is an If-Then Statement? 58
How Does Scratch Create an If-Then Statement? 58
Build A Script to Control the Player's Movements Using Color 59
Test the Game 59
Session 3 Review: Move It 60
Session 3 Skill Review: X and Y Workshop 62
Session 3 Extension Activity: Jump to Hyper Speed 64

Session 4 Avoid Obstacles to Win

Session 4 Avoid Obstacles to Win 66
Session 4 Getting Started 67
Assignment 13 Stay Away 71
Move the Obstacle on the Game Board Forever 71
Take the Coding Challenge 72
Save the Changes and Close Scratch 72
Assignment 14 Don't Touch Me 73
What Will Slow Down the Player in Your Game? 73
Build A Script to Slow the Player Using Touch 74
Take the Coding Challenge 74
Save the Changes and Close Scratch 74
Assignment 15 Winner! 75
What Happens at the End of the Game? 75
Build A Script that Stops All Scripts Using Touch 76
Save the Changes and Close Scratch 76
Session 4 Review: Loops and Logic 77
Session 4 Skill Review: Stop Bugging Me! 79
Session 4 Extension Activity: Flash a Backdrop 81

Copyright © TechnoKids Inc.

Session 5 Collect Treasure

Session 5 Collect Treasure 83
Session 5 Getting Started 84
Assignment 16 Look at Me 90
Open Game in Scratch 90
Explore Looks Blocks to Have a Sprite Talk, Switch Costumes, and Change Size 90
Explore Looks Blocks to Apply Effects or Show and Hide a Sprite 91
Build A Script to Catch the Player's Interest in the Treasure 91
Take the Looks Blocks Coding Challenge 92
Save the Changes and Close Scratch 92
Assignment 17 Score Points 93
What is a Variable? 93
Make a Score Variable 94
Set the Score to Zero at the Start of the Game 94
Score Points When the Treasure and Player Touch 94
Fix the Bug! Pause Score Keeping 95
Fix the Bug! Hide the Treasure After Points Are Scored 95
Fix the Bug! Show the Treasure at the Start of the Game 96
Take the Score Keeping Challenge 96
Save the Changes and Close Scratch 96
Assignment 18 Not Enough Treasure 97
What is an If-Else Statement? 97
Edit the Game Over Script 98
Add an If Else Block that Controls the End of the Game 98
What Happens When a Player Does Not Have Enough Points? 98
Use an Operator to Add Logic 99
Save the Changes and Close Scratch 99
Session 5 Review: About Variables and Operators 100
Session 5 Skill Review: Surprise or Look Out! 102
Session 5 Extension Activity: Paint a New Costume 103

Session 6 Time is Up

Session 6 Time is Up 104
Session 6 Getting Started 105
Assignment 19 Time is Up 110
Variables and If-Then Logic 110
Make a Timer Variable 111
Set the Timer to Zero and Count the Seconds 111
Set a Time Limit to End the Game 112
Get Player Feedback 112
Take the Time Limit Challenge 112
Save the Changes and Close Scratch 112
Assignment 20 Game Tester 113
Observe the Tester 113
Get Tester Feedback 114
Analyze the Findings 114
Assignment 21 Race to the Finish 115
Add Instructions that Entice a Gamer to Play 115
Share the Project 115
Session 6 Review: Scratch Quiz 116
Session 6 Extension Activity: Add Comments 118

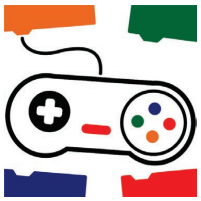
Appendices

Appendices 120
Appendix A: Assessment Tools 121
Race Checklist 121
Race Coding Journal: What Did You Learn? 122

Copyright © TechnoKids Inc.

Race Rubric 124
Race Marking Sheet 125
TechnoRace Skill Summary 126
Appendix B: Glossary 129
Appendix C: Contact Information 131

Copyright © TechnoKids Inc.



Introduction

This section provides valuable information about teaching TechnoRace. 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

TechnoRace Overview

Implementation and Technology Integration Ideas

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. Tasks show students how to enhance the game with additional 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.

Copyright © TechnoKids Inc.

TechnoRace Overview

Introduction to TechnoRace

In this course, students become game developers. They build an imaginary world using Scratch coding blocks. This online rescue mission has players race against time to collect points. Loops, conditionals, and variables combine to produce original game play. Upon completion, gaming fans test the story action. For coders wanting an extra challenge, they can customize animation, create flashing backdrops, or increase difficulty level.

Students complete the following tasks:

- In session 1, students are introduced to Scratch, an online coding platform. To start, they explore the program to learn about common tools and terminology. Once familiar with the programming environment, students compete in a racing adventure. Afterwards, they experiment with the code to alter the player's experience. This exploration provides a foundation for building their own game.
- In session 2, students become game developers. They invent a storyline for a rescue mission. In it, the player races against time to reach a goal. Along the way they must collect treasure and avoid obstacles. Once students have a plan, they begin to build the game board. First, they insert sprites onto the stage to act as the player, treasure, obstacle, and goal. Next, they use the Paint Editor to create an imaginary world. Afterwards, they build a simple script that will play theme music throughout the game.
- In session 3, students create game controls. The fun starts with an exploration of Motion blocks. They build a script that moves the goal sprite, so it attracts attention. Next, the game developers transfer their knowledge to build controls using the arrow keys. Once the player can move around the imaginary world, students learn how to use logic to prevent walking through objects. Students in need of a challenge can build a script that teleports or launches the player at hyper speed. It is time to get moving!
- In session 4, students test the player's skill by restricting their movements. To begin, they code a looping script that moves a sprite on the stage so that it temporarily blocks the player. Next, the game developers design code that causes the player to slow down if it touches the obstacle. With this script complete, students apply their knowledge to stop the game when the player reaches its goal. For those wanting to add even more interest, they can switch backgrounds when two sprites collide, or the game is over.
- In session 5, students design scripts that allow the player to collect points. The first task is an exploration of the Looks blocks to change the appearance of treasure, so players take notice. Next, students learn about variables. They apply this knowledge to calculate points when a player touches an object such as a coin or jewel. To enhance the game, students can elect to use the Paint Editor to customize the animation of a sprite.
- In session 6, students complete the game by adding a timer to increase the difficulty level. They apply their knowledge of variables to build scripts that track time. When a limit is met the game ends. Upon completion, students invite others to test the story action and provide feedback. It is going to be a race to the finish!

Copyright © TechnoKids Inc.

Implementation and Technology Integration Ideas

Have your students design an original game using Scratch. In the race, a player must collect treasure to complete a mission before time is up. Elementary and middle school students explore multiple ways to control game play. They learn how to build scripts that will direct the player's movements, adjust the difficulty level, keep score, set a timer, and much more! This course is a fun way to learn about loops, conditionals, variables, and operators.

Below are some suggestions for implementation:

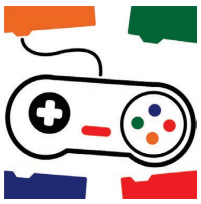
Ideas for Implementation

- *STEM or Computer Science Class:* TechnoRace has 21 assignments divided into six Sessions. The first three assignments introduce Scratch. Afterwards, all remaining assignments have the students develop an original game. Coding tasks increase in difficulty as they master computer science concepts. The gradual progression of skills means that no prior coding experience is required.
- *Coding Unit for Advanced Learners:* TechnoRace provides enrichment opportunities to students with existing programming experience. Each Session ends with coding challenges. Also, there are numerous extension activities to enhance the game. For example, students can import a sprite or sound from an external source, have the player jump to hyper speed, flash a custom backdrop, paint a new costume, or add comments.
- *Game Development Unit:* TechnoRace focuses on building a game. In the pre-production phrase, students form a detailed plan of action. They map out their initial vision including the story, characters, setting, target audience, and mechanics. Next, they shift to the production phrase. This includes design, programming, audio, and testing. Finally, when the game is complete, they enter the post-production phase where they reflect on the experience and consider additional bug fixes or new content.
- *Coding Workshop Series:* If you are planning to run a workshop series as part of an after-school program, computer camp, or community event you will need about 12 -16 hours of instruction. You might be able to complete the course more quickly If you have large chunks of uninterrupted time (e.g., 4 half-days or 2 full days of camp). However, if time is limited, or you have drop-in students then it is best if you use the Skill Reviews. These are simple Scratch activities that can be completed in a short period of time.
- *Digital Citizenship Lessons:* Using Scratch does more than teaching 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. If you would like to extend learning, the Session 1 Extension Activity addresses digital footprints and digital reputation.

Copyright © TechnoKids Inc.

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

SAMPLE



Session 2
Become a Game Developer

In this session, students become game developers. They invent a storyline for a rescue mission. In it, the player races against time to reach a goal. Along the way they must collect treasure and avoid obstacles. Once students have a plan, they begin to build the game board. First, they insert sprites onto the stage to act as the player, treasure, obstacle, and goal. Next, they use the Paint Editor to create an imaginary world. Afterwards, they build a simple script that will play theme music throughout the game.

Assignment 6: Develop a Story Map for the Race

Assignment 7: Sketch the Game Board

Assignment 8: Paint the Game Board

Assignment 9: Loop a Soundtrack

Session 2 Review: Create and Code

Session 2 Skill Review: Sound Studio

Session 2 Extension Activity: Upload a Sprite

Session 2 Getting Started

Overview

In this session, students become game developers. They invent a storyline for a rescue mission. In it, the player races against time to reach a goal. Along the way they must collect treasure and avoid obstacles. Once students have a plan, they begin to build the game board. First, they insert sprites onto the stage to act as the player, treasure, obstacle, and goal. Next, they use the Paint Editor to create an imaginary world. Afterwards, they build a simple script that will play theme music throughout the game.

Materials

- Scratch: https://scratch.mit.edu/
- Scratch Flashcards: Stage, Events, Sound, Control, Paint Editor (optional)
- Sample game videos:
    - rescue
    - find
    - attack
- Game Design Task List, Game Design checklist (optional)
- Session 2 Review: Create and Code (optional)
- Session 2 Skill Review: Sound Studio (optional)
    - *sound.sb3* sample
- Session 2 Extension Activity: Upload a Sprite

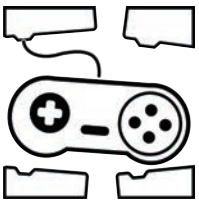
Teacher Preparation

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

- In this session are three sample games. These are available to students as videos. However, they are also in the *Samples/Games* folder as Scratch files.
- (Optional) Gather the flashcards listed in the materials list for this session.
- (Optional) Track progress using the *Game Design* checklist.

Teaching Strategy

In this session, students become game developers. Explain session scenario:



In this session, you develop a game where a player races against time to complete a mission. To get ideas you will view samples. Use the questions to select a plot, player, goal, obstacle, and treasure.

Once you have a plan, sketch the game board. When you are ready, create a new project in Scratch. Apply the Paint Editor tools to make a path for the player to follow. Finish up by building a script that loops music to create a soundtrack that sets the mood.

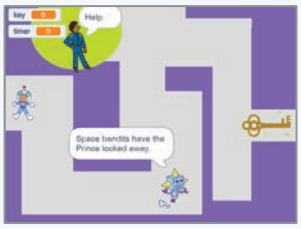
Will the Prince be saved? Will the mermaid find her jewels? Will the monster fly home? It is up to you!

Copyright © TechnoKids Inc.

Assignment 6: Develop a Story Map for the Race

In this assignment, students form a plan for their game. They must determine the plot, setting, player, goal, obstacle, and treasure. To spark creativity, they view videos of sample games. Each is unique. They have different plots, characters, game boards, and complexity of code. These samples are available as Scratch files if you would prefer to give a class demonstration.

GAME IDEAS



Rescue

Save the Prince! Avoid the robot to collect the key to set him free.

- Player cannot touch purple.
- If player touches the robot they shrink for a short time.
- The player must touch the key to score one point.
- To win, the player must have one point (key) when they touch the Prince.

Find

Find the mermaid's jewels. Watch out for the sea creatures.

- Player cannot touch white.
- If player touches a sea creature they go to a cave.
- The player must touch the jewels to score points.
- To win, the player must have enough points (jewels) when they touch the mermaid.

Attack

You are under attack! Drink the potion to fly to safety.

- Player cannot touch blue.
- If player touches a bug they start over.
- The player must touch the potion to score five points.
- To win, the player must have five points (drink potion). They then go to the cloud.

Tips are available for those students who are stuck for an idea. These are optional. Encourage students that are struggling to apply the suggestions. They include:

- keyword triggers
- exploration of the Sprites Library
- searching the Internet for sprites
- fill-in-the blank storyline

TIP: Any PNG Can Become a Scratch Sprite

Do not restrict the plot for the race to the sprites in the Scratch library. Instead, if your students have an original idea encourage them to search the Internet for clip art to use as a sprite. Refer to the *Session 2 Extension Activity Upload a Sprite* for instructions.

Once students have an idea, they answer questions to organize their plan. Consider reviewing responses prior to advancing to the next assignment. Check to make sure that the plot makes sense, and the concept is doable.

Copyright © TechnoKids Inc.

Assignment 7: Sketch the Game Board

In this assignment, students sketch a game board. It will illustrate the path the player will follow to reach the goal. They will recreate this drawing using the Scratch Paint Editor tools in the following assignment.

You may wish to show the samples from the previous assignment to draw attention to the game boards. Each one has a different path style (square, lines, curvy shape), start and end point, and complexity (few or many details). Encourage students to be creative.

Offer the following design suggestions:

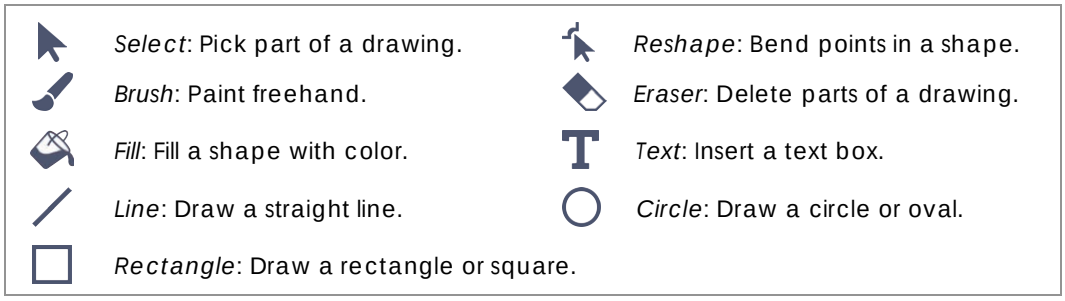
- sketch should include simple shapes, lines, and symbols to illustrate the idea
- include the player, goal, obstacle, and treasure
- consider where the player can and cannot move using color to block the player
- path must be wide enough for the player to move through
- design elements should relate to theme of the game
- search the Internet for classic video game ideas for inspiration

Assignment 8: Paint the Game Board

In this assignment, students create their game board. To start, they follow instructions to place the sprites for the player, obstacle, treasure, and goal. Next, they open the Paint Editor to create the backdrop. If students are familiar with the program, they may want to work independently without the instructions. However, beginners should follow the suggested steps.

IMPORTANT! THE COLOR THAT BLOCKS THE PLAYER MUST BE THE SAME. Emphasize that colors can look the same but may not be an *exact* match. Demonstrate how to use the Eyedropper to copy a color.

You may wish to use the Paint Editor flashcards to introduce the function of each tool:



Scratch has two paint modes – vector and bitmap. Introduce the following terminology:

- *vector image*: A vector image is made from many points and line segments that are based on math equations. This means the lines are very smooth and do not become blurry even when the image size or magnification changes. Individual parts of an image float over the canvas as objects. This makes them easy to edit, delete, layer, and move.
- *bitmap image*: A bitmap image is made from a grid of tiny colored squares called pixels. From a distance the pixels combine to show an image, but up close the picture becomes blurry with jagged lines. Pixels are stuck on the canvas. This causes shapes and lines to merge when put on top of one another. For this reason, it is not as easy to edit, erase, or move individual parts of an image.

Copyright © TechnoKids Inc.

Assignment 9: Loop a Soundtrack

In this assignment, students apply their knowledge of Scratch to build a script that loops a soundtrack. The music should fit the mood or theme of the game. You may want to show the sample games from Assignment 7. Each uses a different sound clip.

Prior to beginning introduce the following coding blocks:

BLOCK	CATEGORY	PURPOSE
	Event	Run the script when *Go* is clicked.
	Control	Loop an action and never stop.
	Sound	Play a sound until it is finished.

Session 2 Skill Review: Sound Studio

Your students are unlikely to finish the tasks all at the same time. For those that complete their game board early you may wish to assign the Session 2 Skill Review. In it, students create an animated scene that uses sound to enhance the action. It is a terrific way for students to explore the Sounds Library as well as practice their coding skills.

Lesson Plan

Assignment 6: Develop a Story Map for the Race

- View videos of sample games to get ideas.
- Use the tips to spark creativity.
- Answer questions to map out a plan for the race.

Assignment 7: Sketch the Game Board

- Sketch a drawing of the game board for the race.

Assignment 8: Paint the Game Board

- Open a new project in Scratch. Name it **my race**.
- Insert and resize the sprites that will act as the player, obstacle, treasure, and goal.
- Place the sprites on the stage according to the game board design.
- Open the Paint Editor and study the tools.
- Use the Paint Editor tools to draw the game board.
- Test the design. Make changes to either the sprite size or game board.
- Convert game board to a bitmap.
- Close Scratch.

Assignment 9: Loop a Soundtrack

- Open the saved race in Scratch.
- Show the Stage Code Area.
- Select a soundtrack for the game from the Sounds Library.
- Build a script to loop a soundtrack.
- Close Scratch.

Learning Objectives

Content Knowledge

- organize a story map for a game
- sketch a game board to illustrate ideas

Digital Citizenship (optional – Session 2 Extension Activity)

- understand that images are protect by copyright laws
- apply Internet search strategies to quickly locate PNG clip art
- engage in legal and ethical behavior when using online resources
- refrain from using materials created by others without permission
- record the source of an image to give credit to the contributor
- save an image from a web page to a local device

Copyright © TechnoKids Inc.

Graphic Design:

- define a vector and bitmap image
- draw lines or shapes
- paint using a brush
- set tool size
- select an object on the canvas
- set the fill or line color of an object
- adjust the saturation and brightness to customize a color
- copy a color using the Eyedropper tool
- magnify the canvas to zoom in or out
- convert an image from a vector to a bitmap to merge objects

Computer Science | Coding

- create a script that loops a sequence forever
- run a script or program
- test a design and make refinements based upon results

Scratch Block-Based Coding

Manage Projects

- create a new project
- open a saved Scratch project from My Stuff

Trigger a Script

- begin a script with an event block
- trigger a script to run when the Go button is clicked

Modify the Appearance of Characters or Backdrop

- delete a sprite from the sprite pane
- select a sprite from a Library
- set the exact size of a sprite using a percentage
- create a unique backdrop using paint tools
- upload a saved image to use as a sprite (optional)

Sequence Sound with Action

- select an audio clip from a Library that matches the game theme
- pause a script until the audio clip reaches the end
- play a sound while a script runs (optional)

Control Action with Conditions

- loop a sequence forever

Applied Technology

- arrange the player, obstacle, treasure, and goal on the game board
- paint a game board that illustrates an imaginary world
- loop a soundtrack to set the mood of a game

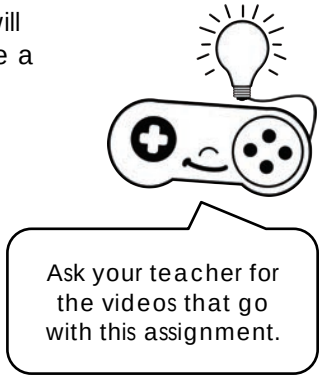
Copyright © TechnoKids Inc.

Assignment 6 Develop a Story Map for the Race

In this assignment you become a game developer. Using Scratch, you will build an imaginary world. In it, the player races against time to complete a mission. They must avoid obstacles and collect treasure to win.

Before you can begin coding, you need a plan. Follow these steps:

- Read about how the game works.
- View sample games to understand what you can make.
- Use the tips to think of a plot.
- Answer the questions to organize your ideas.



View Sample Games to Get Ideas

1. Read the information about how the game works.

It is a race against time…

- player follows a path to reach a goal
- path uses color to control where a player cannot move
- arrow keys move the player along the path (up, down, left, and right)
- one or more obstacles are on the path to slow the player
- player must touch treasure to score points
- player has an amount of time to reach the goal before the game ends
- if the player has enough points when they reach the goal, they win

2. 🖿 Watch the videos *rescue*, *find*, and *attack* to get ideas.

Rescue:
Save the Prince!
Avoid the robot to collect the key to set him free.

Find:
Find the mermaid's jewels. Watch out for the sea creatures.

Attack:
You are under attack! Drink the potion to fly to safety.

Copyright © TechnoKids Inc.

Tips to Spark Creativity

3. Take some time to think about what you want to make.

   a. What will happen in your game? Read the keywords to trigger a plot idea:

race	mission	rescue	free
recover	escape	save	find
ransom	attack	deliver	protect

   b. Explore the Sprites Library to find a player, goal, obstacle, and treasure.

   c. Can't find what you need? Turn a saved image from the Internet into a sprite. Complete the *Session 2 Extension Activity Save a Sprite from the Internet* to learn how.

   d. Fill in the blanks to create a plot for your game.

   You must _____ the _____ before time runs out.
   (verb: help, save) goal

   e. Fill in the blanks to add an obstacle and goal.

   Avoid the _____ and collect the _____ to win.
   obstacle treasure

Plan the Game

4. Organize your ideas for the Scratch game. The storyline should make sense.

   a. Plot: Why is the character racing against time?

   b. Setting: Where does the game take place?

   c. Player: Who is the main character?

   d. Goal: What object or character does the player need to reach?

   e. Obstacle: What object or character will slow down the player?

   f. Treasure: What object must the player collect to score points and win?

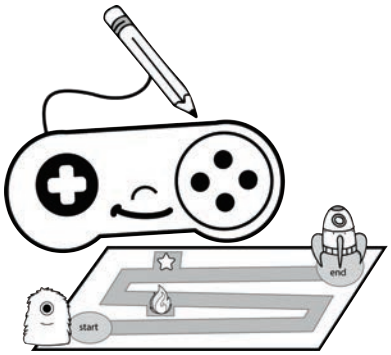
   g. Audience: Who will play your game?

If you are tracking your progress check *#3* Develop *a Plan* on your Game Design checklist.

Copyright © TechnoKids Inc.

Assignment 7 Sketch the Game Board

In this assignment, you sketch the design of the game board. It should match the theme.



Your drawing should include:

- player at the start point.
- goal at the end point.
- path the player must follow.
- obstacle that slows down the player.
- treasure the player must collect.

Keep it simple. Use shapes and lines to make the path. Use symbols to show the player, goal, obstacle, and treasure.

Need inspiration?
Use the keywords to search the Internet to view classic video games.

_____ ***screenshots***			
nintendo 8 bit	sega genesis	donkey kong	pac man
super nintendo	atari	mario bros	kirby
nintendo 64	coleco vision	zelda	final fantasy nes

Copyright © TechnoKids Inc.

Assignment 8 Paint the Game Board

In this assignment you will use the Scratch Paint Editor tools to create the game board. Follow the instructions to:

- Create a new Scratch project.
- Insert sprites for the player, obstacle, treasure, and goal.
- Open the Paint Editor and study the tools.
- Use the paint tips to make a game board.
- Test the design.

Create a New Scratch Project

1. ▷ Sign into Scratch.

   ▷ Click *Create*.

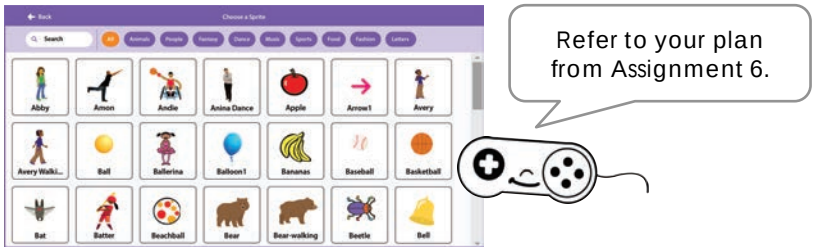
   ▷ Name the file **my race**.

Insert and Resize Sprites

2. ▷ Click *Delete* to remove the cat.

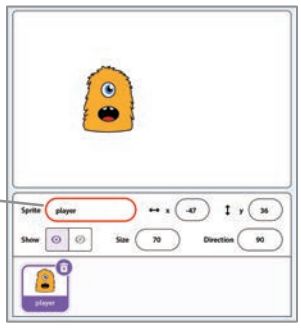
   ▷ Click *Choose a Sprite*.

   ▷ Pick a sprite that matches your plan for the player.



   ▷ Set the size of the sprite. Type a number ***less than 100*** to make it smaller.

TIP: You can rename a sprite as player, goal, obstacle, or treasure.

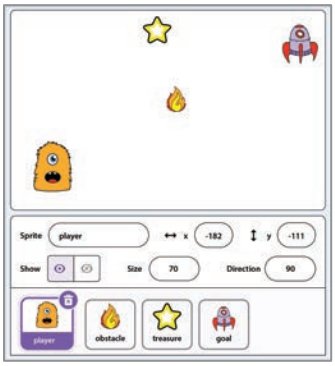


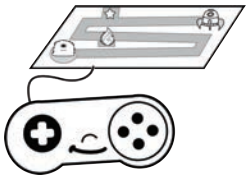
   ▷ Use your skills to insert sprites for the obstacle, treasure, and goal.

Copyright © TechnoKids Inc.

Place Sprites on the Stage

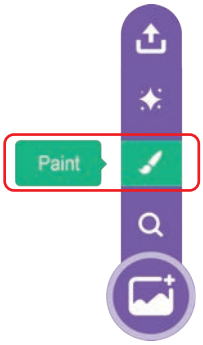
3. ▷ Look at your game board design from Assignment 7.
   ▷ Place the sprites on the stage. For example:





Open the Paint Editor

4. ▷ Hover over the *Choose a Backdrop* tool. Do not click it!
   ▷ Click *Paint*.



▷ Study the Paint Editor tools:

Select: Pick part of a drawing.

Reshape: Bend points in a shape.

Brush: Paint freehand.

Eraser: Delete parts of a drawing.

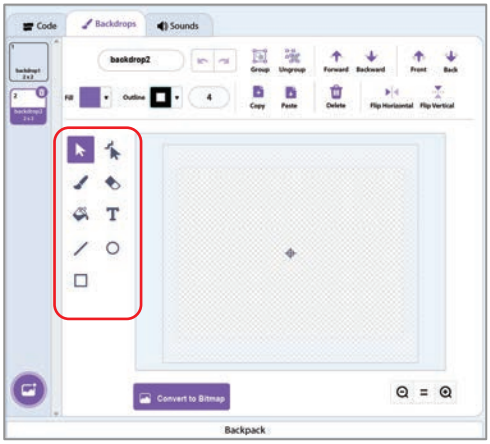
Fill: Fill a shape with color.

Text: Insert a text box.

Line: Draw a straight line.

Circle: Draw a circle or oval.

Rectangle: Draw a rectangle or square.



Create the Game Board

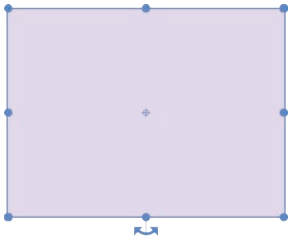
5. Use the Paint Editor tools to draw the game board.

PAINT TIPS:

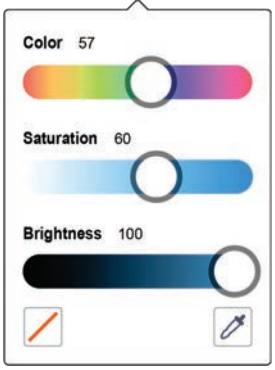
- Any paint outside of the white checkered canvas will NOT SHOW on the stage.
- Use the EXACT SAME color to block where the player can move.
- The *Eyedropper* can be used to copy a color to make sure it is an EXACT MATCH.
- The color used to control movement should not be one that is in the treasure,

If you are new to using the Paint Editor tools, follow these steps:

a. Draw a rectangle that fills the canvas.



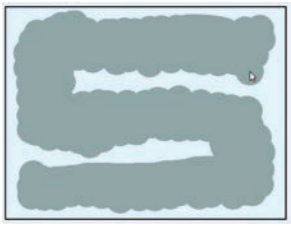
b. Click *Fill*. Drag the *Color* slider to pick a color.



- If you can't get the color you want, drag all sliders to the **middle**. Try again.
- To make **white**, drag the *Saturation* slider to the left and the *Brightness* slider to the right.
- To make **black**, drag the *Brightness* slider to the left.
- To **copy a color**, use the *Eyedropper* to select a color from the canvas.

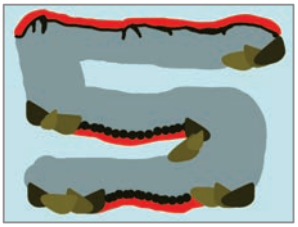
c. Click anywhere on the background to deselect the rectangle.

d. Select the *Brush* to make the path. Pick a *Fill* and a THICK *brush size*. 100



Paint the path from your sketch in Assignment 7.

e. Add details. Keep it simple!



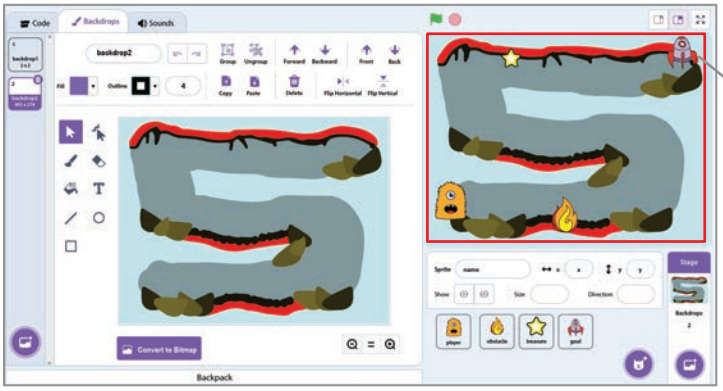
DO NOT paint on the color you will use to block movement.

Zoom in or out.

Test the Design

6. Can the player move through the path?

▷ Look at the stage. Are there changes you need to make to have the sprites fit?



▷ Click the *player* sprite in the Sprites List. Drag it through the path. Does it fit? If not...

- Reduce the size. Size 50
- Increase the size of the path. TIP: Copy the color.

Convert Game Board to a Bitmap

7. When you are done, convert the image to a Bitmap. WARNING! This will blend all the objects together.

Convert to Bitmap

If you are tracking your progress check *#4 Paint the Game Board* on your Game Design checklist.

GET TO KNOW VECTOR AND BITMAP IMAGES:

- It is a good idea to paint vector images in Scratch because changes can quickly be made to parts of an image. A **vector image** is made from many points and line segments that are based on math equations. This means the lines are very smooth and do not become blurry even when the image size or magnification changes. Individual parts of an image float over the canvas as objects. This makes them easy to edit, delete, layer, and move.
- It is a good idea to convert an image to a bitmap in Scratch when you want to blend parts of an image together. A **bitmap image** is made from a grid of tiny colored squares called pixels. From far away the pixels combine to show an image, but up close the picture becomes blurry with jagged lines. Pixels are stuck on the canvas. This causes shapes and lines to merge when put on top of one another. For this reason, it is not as easy to edit, erase, or move individual parts of an image.

Save the Changes and Close Scratch

Copyright © TechnoKids Inc.

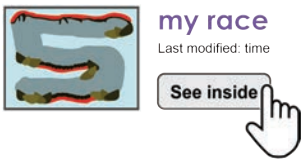
Assignment 9 Loop a Soundtrack

In this assignment, you add a music soundtrack. It sets the mood. It will loop to play over and over again until the game ends. You will use these blocks:

BLOCK	CATEGORY	PURPOSE
	Event	Run the script when *Go* is clicked.
	Control	Loop an action and never stop.
	Sound	Play a sound until it is finished.

Open My Race in Scratch

1. ▷ Sign into Scratch.
   ▷ Click your profile.
   ▷ Pick *My Stuff*.
   ▷ Click *See inside* beside the **my race** file.



Show the Stage Code Area, Then Pick a Sound

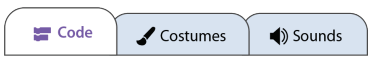
2. ▷ Select *Stage*.

3. ▷ Click the *Sounds* tab.

   ▷ In the bottom left corner, click *Choose a Sound*.
   ▷ Select *Loops*. Preview a sound . Click on one you like.

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

Build a Script to Loop the Sound

4. ▷ Click the *Code* tab. 

   ▷ Use your skills to build a script. Test it.
   ▷ Save the changes and close Scratch.

If you are tracking your progress check *#5 Loop a Soundtrack* on your Game Design checklist.

Copyright © TechnoKids Inc.

Session 2 Review: Create and Code

Match the tool to the task.

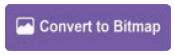
1. C Draw a rectangle.
2. E Change an image from editable points into pixels.
3. F Select a fill color.
4. A Paint freehand.
5. B Copy a color from the canvas.
6. D Set tool size.

A.

B.

C.

D.

E. 

F.

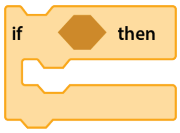
/6

Circle the correct block to complete the task.

7. Loop an action and never stop.

a.

b.

c. 

8. Play a sound until it is finished before doing the next action.

a.

b.

c.

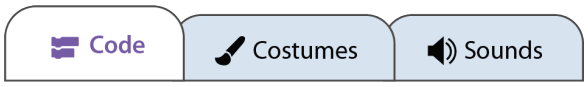
/2

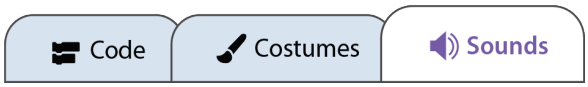
Copyright © TechnoKids Inc.

Pick the correct Scratch tab to complete the task.

9. Build a script.

a.

b. 

c. 

10. Paint a background on a canvas.

a.

b.

c.

/2

True or false?

11. A vector image is made from many points and line segments. ☐ **true** ☐ false

12. A bitmap image is made from a grid of tiny squares called pixels. ☐ **true** ☐ false

13. A vector image becomes blurry when zoomed in on the image. ☐ true ☐ **false**

14. In a bitmap image shapes merge when put over top of one another. ☐ **true** ☐ false

15. Parts in a vector image stick to the canvas and are hard to move. ☐ true ☐ **false**

/5

TOTAL: /15

Copyright © TechnoKids Inc.

Session 2 Skill Review: Sound Studio

Scratch has more than 350 sounds. That is a lot of effects and music to pick. Use your skills to create a simple animation. It should use sound to emphasize the action.

Sound is important. It can be used to:

- set the mood
- make an action come alive
- evoke an emotion
- create tension
- deliver information
- celebrate a happy event
- emphasize a disappointing event
- create a fun experience

BLOCK	CATEGORY	PURPOSE
play sound [ ] until done	Sound	Play a sound until it is finished.
start sound [ ]	Sound	Continue to run a script as sound plays.

---

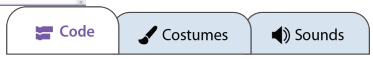
1. Create a new Scratch project. Name the file **sound**.

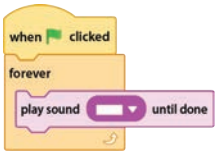
2. Set the scene:
   a. Remove the cat.
   b. Pick a backdrop.
   c. Insert a sprite.

---

3. Loop a soundtrack to set the mood:
   a. Click the *Sounds* tab.

   b. Pick *Choose a Sound*.
   c. Select *Loops*. Click a sound you like:

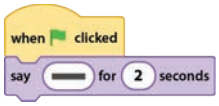
   d. Click the *Code* tab. 

   e. Use your skills to build a script. 

Copyright © TechnoKids Inc.

4. Match sound to an action:

   a. Make the sprite talk. Add text to the callout.



   b. Use your skills to add a sound effect that plays while the callout shows.

   Which block should you use? Where should it go?

   c. Test the scene. When done, click *Stop*.

---

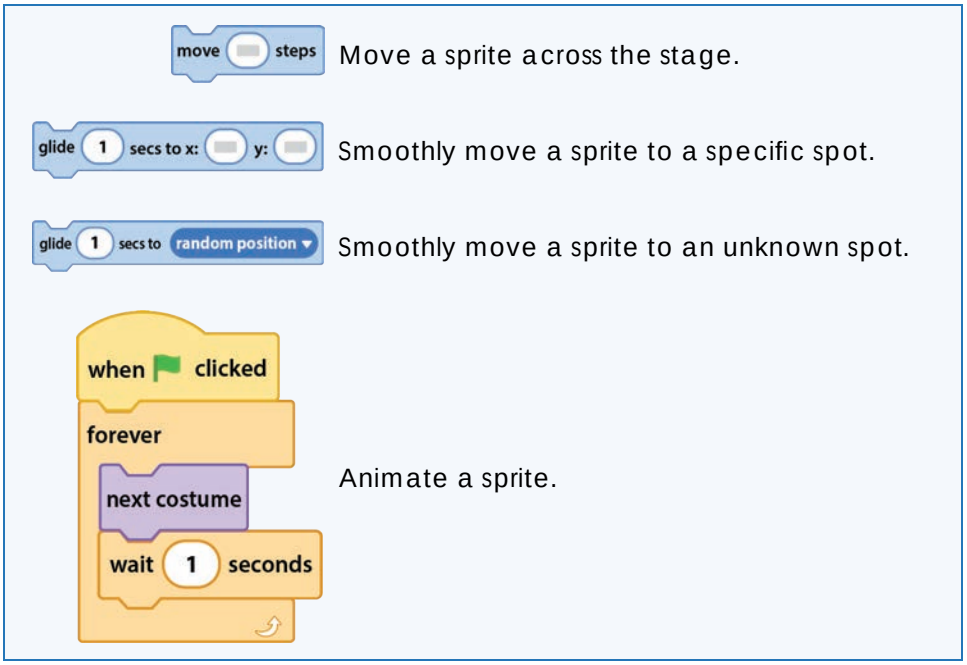
5. What happens next? If you need ideas, try the suggestions below.

   a. Use your skills to match sound effects to an action.

   b. Set the timing of events.

SUGGESTIONS:

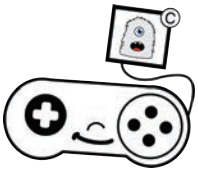
Add blocks to the script. Or build a new script.
What sound matches the action?



6. Close Scratch.

Session 2 Extension Activity: Upload a Sprite

Read about copyright and images on the Internet. Afterwards, use a search engine to find a clip art of an object or character to use in your game. Follow the instructions to upload it into Scratch as a sprite.



Copyright and Images

You cannot just take what you want from the Internet. That is stealing. The creator who made the image or the website hosting the file controls it. They are the copyright holder.

Some people or websites let others use their artwork. Others do not. Check to see if the clip art you want to use has a © copyright symbol to show that it is protected. Also look to see if the owner has rules about using the image.

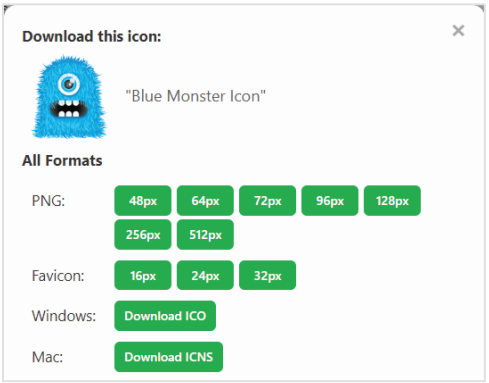
When you find an image you like make sure you can use it before you save the file. Record the site, artist, and/or URL of the image. When you complete your Scratch project list the source in the *Notes and Credits* section.

Image Tips:

- Find an image that is a **PNG**.
- Clip art must have a **transparent** background.
- Only save images that you are permitted to use.
- The smaller the image – the better. (75 px x 75 px)
- Use Google Image Search: https://images.google.com/

Need Help Searching for an Image?

1. Open your browser. Visit a free icon site such as **https://iconarchive.com/**
2. Type in a ***keyword***. Click *Search icons*.
3. Click on an image you like.
4. Click Add Download Formats.
5. Click on a smaller file such as **64px**.
5. Choose where to save the image. Give the image a suitable file name.

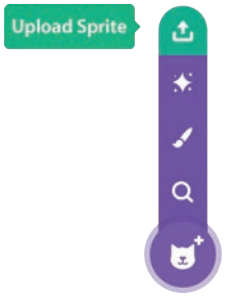


A large image will look blurry when you resize it for your game.

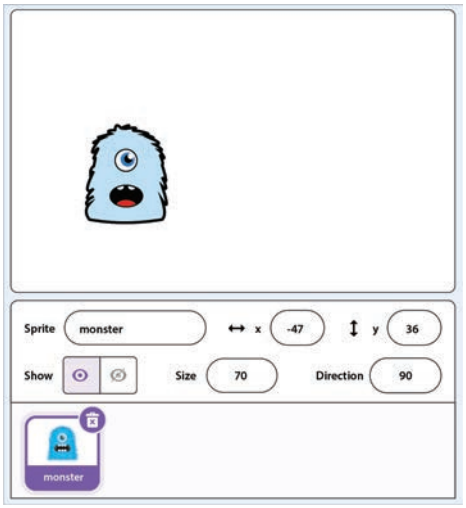
Pick a smaller image.

Upload a Saved Image as a Sprite into Scratch

1. Open your game in Scratch.
2. Hover over the *Choose a Sprite* tool. Do not click it!
3. Select *Upload Sprite*.



4. Go to the place where you saved the image. Select it. Click *Open*.
5. It will show in the Sprites List.



Use clip art from the Internet for the player, goal, obstacle, and treasure sprites.

Copyright © TechnoKids Inc.

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

SAMPLE

Appendices

Refer to the appendices for additional resources:

Appendix A: Assessment Tools

- Race Checklist
- Coding Journal
- Race Rubric
- Race Marking Sheet
- TechnoRace Skill Summary

Appendix B: Glossary

Appendix C: Contact Information

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

SAMPLE

Race Rubric

Game Components	Game Developer Level 1 Beginner	2 Skilled	3 Talented	4 Expert
User Experience	• Game does not include instructions.	• Game has instructions and describes the plot.	• Game has instructions which clearly describe the plot. Plot is logical.	• Game has instructions which entice players with a unique description. Plot is imaginative.
Theme	• Game board design does not fit the theme. • Characters and objects do not match storyline.	• Game board design matches the theme. • Some characters and objects match storyline.	• Game board design matches the theme and has an interesting path. • All characters and objects match the storyline.	• Game board design matches the theme and has creative elements. • All characters and objects match the storyline, and some are from an external source.
Player Movements	• Player does not start at a specific spot, nor stay on the path.	• Player starts at a specific spot and sometimes stays on the path.	• Player starts at a suitable spot and always stays on the path.	• Player starts at a suitable spot, always stays on the path, and provides an optimal challenge.
Sound	• Soundtrack is missing or unsuitable.	• Soundtracks loops forever.	• Soundtrack loops forever and sets the mood. • Actions have sound effects.	• Soundtrack loops forever and sets the mood. • Actions have fitting sound effects, and some are from an external source.
Obstacles	• Obstacle is missing or does not slow the player.	• Obstacle moves and slows the player.	• Obstacle slows the player in an interesting way (e.g., freeze, trap, start over).	• Obstacle slows the player in an entertaining way and is the ideal difficulty level.
Sprites (goal, treasure)	• Sprites do not move or change appearance.	• Sprites move and change appearance.	• Sprites move and change appearance, attracting player interest.	• Sprites are customized to move and change appearance, captivating player interest.
Score	• Score is missing.	• Score resets to zero. • Player scores points when they touch treasure.	• Score resets to zero. • Player correctly scores points when they touch treasure. • Player wins if they have enough points when they reach the goal.	• Score resets to zero. • Player correctly scores points when they touch multiple pieces of treasure. • Player wins if they have enough points when they reach the goal.
Timer	• Timer is missing.	• Timer counts the seconds and resets to zero at start.	• Timer counts the seconds and resets to zero at start. • Game ends when time is up.	• Timer counts the seconds and resets to zero at start. • Game ends when time is up. • Time limit provides optimal challenge.
Creativity	• Game does not include creative elements.	• Game includes few creative elements.	• Game includes some creative elements.	• Game includes many creative elements. (e.g., hyper speed, switch backdrop)

Copyright © TechnoKids Inc.