

## **T-SCRATCH-Level1**



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# Chapter #1: Introduction to Scratch

## Key Terms:

- **Scratch:** Animation based block coding language
- **Programmer:** Someone who programs a software
- **Computer programming:** Ways to tell a computer to do something for you
- **Software:** Program that can be run on a computer and creates an outcome
- **Animation:** Creating motion using a collection of photos placed one by one

## Why Learn Programming?

So, let's start off with what coding is. Coding is a set of instructions which a computer can understand and execute. Coding is very imperative in programming because computers are like children; they are very obedient and liberal but they know very little, this makes it necessary that you know how to express yourself using terms that they understand and have the same mentality as them so that you are able to elaborate to them on how to efficiently accomplish a large task.

In this day and age, it is very important for students to learn coding as a foundational discipline like Science, Math, English, or History. This is because there are much more consumers of technology than developers.

Data from the Bureau of Labor Statistics shows that over the next 10 years, it is estimated that there will be 1.4 million jobs in computer science with only 400,000 graduates qualified to do them. The Week of Code is an initiative which seeks to unveil the mystery surrounding coding and show students and adults that anyone could learn the basics of coding.

Coding is also important in the classroom because it requires many skills such as computational thinking, analysis of problems, developing understanding, creating algorithms, managing resources, verification of requirements, and implementation of ideas.

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Since technology is very useful, handy, and flexible, learning coding can benefit you because you can become skilled with technology and use it to teach yourself concepts relating to your classes such as a vocabulary game.

With Scratch, you can program your own interactive stories, games, and animations — and share your creations with others in the online community.

### **You can play the video game created by You isn't that cool!**

Scratch helps young people learn to think creatively, reason systematically, and work collaboratively — essential skills for life in the 21st century.

### **What Are Animations?**

A simulation of movement created by displaying a series of pictures, or frames. Cartoons on television is one example of animation. Animation on computers is one of the chief ingredients of multimedia presentations. There are many software applications that enable you to create animations that you can display on a computer monitor.

Note the difference between animation and video. Whereas video takes continuous motion and breaks it up into discrete frames, animation starts with independent pictures and puts them together to form the illusion of continuous motion.

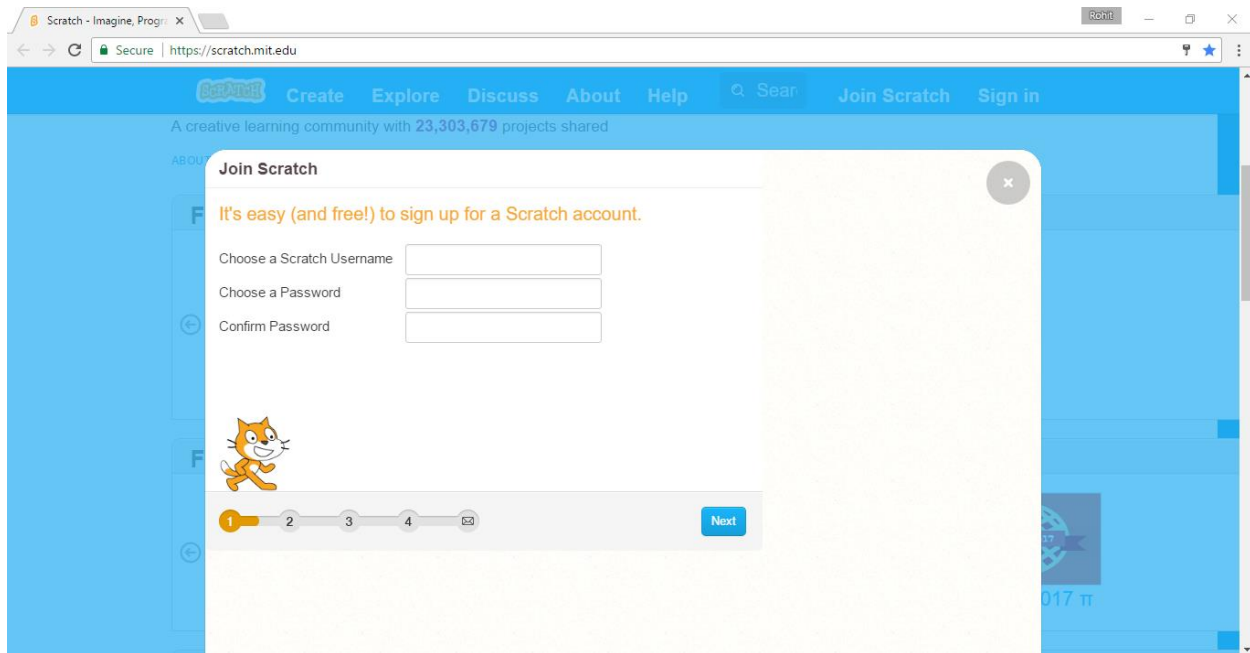


## How to Create an Account on Scratch:

1. Go to [www.scratch.mit.edu](http://www.scratch.mit.edu)

2. Click Join Scratch

Your screen should look like this



3. For your username, pick something you will remember that is NOT your name. In addition, choose a password. Note down your username and password in some place where you won't lose it.



4. Your screen should now look like this. Answer the questions.

Scratch - Imagine, Program, Share X

Secure | <https://scratch.mit.edu>

Create Explore Discuss About Help Search Join Scratch Sign in

A creative learning community with 23,303,679 projects shared

**Join Scratch**

Your responses to these questions will be kept private.

Why do we ask for this info?

Birth Month and Year: - Month - - Year -

Gender: ☐ Male ☐ Female

Country: - Country -

017 π

1 2 3 4 5

Next

5. Your screen should look like this now:

Scratch - Imagine, Program, Share X

Secure | <https://scratch.mit.edu>

Create Explore Discuss About Help Search Join Scratch Sign in

Featured Projects

**Join Scratch**

Enter your email address and we will send you an email to confirm your account.

Email address:

Confirm email address:

☐ Receive updates from the Scratch Team

017 π

1 2 3 4 5

Next

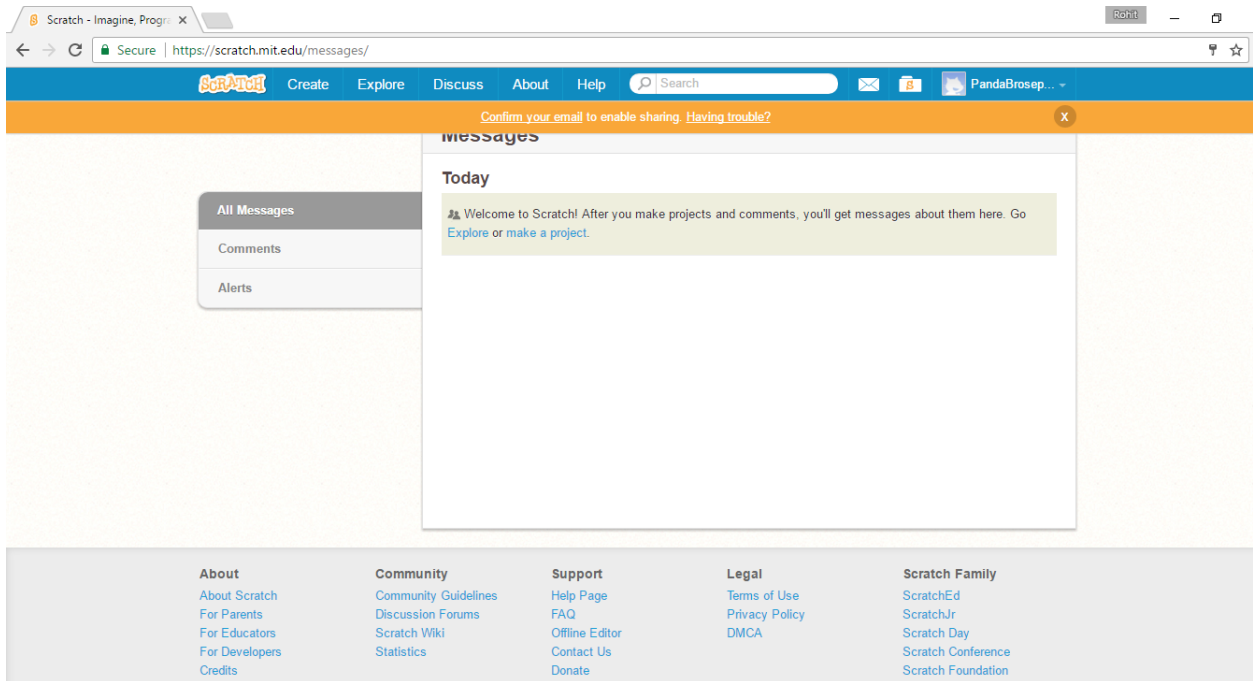
Fill it out with a parent's email

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6. Now click “ok go” and go to the mail button. Screen should look like this:



7. Have your parent confirm Scratch by checking their email.

8. Now, your teacher will have you join the CT STEM Kids Club Studio.



Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Introduction to Scratch**

1. Briefly explain what Scratch is:

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2. What are 5 things you would like to make in this class?

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3. When it comes to making a username and password, what should you never do?

- a. Use your name as the username
- b. Tell your friends your password
- c. All of the above
- d. None of the above

4. Unscramble and Define (extra credit)

- a. TCHSRCA
- b. CMPTUERO





## Chapter #2: Motion Blocks

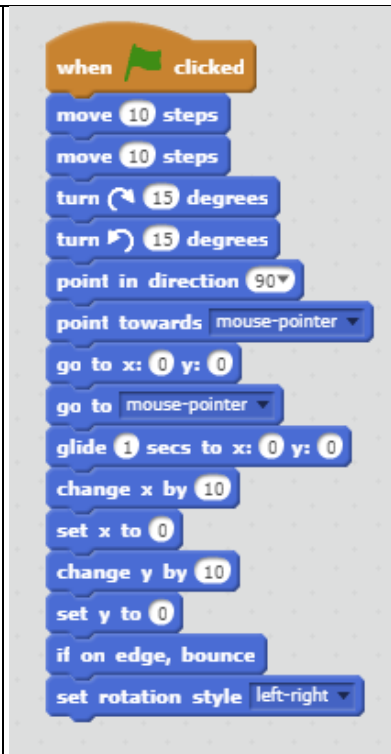
### Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done.
- **Motion:** The art of moving.
- **Keyword:** A word that gives a block a special meaning and command.

### What are motion blocks?

Motion blocks are the blue blocks on scratch. Their job is to control the movement of a sprite. These are keywords you would find on a motion block.

- *Move\_steps:* Allows you to go a certain number of steps
- *turn right:* Allows sprite to turn right
- *turn left:* Allows sprite to turn left
- *point in direction:* Allows sprite to point in a certain direction
- *point towards:* Allows sprite to point to a certain object
- *go to x:, y::* Go to a place on the grid
- *go to:* Go to an object on the grid
- *glide \_ seconds to x:,y:* Glide for a certain amount of time to a certain place
- *change x by \_:* Move left or right a certain amount
- *set y to:* Go up to a certain spot
- *if on edge, bounce:* Makes sprite bounce off the wall
- *set rotation style:* Set the way sprite faces



**Lab-work:** Playing around with motion blocks and seeing how they can be used.

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Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Motion Blocks**

1. Briefly explain what motion blocks are:

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2. Match:

Blocks

Where commands are stored

Command

Something that is told to be  
done.



## Chapter #3: Look Blocks

### Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done.
- **Sight:** Vision, what you use to see
- **Keyword:** A word that gives a block a special meaning and command.

### What are looking blocks?

Looking blocks are the purple blocks on Scratch. The job of these blocks is to control the appearance of the sprite. These are keywords you would find on a looking block.

*Say for \_ secs:* Says something for \_ seconds

*Say:* Says something

*Think for \_ secs:* Thinks something for \_ seconds

*Think:* Shows a thought in a thought bubble

*Show:* Allows sprite to appear on the screen

*Hide:* Removes sprite from the screen

*Switch costume to:* Allows sprite to change the costume

*Next costume:* Go to the next costume on the list

*Next backdrop:* Switch the scenery to the next on the list

*Switch backdrop and wait:* Transition to new scene

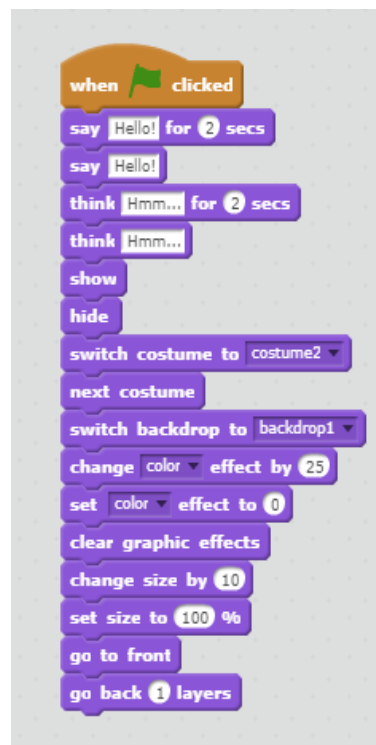
*Change effect to:* Changes the way you see the sprite

*Set effect to:* Sets the color/way you will see the sprite

*Clear graphic effects:* Clears everything

*Change size by:* Makes it bigger

*Set size to:* Make something a certain size



**Lab-work:** Play around with looking blocks and see how they can be used.

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Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Look Blocks**

1. Briefly explain what look blocks are:

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2. Define:

- Say for \_ secs: \_\_\_\_\_
- Say: \_\_\_\_\_
- Think for \_ secs: \_\_\_\_\_
- Think: \_\_\_\_\_
- Show: \_\_\_\_\_
- Hide: \_\_\_\_\_

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- Switch costume to: \_\_\_\_\_
- Next costume: \_\_\_\_\_
- Next backdrop: \_\_\_\_\_
- Switch backdrop and wait: \_\_\_\_\_
- Change effect to: \_\_\_\_\_
- Set effect to: \_\_\_\_\_
- Clear graphic effects: \_\_\_\_\_
- Change size by: \_\_\_\_\_
- Set size to: \_\_\_\_\_



## Chapter #4: Sound Blocks

### Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done.
- **Keyword:** A word that gives a block a special meaning and command.

### What are sound blocks?

Sound blocks are the magenta colored blocks on Scratch. Their job is to control the sounds playing in the project. These are keywords you would find on a sound block.

*Play sound \_:* Plays a certain sound

*Play sound \_ until done:* Plays a certain sound for a certain amount of time

*Stop all sounds:* Silence the player

*Play drum \_ for \_ beats:* Plays the drums for a certain rhythm

*Rest for \_ beats:* Stays silent for certain amount of time

*Play note \_ for \_ beats:* Play a note for a certain amount of time

*Set instrument to:* Make a new sound

*Change volume by \_:* Make it louder or softer

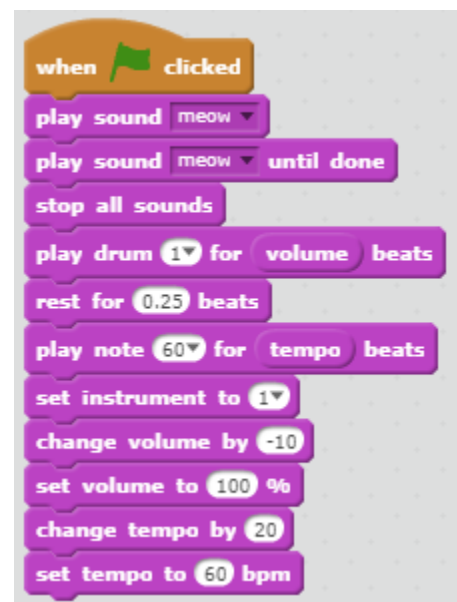
*Set volume to \_%:* Set the loudness of the sound

*Change tempo by \_:* Make it faster or slower

*Set tempo to \_ bpm:* Make it a certain speed

*Tempo:* Speed

*Volume:* Sound



**Lab-work:** Playing around with sound blocks and seeing how they can be used.

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Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Sound Blocks**

1. Briefly explain what sound blocks are:

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2. What's your favorite sound to use in Scratch and why?

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# Chapter #5: Pen Blocks

## Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done.
- **Keyword:** A word that gives a block a special meaning and command.

## What are pen blocks?

The pen blocks are the green blocks on Scratch and their job is to control the pen aspect of scratch (making drawings while the project is running). According to programming research data, it is the least commonly used Scratch block type. These are keywords you would see on a pen block.

*Clear:* Clears the screen

*Stamps:* Leaves a mark

*Pen down:* Allows the pen to draw

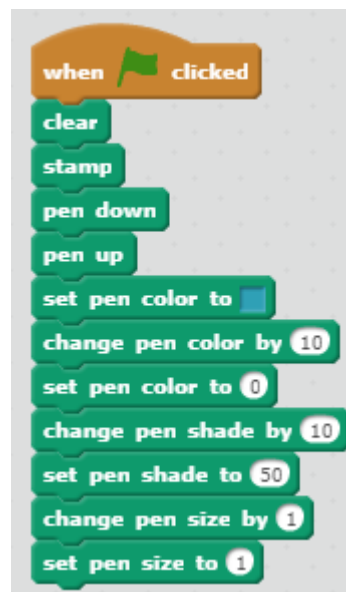
*Set pen color to [color]:* Allows the ink to be a certain color

*Set pen color to [number]:* Allows the ink to be a certain numbered color

*Set pen shade to:* Make the shade increase/decrease

*Change pen size by:* Make the font bigger/smaller

*Set pen size to:* Set a font size



**Lab-work:** Playing around with pen blocks and seeing how they can be used.





Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Pen Blocks**

1. Briefly explain what pen blocks are:

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2. When would you use these types of blocks?

- Clear: \_\_\_\_\_
- Stamps: \_\_\_\_\_
- Pen down: \_\_\_\_\_
- Set pen color to [color]: \_\_\_\_\_
- Set pen color to [number]: \_\_\_\_\_
- Set pen shade to: \_\_\_\_\_
- Change pen size by: \_\_\_\_\_
- Set pen size to: \_\_\_\_\_



# Chapter #6: Event Blocks

## Key Terms:

- Blocks: Where commands are stored.
- Command: Something that is told to be done.
- Keyword: A word that gives a block a special meaning and command.
- Event: Something that happens

## What are event blocks?

Event blocks are the orange blocks on Scratch and they control when a certain thing happens. For example, “When Flag Clicked” represents a block which allows you to execute a function when the flag is clicked. There are some other keywords which are seen on event blocks.

*When green flag clicked:* Does something when green flag is clicked

*When \_ key is pressed:* Does something when a key is clicked

*When sprite is clicked:* Does something when a sprite is clicked

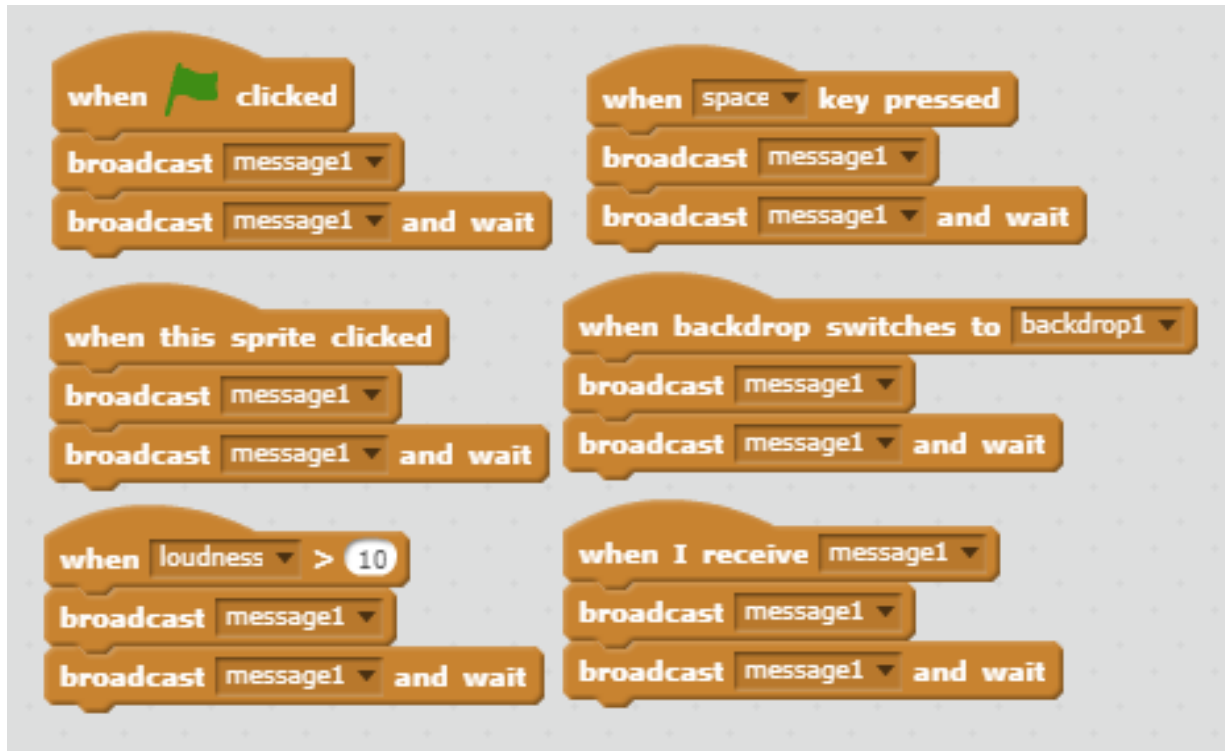
*When backdrop switches to:* Does something when the scene changes

*When \_ > \_:* Does something when something is greater than another thing

*When I receive:* Does something when an action is received

*Broadcast:* Shows a message

*Broadcast and Wait:* Shows and message and awaits a response



**Lab-work:** Playing around with event blocks and seeing how they can be used.



Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Event Blocks**

1. Briefly explain what event blocks are:

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2. Define:

- *When green flag clicked:* \_\_\_\_\_
- *When \_ key is pressed:* \_\_\_\_\_
- *When sprite is clicked:* \_\_\_\_\_
- *When backdrop switches to:* \_\_\_\_\_
- *When \_ > \_:* \_\_\_\_\_
- *When I receive:* \_\_\_\_\_
- *Broadcast:* \_\_\_\_\_
- *Broadcast and Wait:* \_\_\_\_\_



# Chapter #7: Control Blocks

## Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done.
- **Keyword:** A word that gives a block a special meaning and command.

## What are control blocks?

Control blocks are the golden colored blocks in Scratch. Some of them are conditional (happen when something is true), and others are looped (keep going for a certain amount of time, possibly even forever). They control scripts (how many times and exactly when they happen). The following are examples of control blocks.

*Wait \_ secs:* Pauses a certain sprite for a certain amount of time.

*Repeat:* Does something a certain amount of times.

*Forever:* Does something for life.

*If \_ then:* Does something if something else is true.

*If \_ then else:* Does something if certain conditions are true otherwise does something else.

*Wait until:* Holds everything until an event.

*Repeat until:* Repeats everything until an event.

*Stop:* Stops everything.



**Lab-work:** Playing around with control blocks and seeing how they can be used.

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**Homework: Control Blocks**

1. Briefly explain what control blocks are:

---

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---

2. Sort into conditional and forever types of blocks

- *Wait \_ secs:* \_\_\_\_\_
- *Repeat:* \_\_\_\_\_
- *Forever:* \_\_\_\_\_
- *If \_ then:* \_\_\_\_\_
- *If \_ then else:* \_\_\_\_\_
- *Wait until:* \_\_\_\_\_
- *Repeat until:* \_\_\_\_\_



# Chapter #8: Sensing Blocks

## Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done.
- **Keyword:** A word that gives a block a special meaning and command.
- **Data:** A piece of information that is stored

## What are sensing blocks?

Sensing blocks are the light-blue colored blocks on Scratch, and they work to see what a sprite is touching, as well as send messages and check the keyboard commands. Go to [scratch.mit.edu](http://scratch.mit.edu) and create a new project called sensing blocks. Select tips and then go to blocks. Open up the data menu and learn about the following keywords:

*Touching:* Sees if you are touching something

*Touching color:* Sees if you are touching a color

*Color is touching:* Sees if a certain color is touching another color

*Distance to:* A number that represents the distance between two things

*Ask and wait:* Asks a question, saves response as data

*Answer:* Stores the response

*Key\_Pressed:* Sees if a key is pressed

*Mouse\_down:* See if mouse is being clicked

*Loudness:* Sees the volume

*Timer:* Reports what the timer has been set to

*Reset timer:* Resets timer

*\_ of \_:* Sees the x/y position of an object/sprite

*Username:* Sees username of player



Name \_\_\_\_\_ Date \_\_\_\_\_

### **Homework: Sensing Blocks**

1. Briefly explain what sensing blocks are:

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---

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2. Rearrange

- *egCnah\_yb*: \_\_\_\_\_
- *EnsgniS*: \_\_\_\_\_





# Chapter #9: Data/Operator Blocks

## Key Terms:

- Blocks: Where commands are stored.
- Command: Something that is told to be done.
- Keyword: A word that gives a block a special meaning and command.
- Data: A piece of information that is stored

## What are operating blocks?

Today, you will work with the operating blocks on Scratch. Operating blocks are the light-green colored blocks on Scratch, and they work to see what a sprite is touching, as well as send messages and check the keyboard commands. Go to [scratch.mit.edu](http://scratch.mit.edu) and create a new project called sensing blocks. Select tips and then go to blocks. Open up the control menu and learn about the following keywords:

+ - adds

- - Subtracts

\* - Multiply

/ - Divide

*Pick random \_ to \_:* Picks a random number from a set

< - Less

= - Equal

> - More

*And:* combines conditions

*Or:* Goes through multiple conditions

*Letter \_ of:* Picks a certain spot in a word

*Length of:* Sees the length of a word

## What are data blocks?

Today, you will work with the data blocks on Scratch. Data blocks are the red blocks on scratch. These blocks hold information. Go to [scratch.mit.edu](http://scratch.mit.edu) and create a new project called data blocks. Select tips and then go to blocks. Open up the data menu and learn about the following keywords:

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*Make a variable:* Creates a variable for you

*Variable:* Reports the value of a variable

*Set\_to:* Sets the value of a variable to something else

*Change\_by:* Changes the value of a variable by a certain amount

*Show variable:* Shows the variable on a slider

*Hide variable:* Hides the slider

*Make a List:* Makes a list of variable amounts

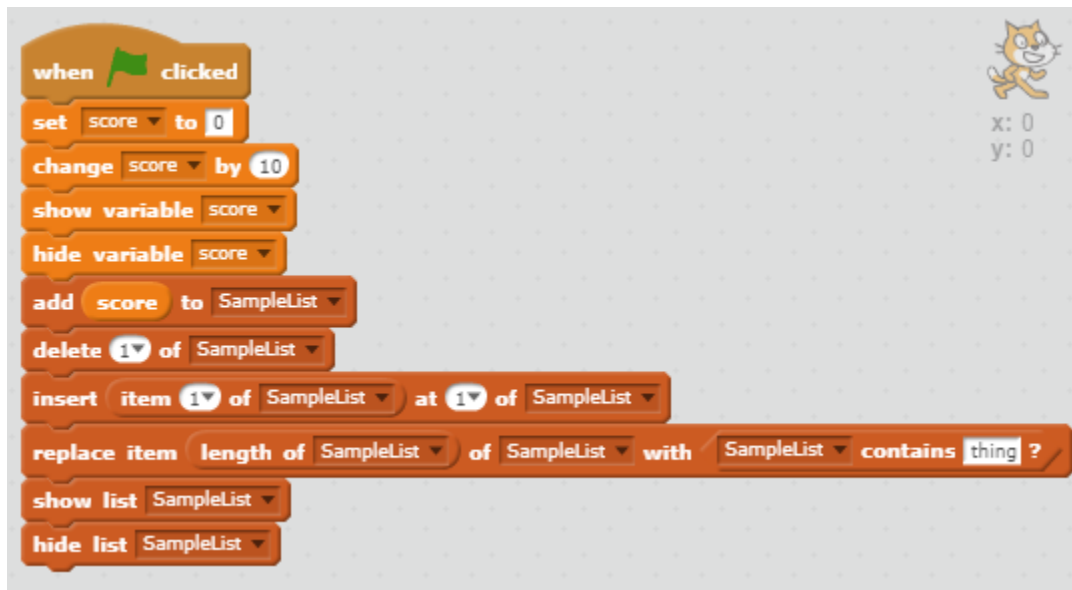
*List:* Creates a new list

*Add\_to:* Adds a variable to the list

*Delete\_of:* Removes something from the list

*Insert\_at\_of:* Adds a variable to a certain point of a list

*replace item\_of\_with:* Replaces a variable with another variable, all in a list



**Lab-work:** Playing around with operator/data blocks and seeing how they can be used.

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Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Data/Operator Blocks**

1. Briefly explain what data and operator blocks are:

**Data:** \_\_\_\_\_

\_\_\_\_\_

**Operator:** \_\_\_\_\_

\_\_\_\_\_

2. Pick 4 data and operator words and define them all.



# Chapter #10: Keywords Review

## Key Terms:

- Blocks: Where commands are stored.
- Command: Something that is told to be done.
- Motion: The art of moving
- Keyword: A word that the computer understands and allows you to execute a command

## Reviewing key terms:

In this chapter, you will review the words you studied over the past chapters.

### *Motion Blocks:*

- *Move\_steps*: Allows you to go a certain number of steps
- *turn right*: Allows sprite to turn right
- *turn left*: Allows sprite to turn left
- *point in direction*: Allows sprite to point in a certain direction
- *point towards*: Allows sprite to point to a certain object
- *go to x:, y::* Go to a place on the grid
- *go to*: Go to an object on the grid
- *glide \_ seconds to x:,y:* Glide for a certain amount of time to a certain place
- *change x by \_*: Move left or right a certain amount
- *set y to*: Go up to a certain spot
- *if on edge, bounce*: Makes sprite bounce of the wall
- *set rotation style*: Set the way sprite faces



**Look Blocks:**

- *Say for \_ secs: Says something for \_ seconds*
- *Say: Says something*
- *Think for \_ secs: Thinks something for \_ seconds*
- *Think: Shows a thought in a thought bubble*
- *Show: Allows sprite to appear on the screen*
- *Hide: Removes sprite from the screen*
- *Switch costume to: Allows sprite to change the costume*
- *Next costume: Go to the next costume on the list*
- *Next backdrop: Switch the scenery to the next on the list*
- *Switch backdrop and wait: Transition to new scene*
- *Change effect to: Changes the way you see the sprite*
- *Set effect to: Sets the color/way you will see the sprite*
- *Clear graphic effects: Clears everything*
- *Change size by: Makes it bigger*
- *Set size to: Make something a certain size*

**Sound Blocks:**

- *Play sound \_ : Plays a certain sound*
- *Play sound \_ until done: Plays a certain sound for a certain amount of time*
- *Stop all sounds: Silence the player*
- *Play drum \_ for \_ beats: Plays the drums for a certain rhythm*
- *Rest for \_ beats: Stays silent for certain amount of time*
- *Play note \_ for \_ beats: Play a note for a certain amount of time*
- *Set instrument to: Make a new sound*
- *Change volume by \_ : Make it louder or softer*
- *Set volume to \_ %: Set the loudness of the sound*
- *Change tempo by \_ : Make it faster or slower*
- *Set tempo to \_ bpm: Make it a certain speed*
- *Tempo: Speed*
- *Volume: Sound*



*Pen Blocks:*

- *Clear: Clears the screen*
- *Stamps: Leaves a mark*
- *Pen down: Allows the pen to draw*
- *Set pen color to [color]: Allows the ink to be a certain color*
- *Set pen color to [number]: Allows the ink to be a certain numbered color*
- *Set pen shade to: Make the shade increase/decrease*
- *Change pen size by: Make the font bigger/smaller*
- *Set pen size to: Set a font size*

*Event Blocks:*

- *When green flag clicked: Does something when green flag is clicked*
- *When \_ key is pressed: Does something when a key is clicked*
- *When sprite is clicked: Does something when a sprite is clicked*
- *When backdrop switches to: Does something when the scene changes*
- *When \_ > \_ : Does something when something is greater than another thing*
- *When I receive: Does something when an action is received*
- *Broadcast: Shows a message*
- *Broadcast and Wait: Shows and message and awaits a response*

*Control Blocks:*

- *Wait \_ secs: Pauses a certain sprite for a certain amount of time*
- *Repeat: Does something a certain amount of times*
- *Forever: Does something for life*
- *If \_ then: Does something if something else is true*
- *If \_ then else: Does something if multiple conditions are true*
- *Wait until: Holds everything until an event*
- *Repeat until: Repeats everything until an event*
- *Stop: Stops everything*



### *Sensing Block:*

- *Touching: Sees if you are touching something*
- *Touching color: Sees if you are touching a color*
- *Color is touching: Sees if a certain color is touching another color*
- *Distance to: A number that represents the distance between two things*
- *Ask and wait: Asks a question, saves response as data*
- *Answer: Stores the response*
- *Key\_Pressed: Sees if a key is pressed*
- *Mouse\_down: See if mouse is being clicked*
- *Loudness: Sees the volume*
- *Timer: Reports what the timer has been set to*
- *Reset timer: Resets timer*
- *\_ of \_: Sees the x/y position of an object/sprite*
- *Username: Sees username of player*

### *Data / Operator Blocks:*

- *Make a variable: Creates a variable for you*
- *Variable: Reports the value of a variable*
- *Set\_to: Sets the value of a variable to something else*
- *Change\_by: Changes the value of a variable by a certain amount*
- *Show variable: Shows the variable on a slider*
- *Hide variable: Hides the slider*
- *Make a List: Makes a list of variable amount*
- *List: Creates a new list*
- *Add\_to: Adds a variable to the list*
- *Delete\_of: Removes something from the list*
- *Insert\_at\_of: Adds a variable to a certain point of a list*
- *replace item\_of\_with: Replaces a variable with another variable, all in a list*



Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Blocks review**

1. Name the 9 categories of Scratch blocks, and explain briefly what they do:

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2. What is your favorite keyword? Right it down, and explain what it does, and what category it belongs to.

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# Chapter #11: Gravity

## Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done
- **Keyword:** A word that allows to execute a command
- **Sprite:** An image that can be controlled by code
- **Backdrop:** The scenery of your project
- **Script:** Set of instructions to be executed

## Objective:

Your goal is to make Gravity. Gravity is the force that pulls us down.

1. To get started, go to [scratch.mit.edu](http://scratch.mit.edu) and start a new project.
2. Keep the cat and write the following code. The code shows the way it will move down.





Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Gravity**

1. Explain how you made Gravity.

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2. Who discovered gravity?

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---

3. What is Gravity?

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4. How does the cat go down?

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# Chapter #12: Hide and Seek

## Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done
- **Keyword:** A word that is important and relates to subject
- **Sprite:** An image that can be controlled by code
- **Backdrop:** The scenery of your project
- **Script:** Set of instructions to be executed

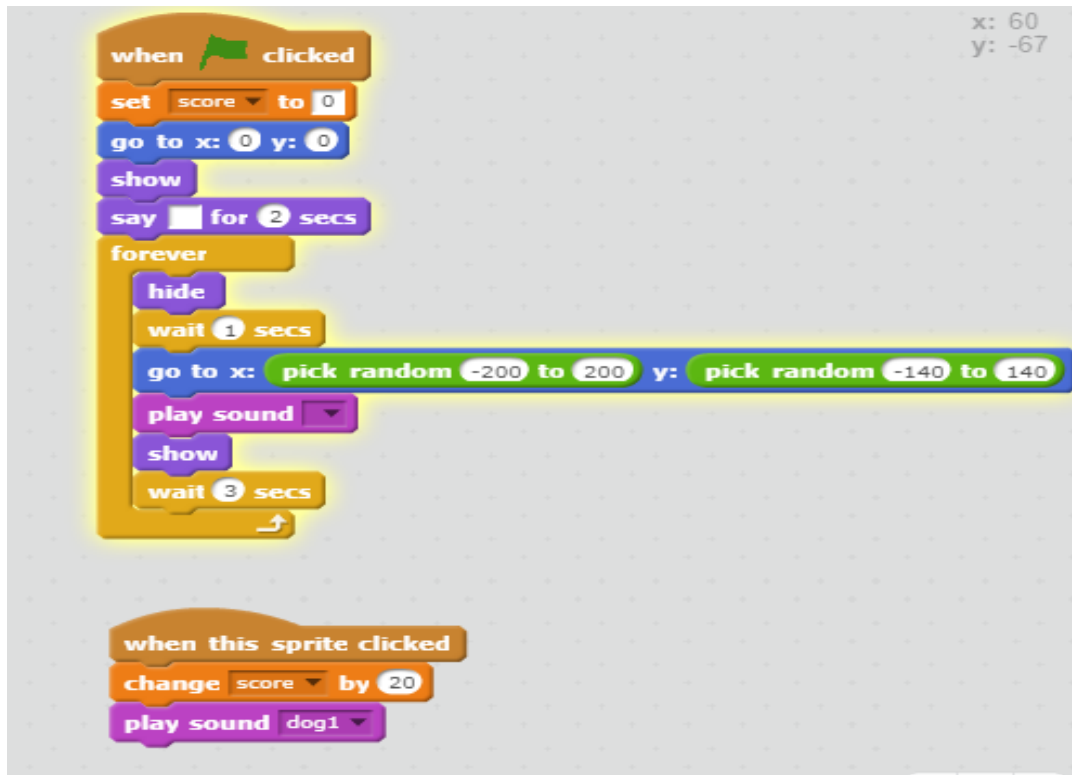
## Objective:

Your goal is to make a hide and seek game. Hide and seek is a fun game where the sprite hides and a seeker tries to find the sprite.

1. To get started, go to [scratch.mit.edu](http://scratch.mit.edu) and start a new project.
2. First you have to make a variable. The variable should be called "score" and it is what keeps tracks of how-many times you score. Then you must make the sprite go to a certain spot. Then you must forever make it hide wait one sec and so on. You basically just must follow the



code below.





Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Hide and Seek**

1. Briefly explain how you made the hide and seek game?

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2. What country first played hide and seek?

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3. Name the Bug (cheat code) in the game:

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## Chapter #13: Orange Hunt

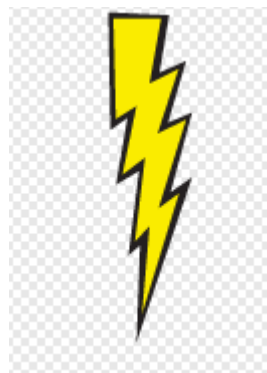
### Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done
- **Keyword:** A word that allows to execute a command
- **Sprite:** An image that can be controlled by code
- **Backdrop:** The scenery of your project
- **Script:** Set of instructions to be executed

### Objective:

The goal is to make a game where we have a bat that tries to get an orange while trying not to get struck by lightning.

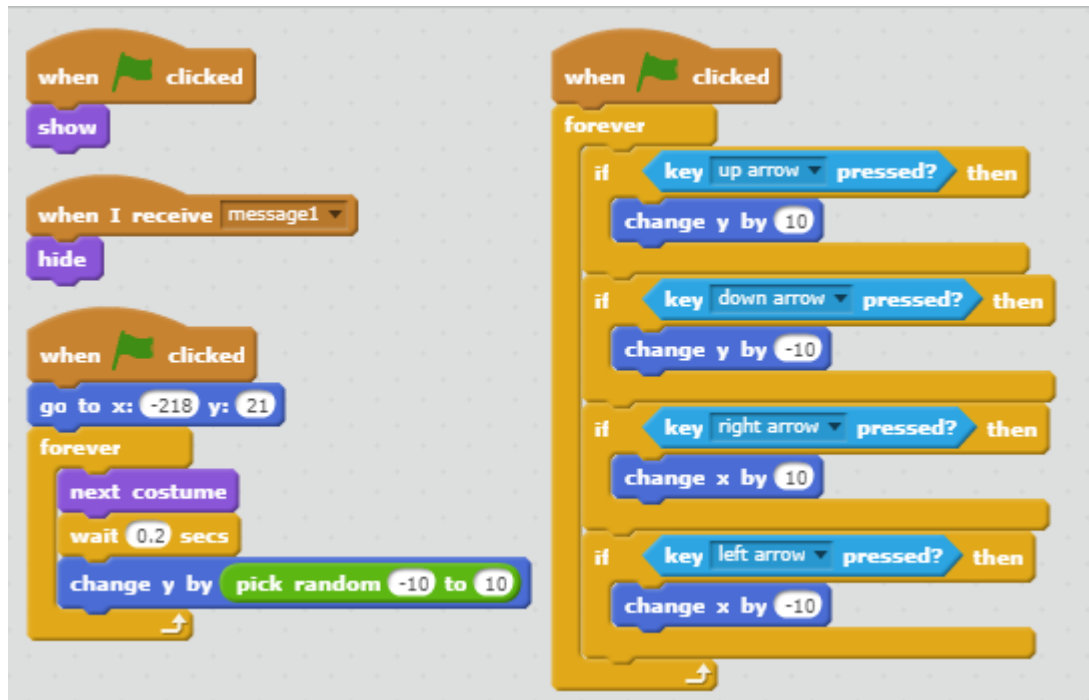
1. To get started, go to [scratch.mit.edu](http://scratch.mit.edu) and start a new project.
2. Delete the existing sprite cat. And create and replace it with 3 sprites "bat1, orange, and 3 Lightnings":







3. Make the code for the bat. It tells you how to move and what keys to press like the up, down, left and right arrows.

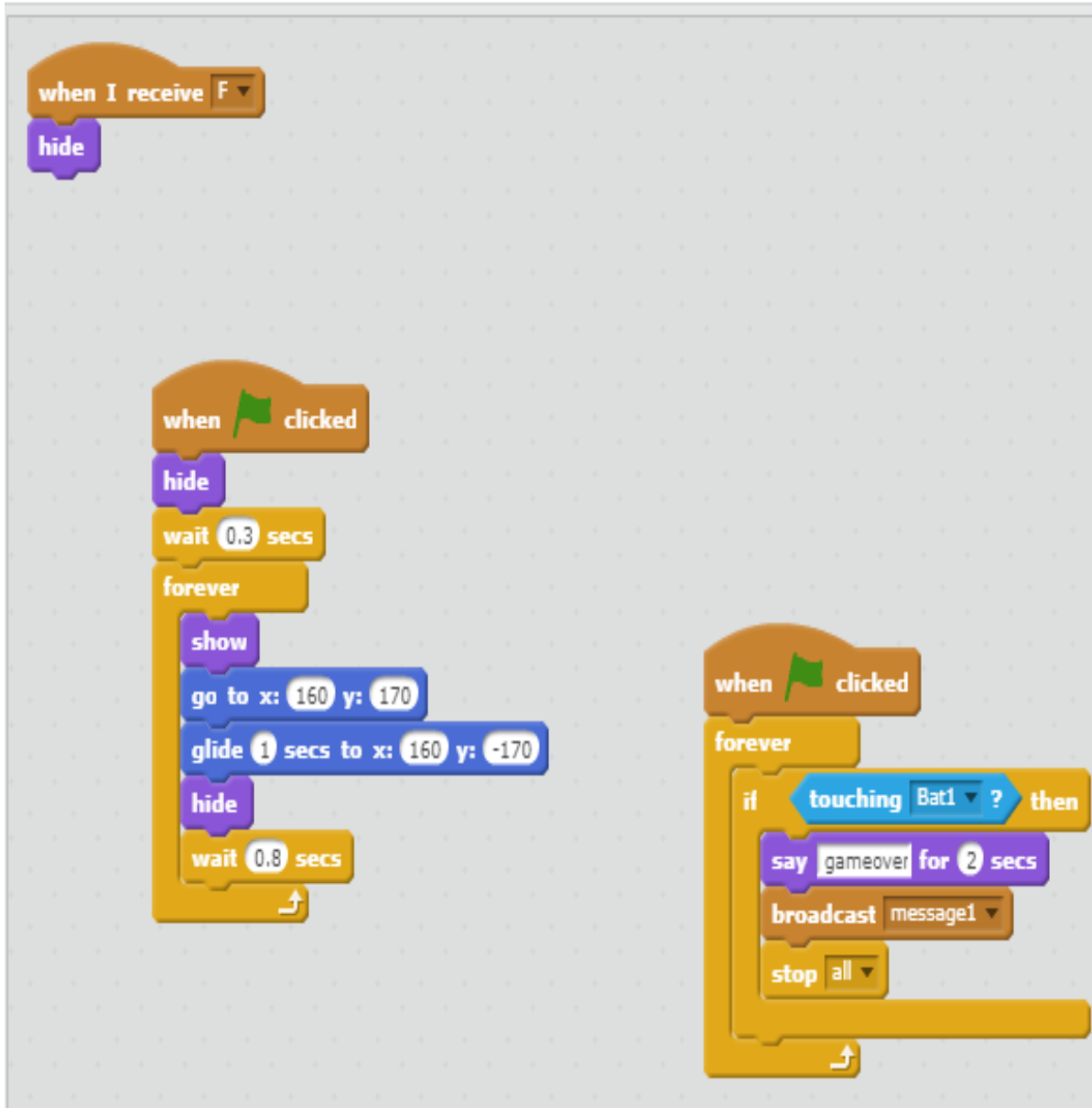


4. The code for the orange tells the user if you win or lose by simply saying you win or you lose.





5. The lightning's code tells you us when it will appear and when it will hide and also says game over if touching the lightning:





Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Orange Hunt**

1. Explain how you made the Orange hunt game? And what types of code you use to make this game?

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2. What happens if you are touching the lightning?

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# Chapter #14: Factorial

## Key Terms:

- **Blocks:** Where commands are stored.
- **Command:** Something that is told to be done
- **Keyword:** A word that allows to execute a command
- **Sprite:** An image that can be controlled by code
- **Backdrop:** The scenery of your project
- **Script:** Set of instructions to be executed

## Objective:

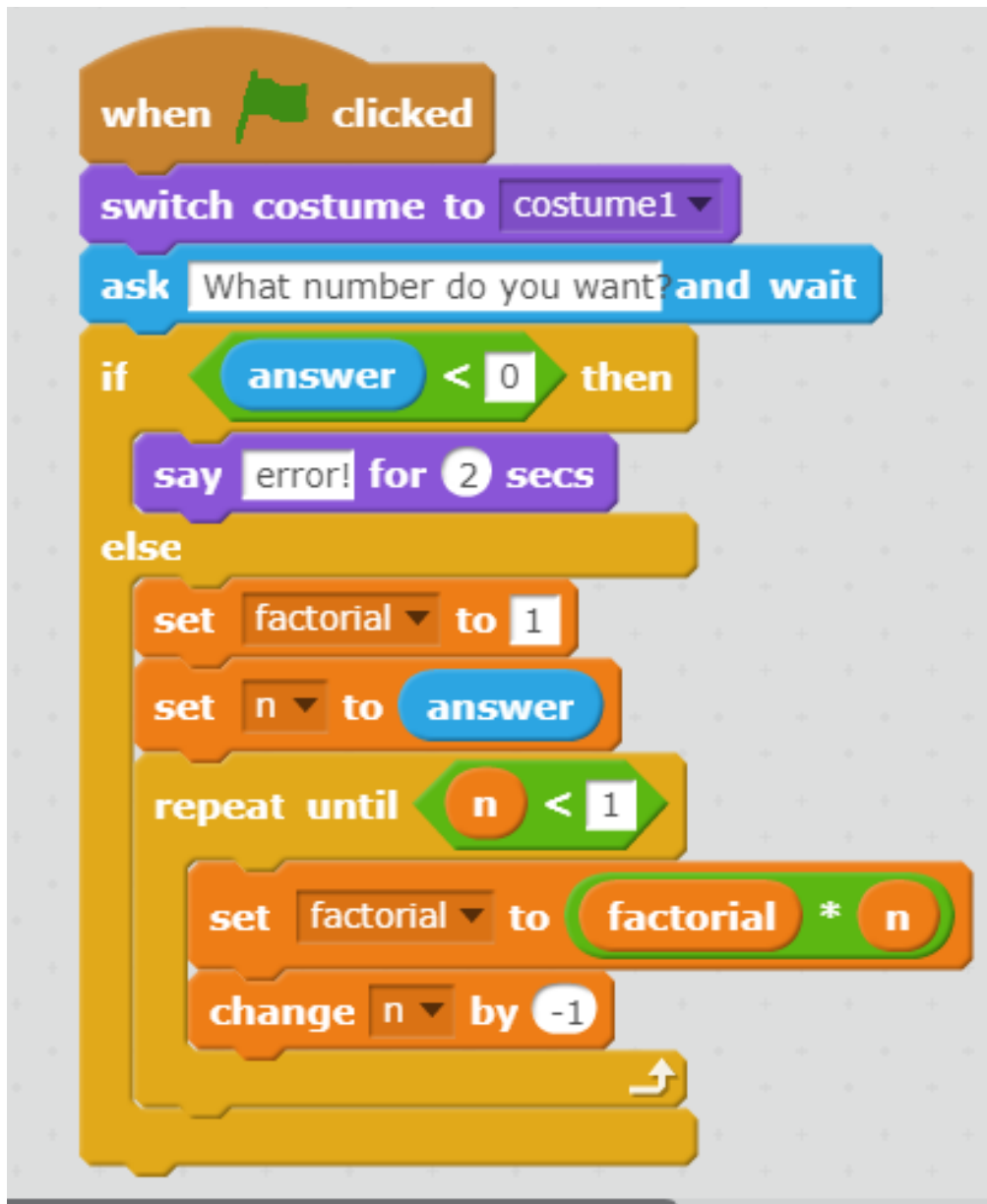
The objective of this lesson is to make a factorial game. A factorial game replicates the *Math Factorial* function. A factorial is when you pick a number and multiply it by the previous number over and over again until you reach 1. For example, Factorial of 4 (also written as 4!) is equal to  $4 \times 3 \times 2 \times 1$ . Some other interesting facts about Factorial function is

Factorial of 1 ( $1!$ ) = 1

Factorial of 0 ( $0!$ ) = 1

## Steps to do the projects:

1. To get started, go to [scratch.mit.edu](http://scratch.mit.edu) and start a new project.
2. Now keep the cat or replace it with a new sprite. And please do the same thing with the backdrop.
3. Given below is the code. It will explain what to do like how it will multiply the factorial etc.





Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Factorial**

1. Explain how you made the factorial game:

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---

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---

---

2. Who had the factorial idea?

---

3. Unscramble these words:

a. ENSGNIS: \_\_\_\_\_

b. SRTN\_EEEGURD: \_\_\_\_\_

4. What happens when you input abcd to your program? Why?

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# Chapter #15: Name Animation

## Key Terms:

- Blocks: Where commands are stored
- Command: Something that is told to be done
- Keyword: A word that allows you to execute a command.
- Sprite: An image that can be controlled through code.
- Background: The scenery of your project.
- Script: Set of instructions to be executed.

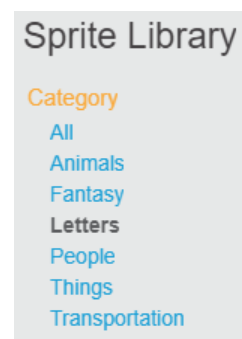
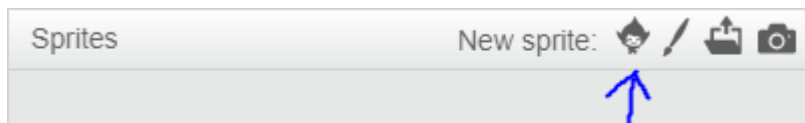
## Objective:



In this chapter, students will learn how to animate their name. To get started, they should log into their account at [scratch.mit.edu](http://scratch.mit.edu) and create a new project. Now they will click on tips at the upper-left corner of the screen. After that, they should click on animate a name on the step-by-step list and watch the video then follow the instructions. Once they are done with their project, they should add it to the CT Stem Studio.

## How to build a name animation game:

1. First, students should delete the cat sprite from their project and use the sprite menu to find a letter sprite for the first letter of their name.



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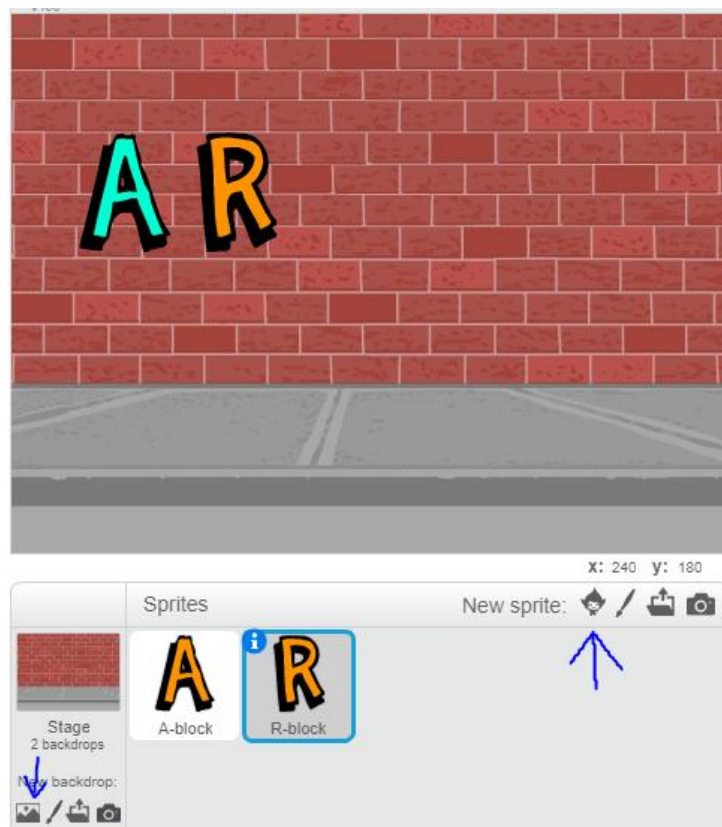
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2. Next, they should add a color effect to their sprite and make it play a noise when it is clicked.



3. After this, students should choose a backdrop and another letter from the sprite menu.



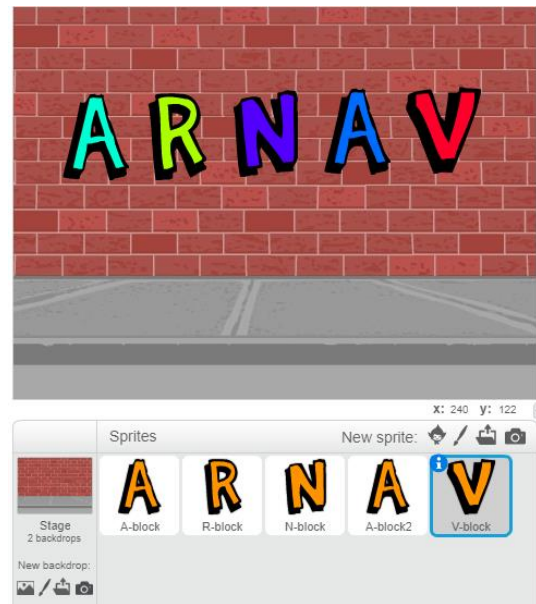
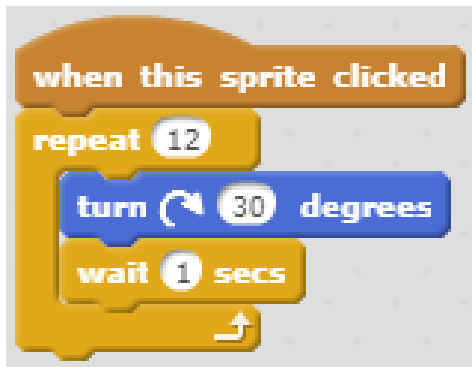




4. Once that is done, they should add the second letter of their name and make a script to make it spin.

They should continue this process for the rest of their name until they are done. Once they are satisfied with their project, they should add it to the

CT Stem Studio.







3. What block type does the “Say \_ for \_ sec” block come belong in?
  - a. Motion Blocks
  - b. Look Blocks
  - c. Sensing Blocks
  - d. Control Blocks
  
4. What are event blocks used for?
  - a. Trigger Scripts
  - b. Control Sprites
  - c. Play Sounds
  - d. Execute Scripts



# Chapter #16: Dance Party Game

## Key Terms:

- Blocks: Where commands are stored.
- Command: Something that is told to be done.
- Motion: The art of moving
- Keyword: A word that the computer understands and allows you to execute a command

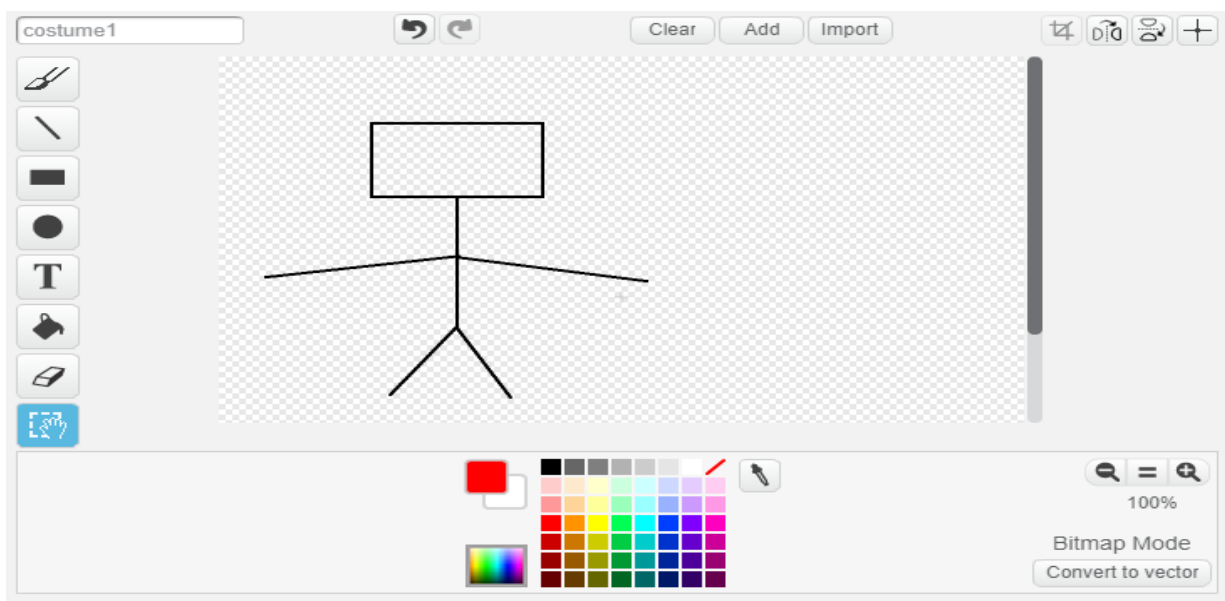
## Objective:

You are going to combine data types to create an interactive dance party using a step by step explanation provided by Scratch themselves. This can be found by going to tips, and clicking the step by step tab. Afterwards, you can click Getting Started with Scratch and follow the steps. You will title the project \_\_\_\_\_ (insert name)'s Dance Party, and will add it to the CT STEM Studio.

## How to build a Dance Party game:

### 1. Make a character:

Make a new sprite by clicking the paintbrush in the sprite section. Draw your character from there.



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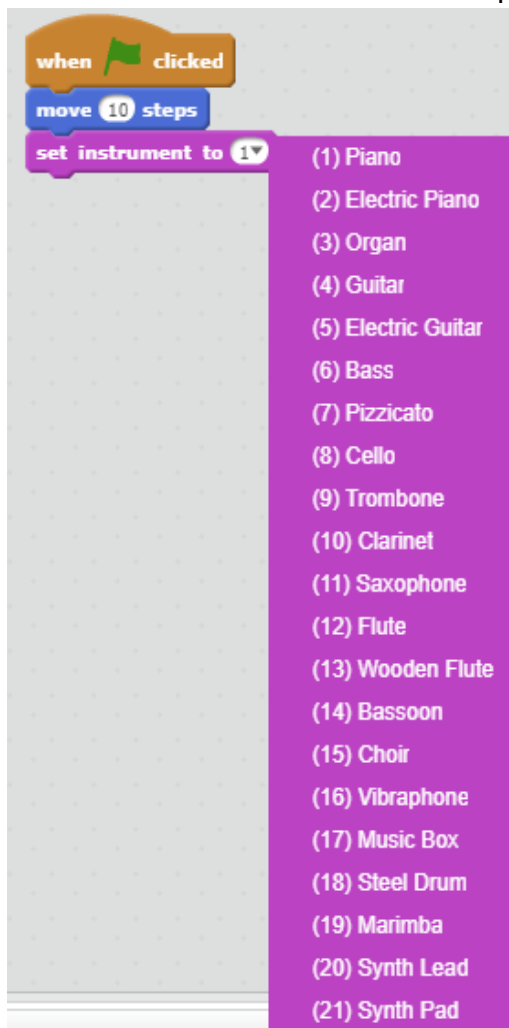
## 2. Start Moving:

Drag a When flag clicked block onto the screen to get your character to start moving



## 3. Play a sound:

Go to the sound blocks, and drag out the set instrument block. Then use the drop-down menu to select the instrument to play.



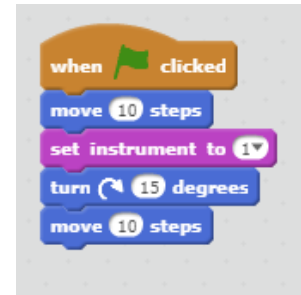
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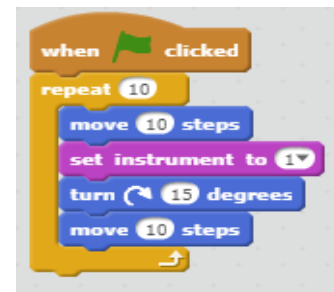
4. Pick your dance move:

Go back to the move blocks, and using the turn and moving blocks make a pattern that can make you go around with the sound



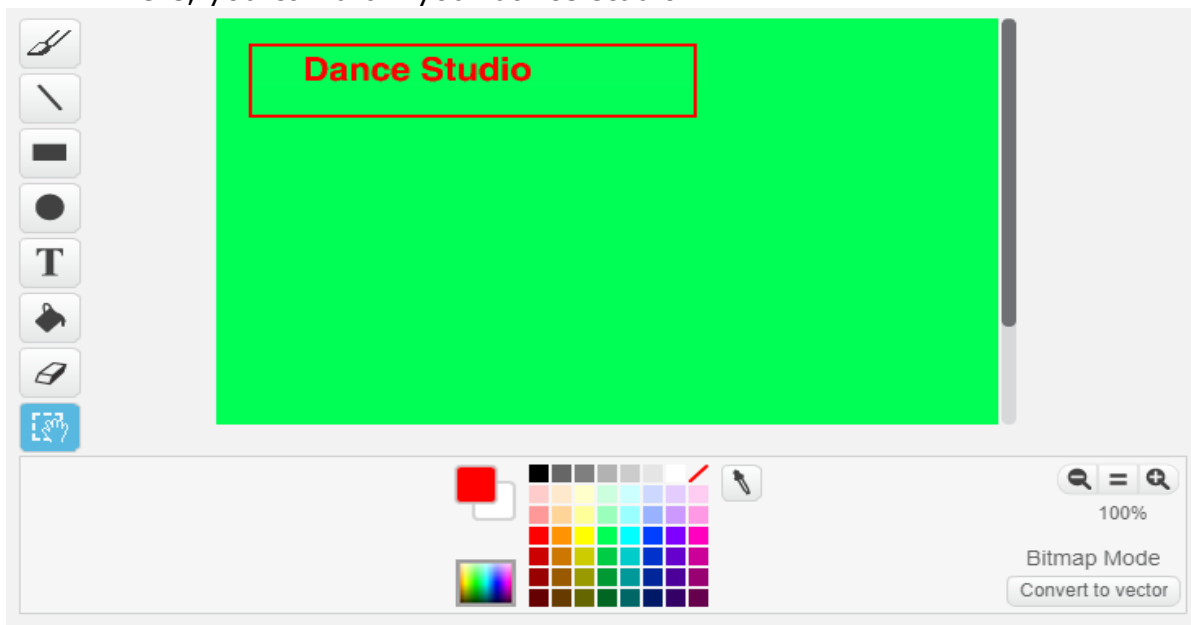
5. See how many times you want to keep it going:

Using the repeat block (control), see how many times you want to do the dance



6. Set where you want to dance:

Go to the background section (lower left corner), and pick the paintbrush. There, you can draw your dance studio.





Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Dance Party**

1. Briefly explain the process of building a dance party game:

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2. Play around with the decoration features on Scratch and make your program look as neat as possible.



5. What block type does the “Say \_ for \_ sec” block come belong in?
- a. Motion Blocks
  - b. Look Blocks
  - c. Sensing Blocks
  - d. Control Blocks
6. What are event blocks used for?
- a. Trigger Scripts
  - b. Control Sprites
  - c. Play Sounds
  - d. Execute Scripts





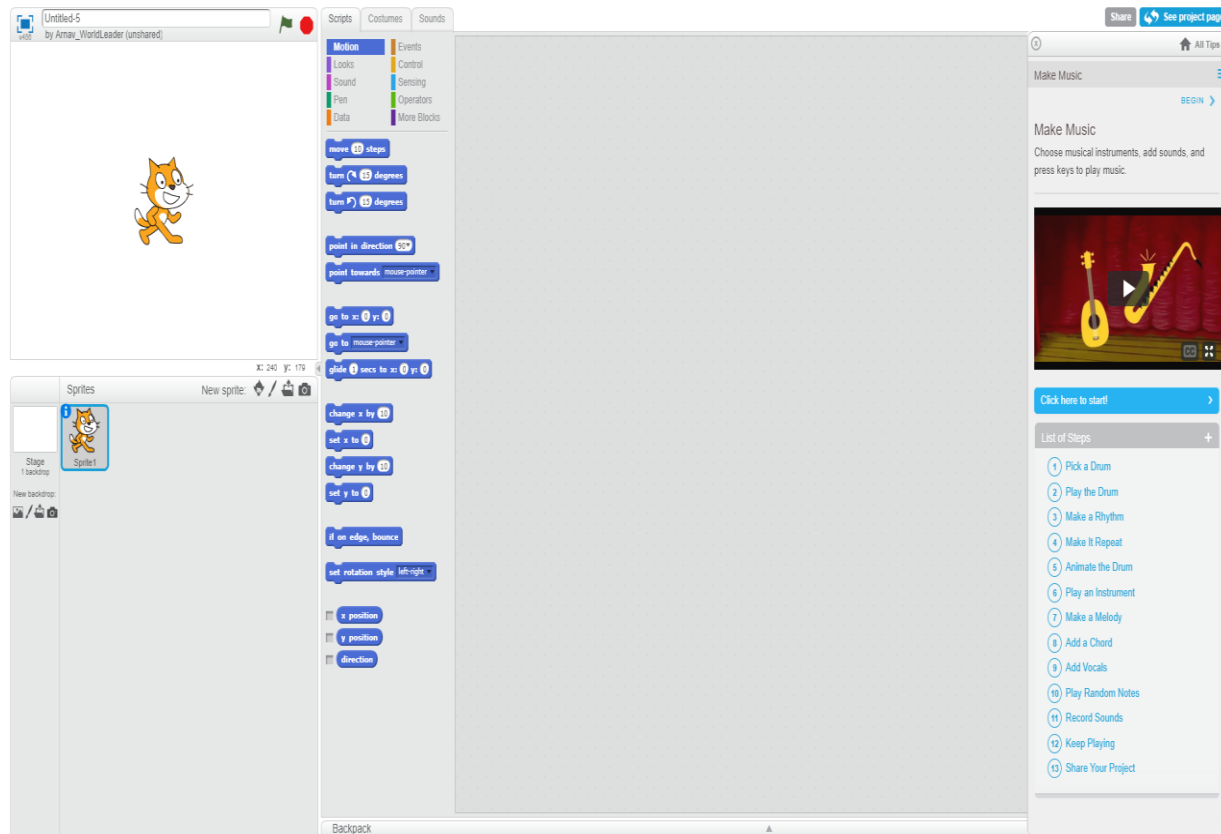
# Chapter #17: Create a Song

## Key Terms:

- **Blocks:** Where commands are stored
- **Command:** Something that is told to be done
- **Keyword:** A word that allows you to execute a command.
- **Sprite:** An image that can be controlled through code.
- **Background:** The scenery of your project.
- **Script:** Set of instructions to be executed.

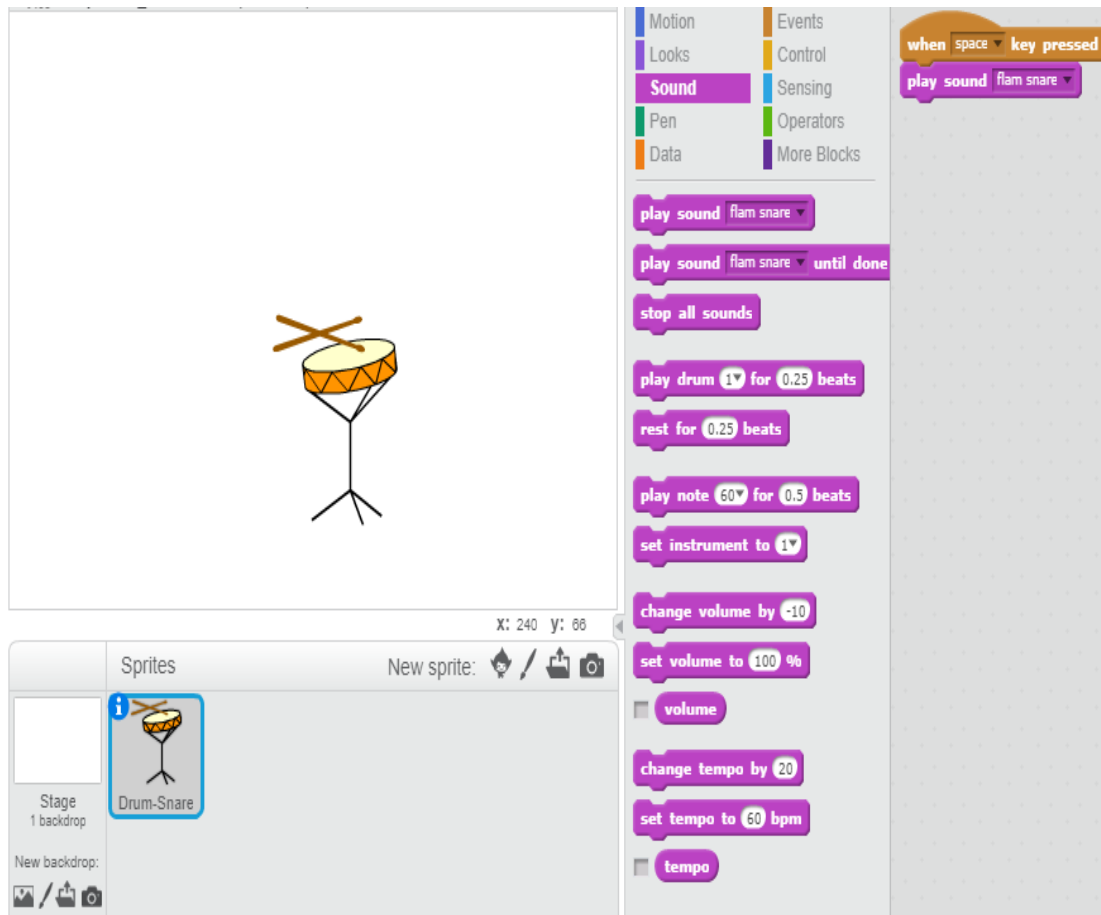
## Objective:

In this chapter, students will learn how to create a song. To get started, they should log into their account at [scratch.mit.edu](http://scratch.mit.edu) and create a new project. Now they will click on tips at the upper-left corner of the screen. After that, they should click on make music on the step-by-step list and watch the video then follow the instructions. Once they are done with their project, they should add it to the CT Stem Studio.

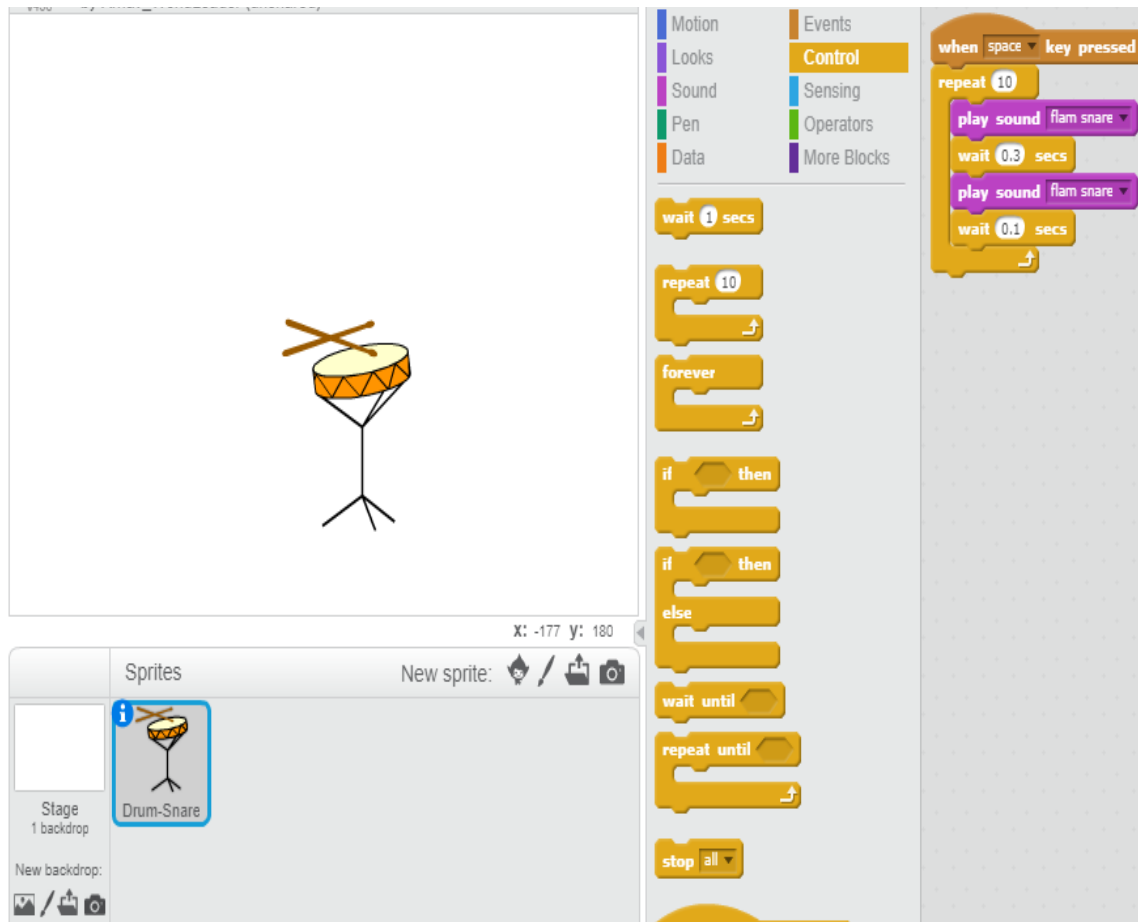


## How to create a song:

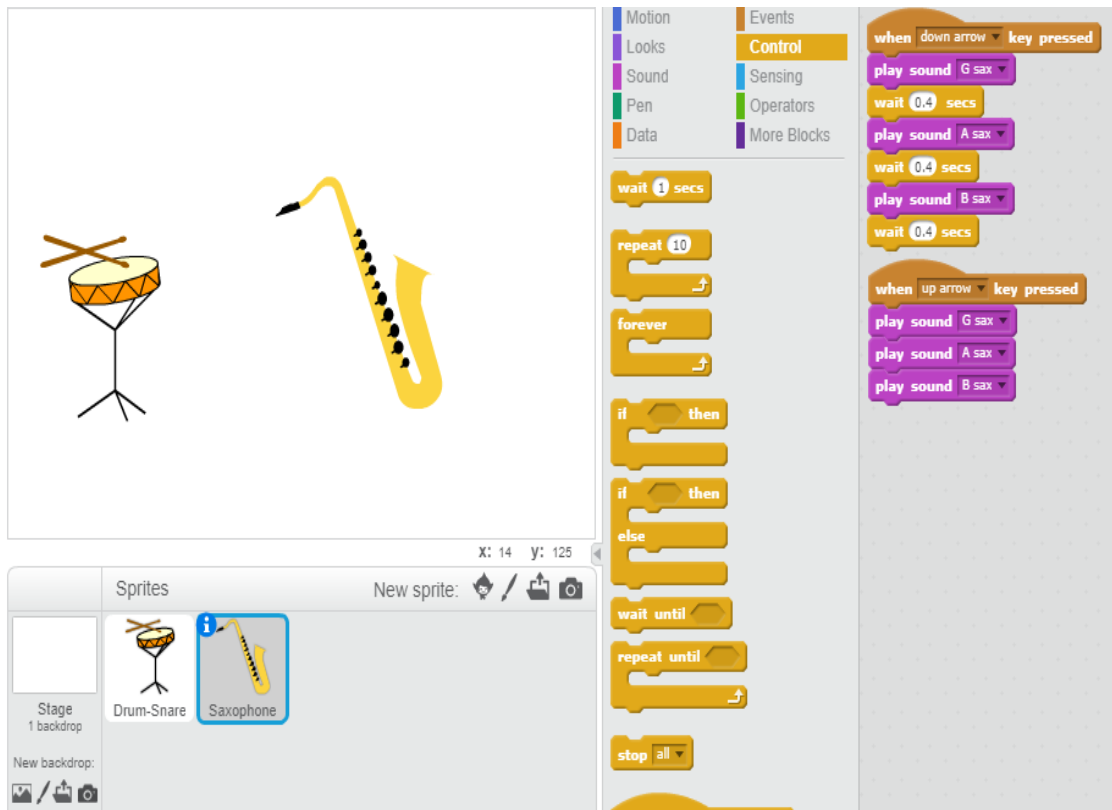
1. To start, students should choose a drum sprite and add a script to it to make it play a sound when a key is pressed.



2. Next, they could make a rhythm by adding wait blocks between sound blocks to add delay.
3. Then, they could add a repeat block to make a loop of their melody. You can also add a next costume block to animate the drums.



4. To use an instrument, students must create a new sprite from the music category such as a saxophone and create a melody using a script with different sounds and wait times like they did before. They can also make a chord by not adding wait blocks.



5. Then, students can play random notes with another instrument by making a new sprite and script like this:



**Lab-work:** Play around with other instruments, sound blocks, and techniques to make an orchestra. Once students are satisfied with their project, they should add it to the CT Stem Studio.



Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Make a Song**

1. Briefly describe how you made your song:

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2. Draw a script below that will play a chord if "b" is pressed.

3. Briefly describe what a random number generator is and how it is used in this project

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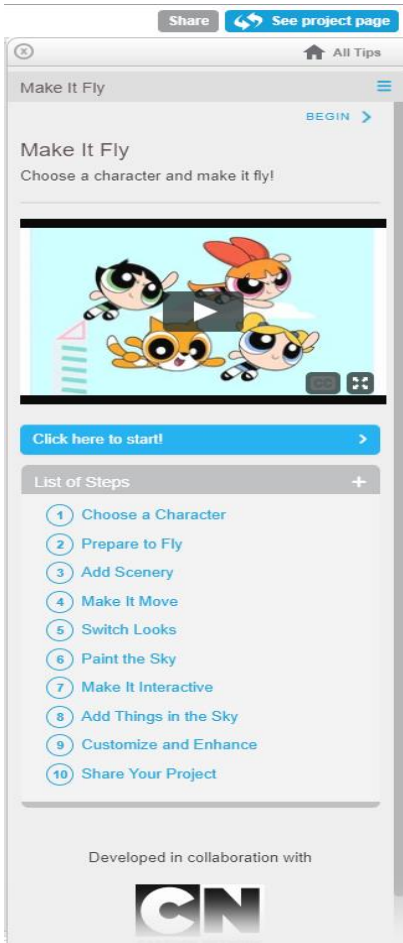


# Chapter #18: Create a Character

## Key Terms:

- Blocks: Where commands are stored
- Command: Something that is told to be done
- Keyword: A word that allows you to execute a command.
- Sprite: An image that can be controlled through code.
- Background: The scenery of your project.
- Script: Set of instructions to be executed.

## Objective:

	<p>In this chapter, students will learn how to create a character and make it fly. To get started, they should log into their account at <a href="http://scratch.mit.edu">scratch.mit.edu</a> and create a new project. Now they will click on tips at the upper-left corner of the screen. After that, they should click on make it fly on the step-by-step list and watch the video then follow the instructions. Once they are done with their project, they should add it to the CT Stem Studio.</p>
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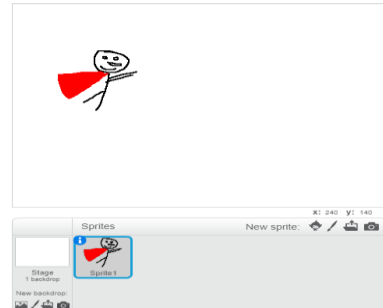
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## How to create a character and make it fly:

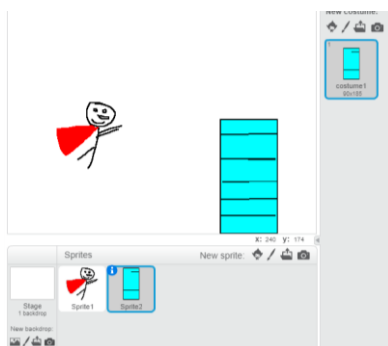
1. To start, students should make a sprite. This sprite can be anything they want because this will be the main character of their project.



2. Next, students should make a script to make their character say something.



3. Then, they should create sprites that their character will fly past such as buildings. During this time, they could also make multiple costumes for their new sprites so it will look like their character is flying past multiple buildings.



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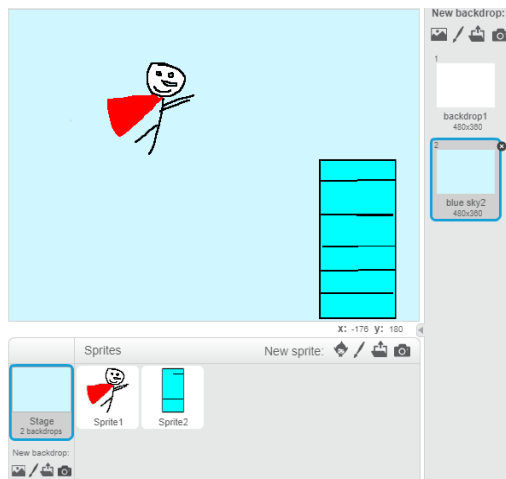




4. After that, if they want to make their scenery move past their character so it looks like their character is flying. You can also add a next costume block if you made a costume in the last step



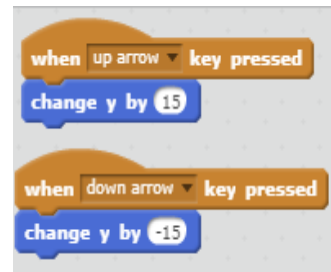
5. Now they could choose a plain backdrop to give the effect that their character is flying in the sky.



6. Once that is done, they could make their character controllable with two separate event blocks called, "when \_ is pressed" and two separate motion blocks called, "change y by \_" that should have two opposite values (e.g. 20 and -20). They should experiment and change the values to their liking.

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7. Afterwards, they can add objects into the sky by making new sprites for their objects and building a script like this:



8. Finally, they could experiment with their ideas and add them into the game such as a score counter for when the player captures an object in the sky or giving the ability to control the character horizontally. Once they are satisfied, they should add their project to the CT Stem Studio.



Name\_\_\_\_\_ Date\_\_\_\_\_

**Homework: Make Your Character Fly**

1. Put the steps used to make your character fly in order by placing a number before them and briefly describe what is done in each step.

Creating Scenery:

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Making Your Sprite Talk:

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---

Sprites to the Sky:

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Making Your Sprite Controllable:

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---

Adding Your Own Features:

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Adding Things in the Sky:

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Moving Your Scenery:

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Making Costumes for Your Scenery:

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2. Can we make any change to this game? Do you have any idea - Express your thoughts?

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# Chapter #19: Wall Tennis Game

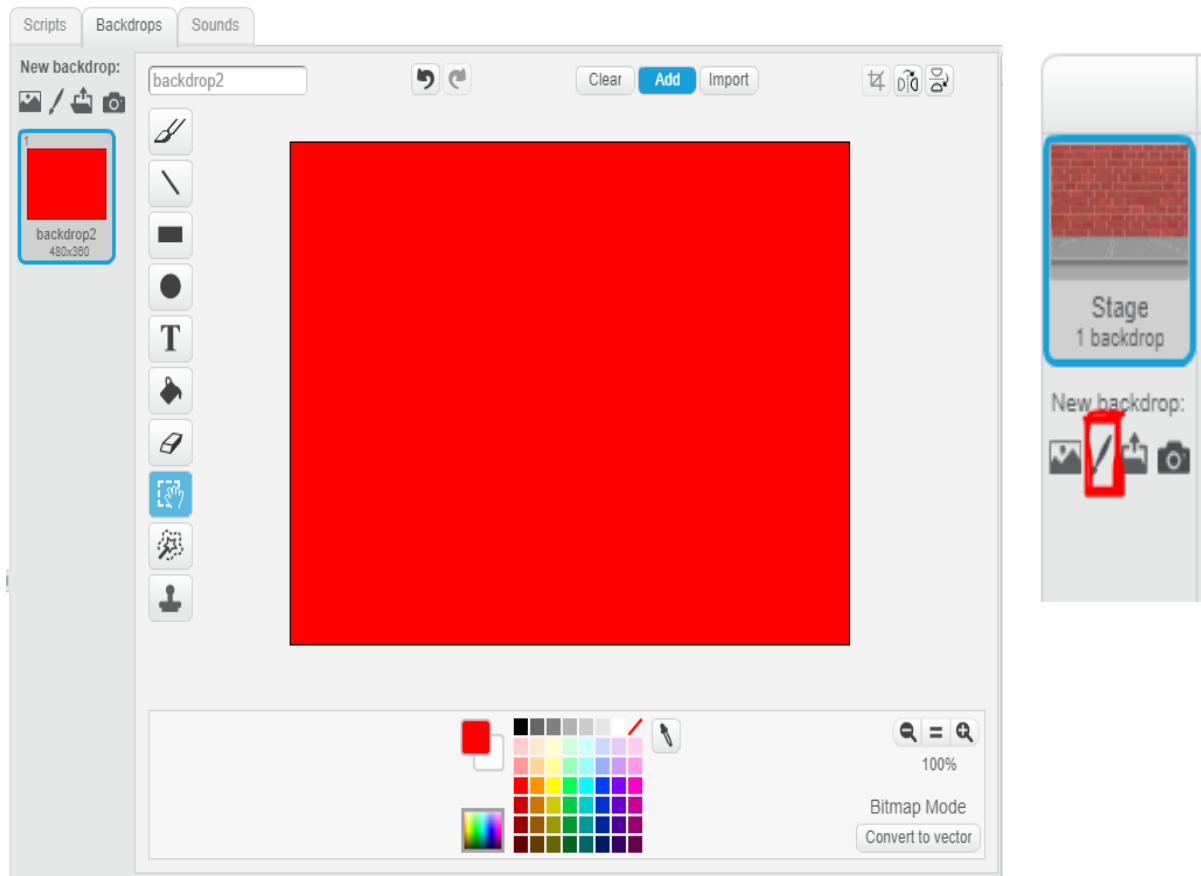
## Key Terms:

- **Blocks:** Where commands are stored
- **Command:** Something that is told to be done
- **Keyword:** A word that allows you to execute a command.
- **Sprite:** An image that can be controlled through code.
- **Background:** The scenery of your project.
- **Script:** Set of instructions to be executed.

## Objective:

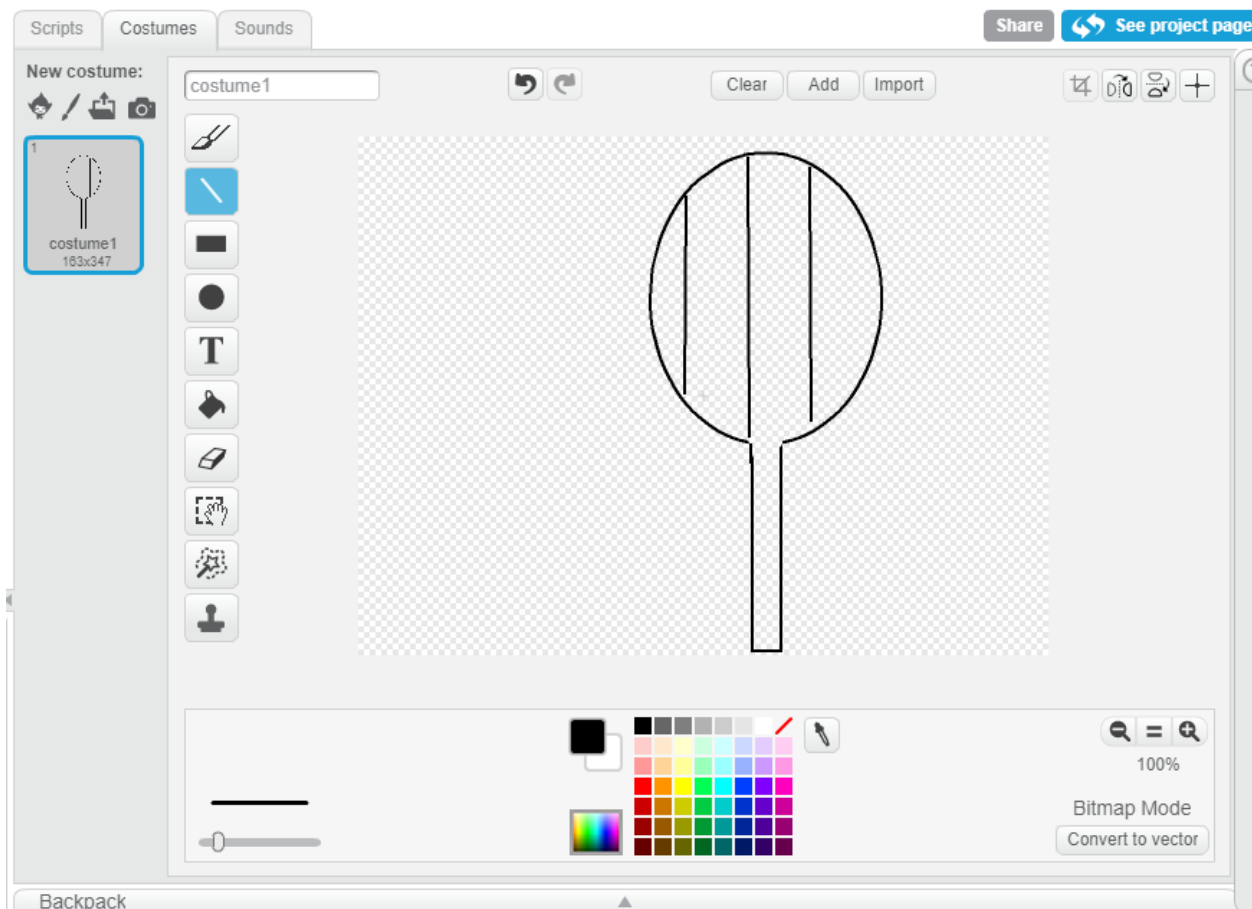
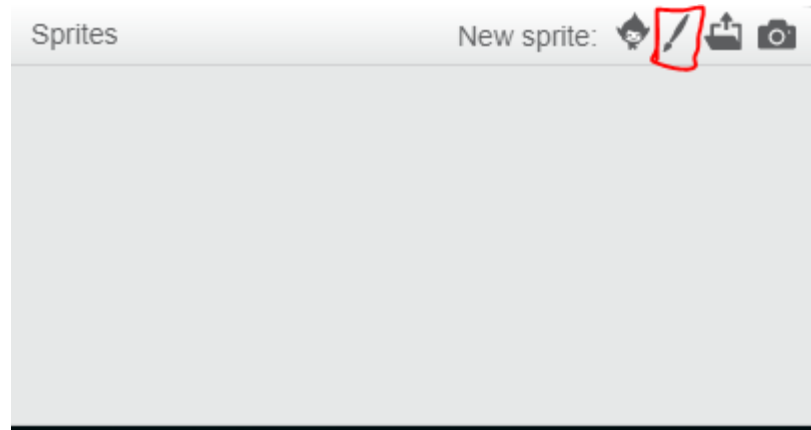
In this chapter, students will learn how to create a wall tennis game. To get started, they should log into their account at [scratch.mit.edu](http://scratch.mit.edu) and create a new project. This will be a two part project. The first part is to complete in the class, and is to establish a basic version of the game. The second part needs to be completed as homework, and is a more advanced version of it all. Once they are done with their project, they should add it to the CT Stem Studio.

Your goal is to accomplish a game, where the mouse controls a tennis racquet flying around and chasing the ball. When the racquet hits the ball, a point gets added.





2. Next, they should make sprites. One of the sprites will be the racquet that will hit the balls. So, they should go to the new sprite section and click the pen. Then, they should make the tennis racquet.



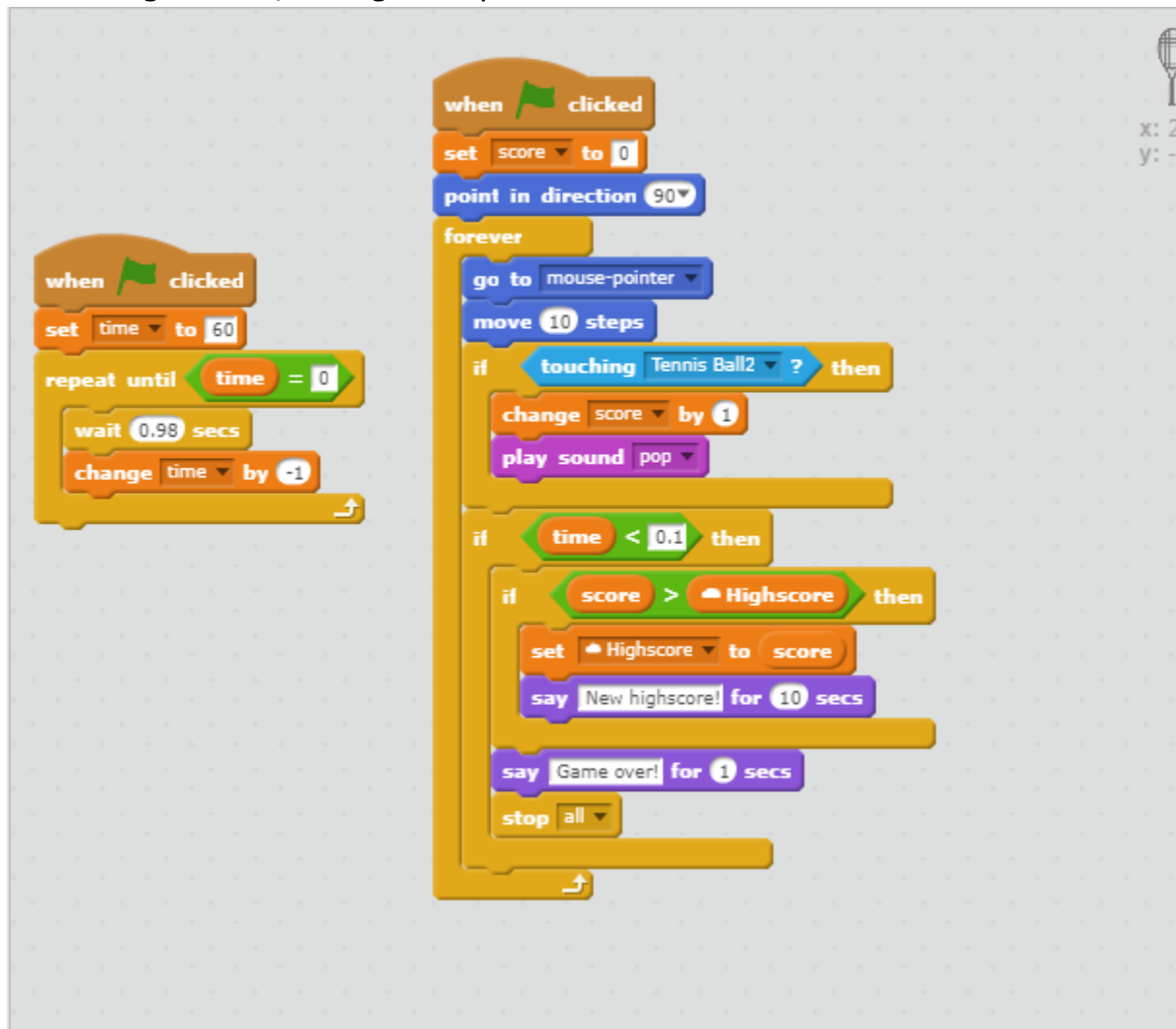
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3. After this, students should write the function for the racquet.

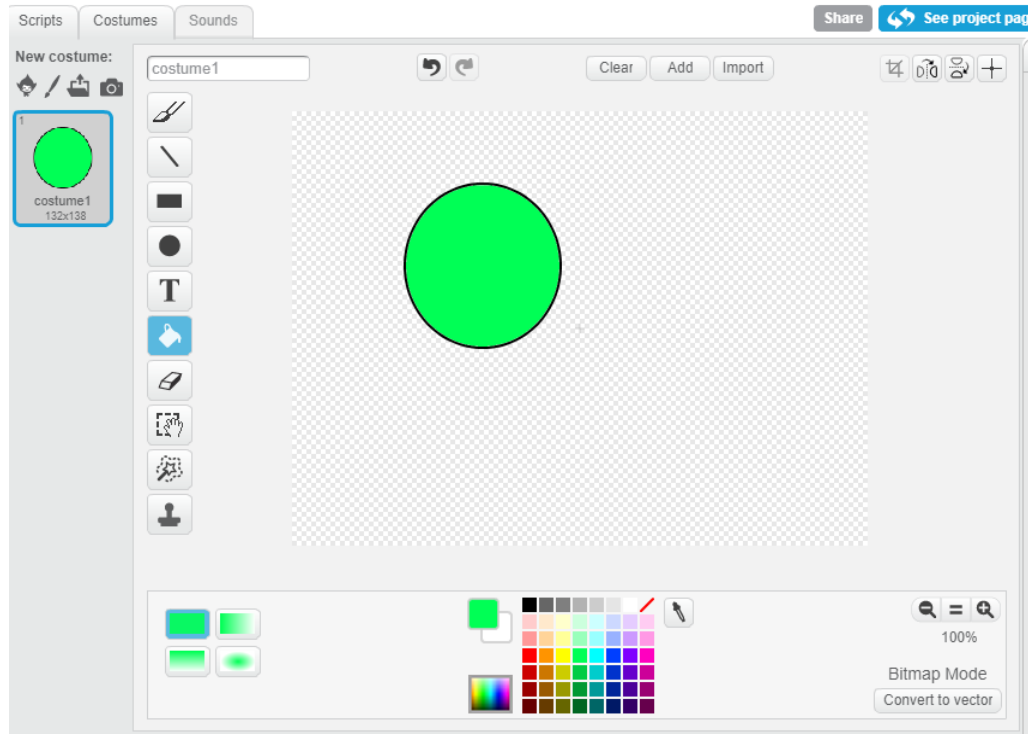
There are two functions to be done, both when flag is clicked. The first, is the timer. You have to create a variable called time. Then you set timer to however long you want the time to be. Then you set it so that every second, it goes down one. The other function is controlling the racquet. You start by creating a score variable and setting it to zero. You have it go to wherever the mouse is pointing. Next you check to see if it's touching a tennis ball, and if so, the score increments, and a noise plays. Finally, you do two more things. You see when the game is over. If the timer hits zero the game automatically stops. Also, if the score is above the high score, that gets replaced.







4. Next, you have to make the ball



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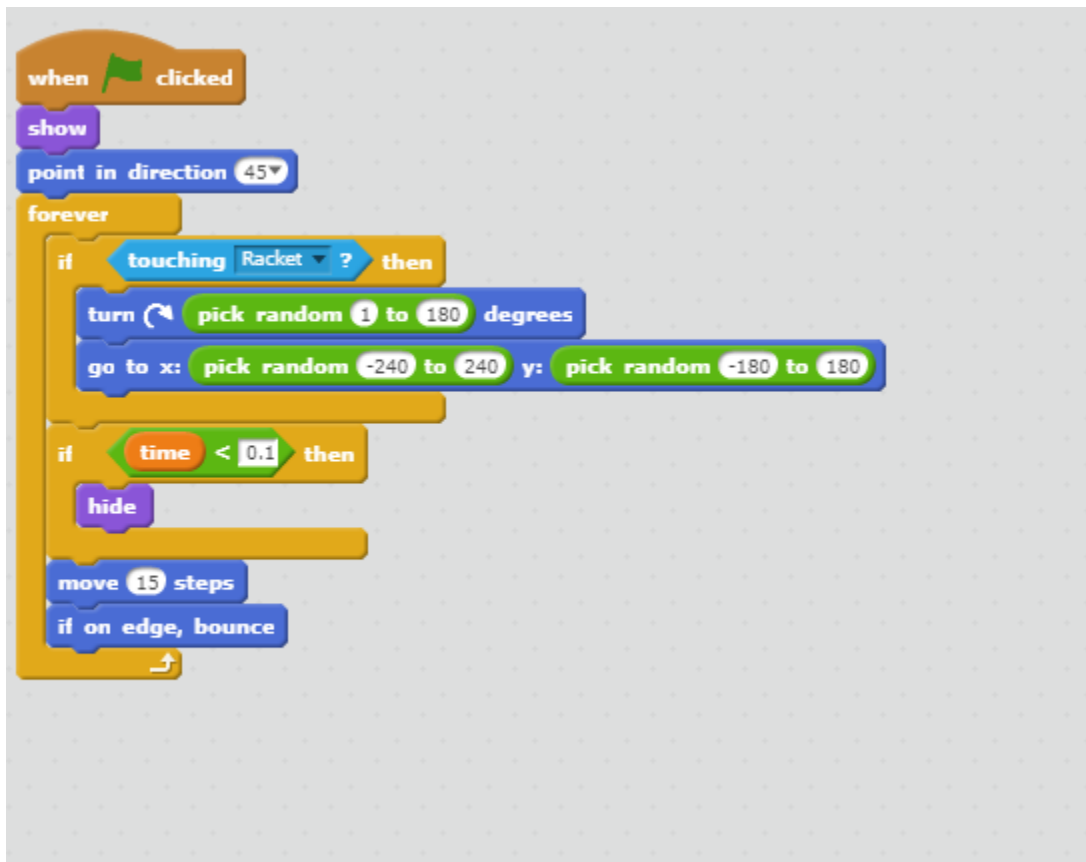
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5. Then, you make the functions for the ball:

This ball is always moving. If it's on the edge it bounces off. If it touches the racket, it immediately moves away. If the game is over, it is removed from the screen.

Once they are satisfied with their project, they should add it to the CT Stem Studio.





Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Wall Tennis**

1. Briefly explain the process of Part 1:

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2. Connect the keywords with their definition.

Command	A word that allows you to execute a command.
Sprite	The scenery of your project.
Blocks	Set of instructions to be executed.
Background	An image that can be controlled through code.
Keyword	The scenery of your project.
Script	Something that is told to be done.

3. Part 2: Add more balls:

For your final assignment, you have to work with the code so that a 2<sup>nd</sup> ball comes into play. This involves creating a new ball, and working with the first ball and racquet's code to deal with when they touch. When you are satisfied, feel free to add more.



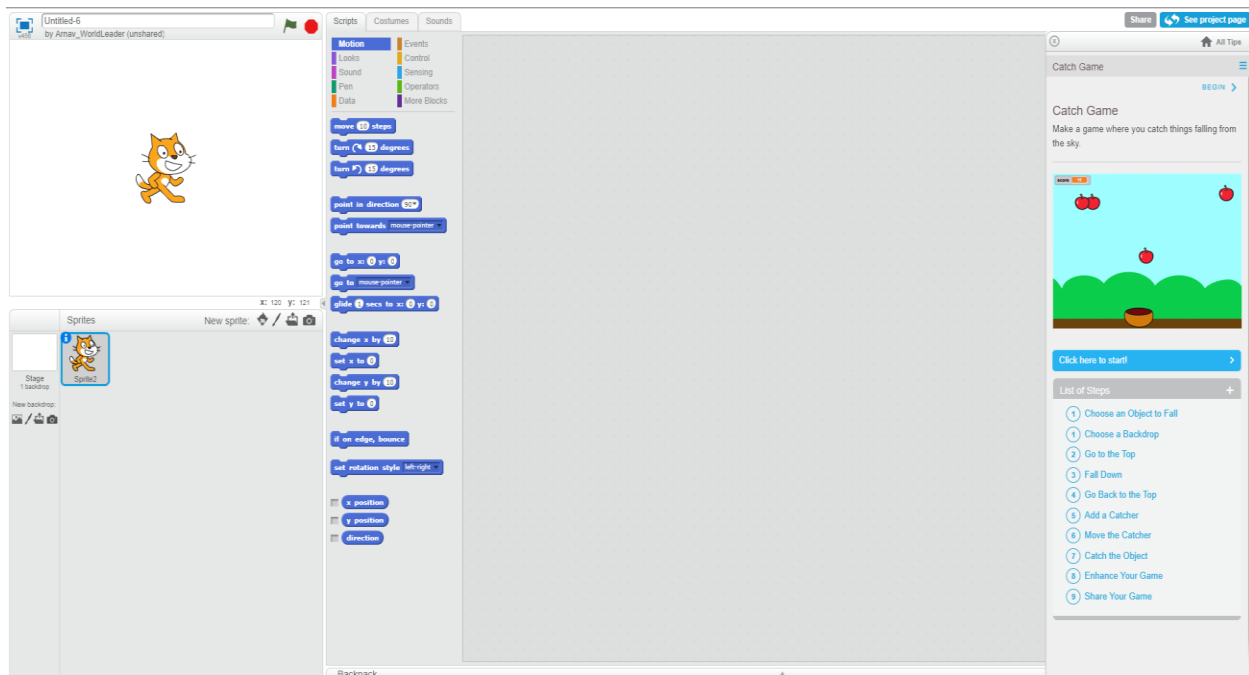
# Chapter #20: Catch Game

## Key Terms:

- Blocks: Where commands are stored
- Command: Something that is told to be done
- Keyword: A word that allows you to execute a command.
- Sprite: An image that can be controlled through code.
- Background: The scenery of your project.
- Script: Set of instructions to be executed.

## Objective:

In this chapter, students will learn how to create a catch game. To get started, they should log into their account at [scratch.mit.edu](http://scratch.mit.edu) and create a new project. Now they will click on tips at the upper-left corner of the screen. After that, they should click catch game on the step-by-step list and watch the video then follow the instructions. Once they are done with their project, they should add it to the CT Stem Studio.



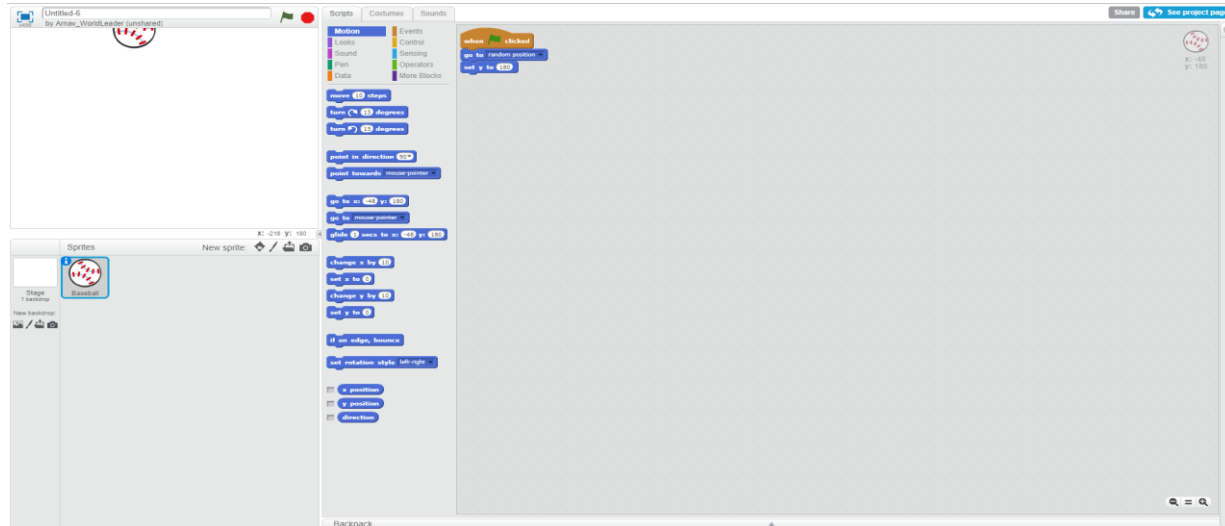
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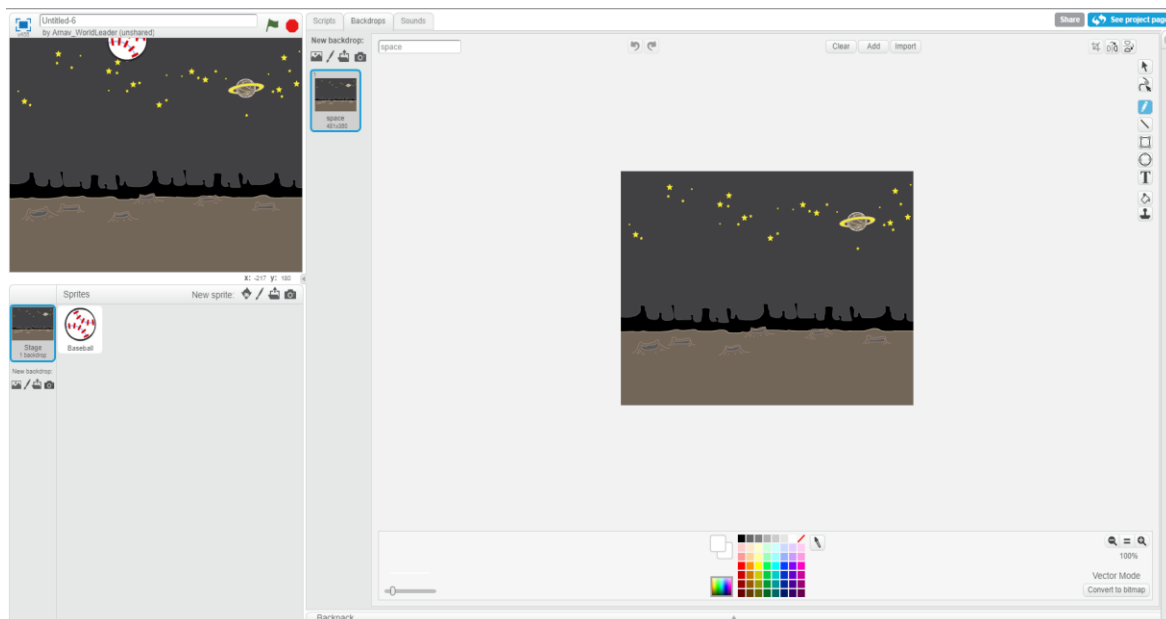


## How to build a catch game:

1. To start, you need to make a sprite which will be your falling object that you will catch and add a script which will make it go to a random x position at the top of your screen.



2. Next, you want to choose a background from the preset ones or make one.

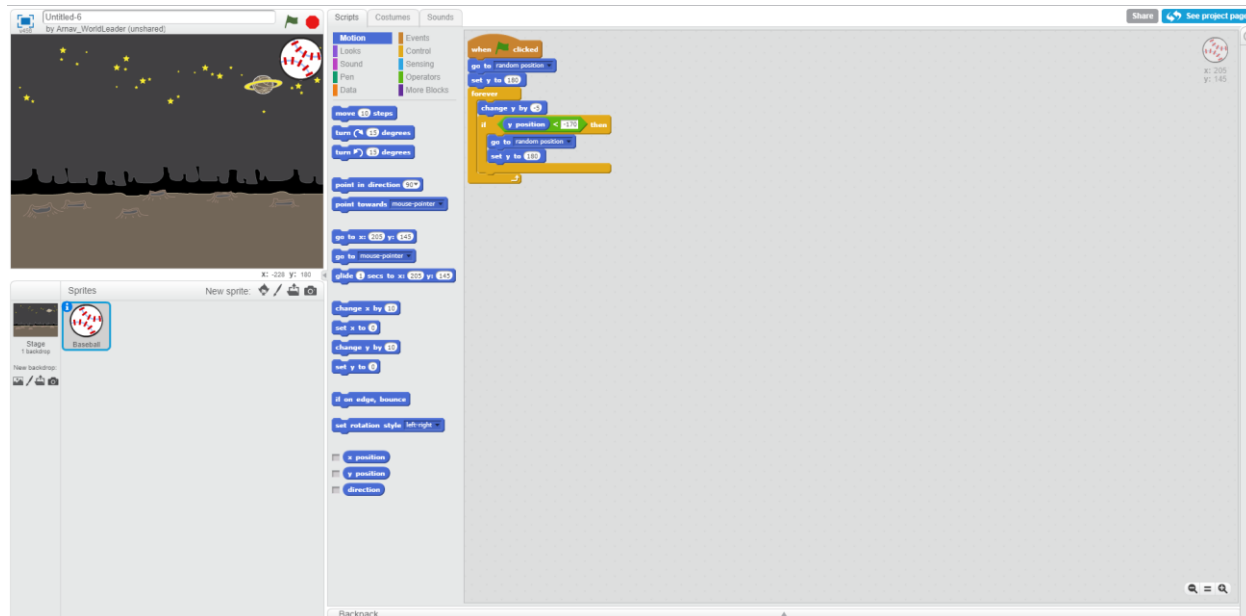


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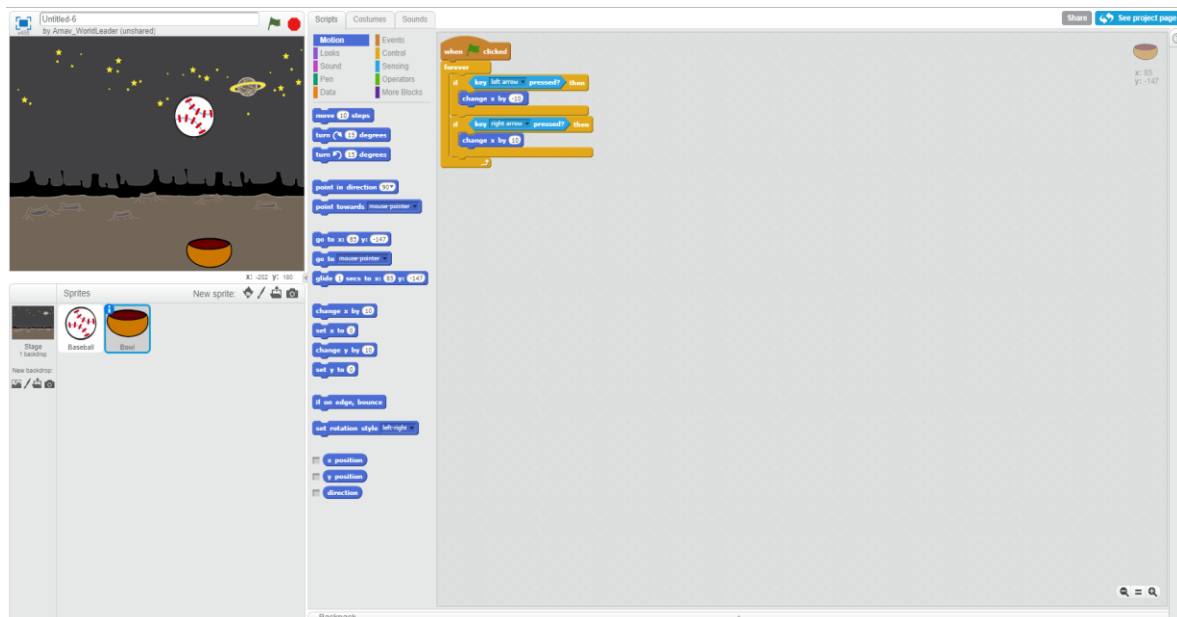
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- Then, you want your object to fall down by making it change its y position downward forever and making it go back to the top after it reaches a certain y position with a script like this:



- After that, you want to create a catcher sprite with a script to make it move when pressing the arrow keys.

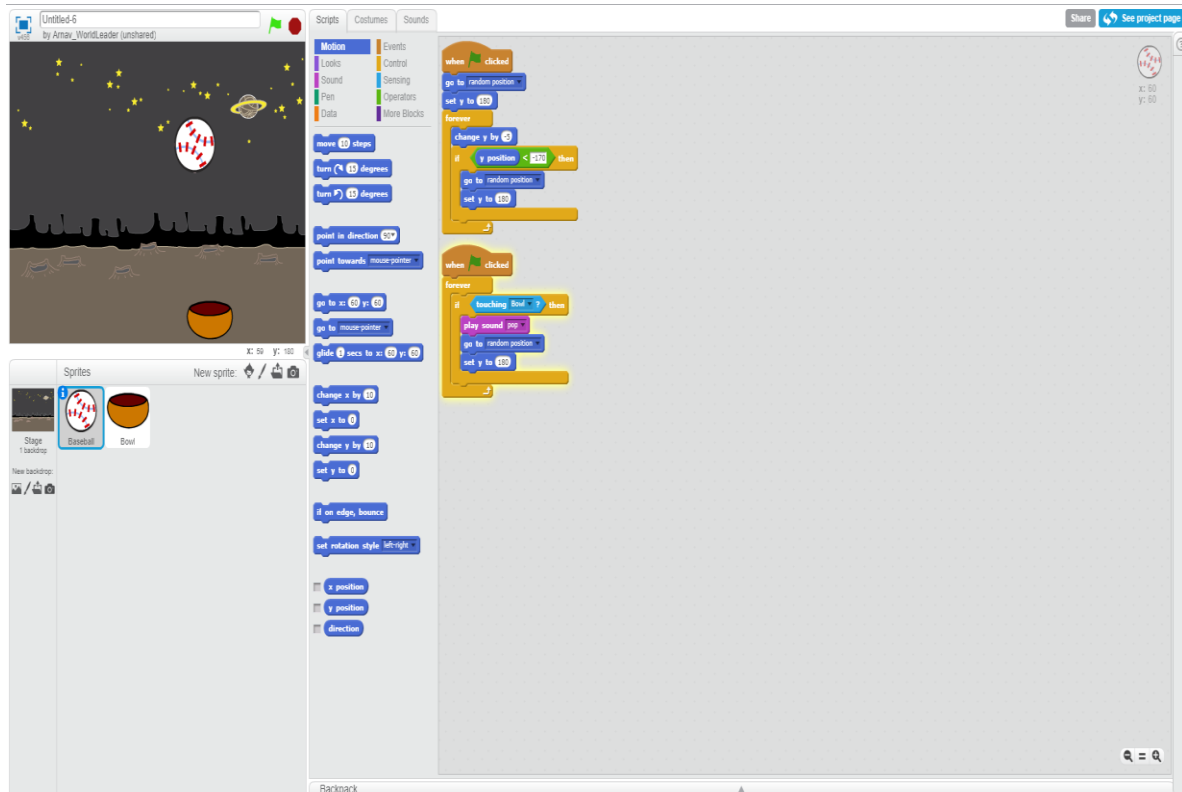


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5. Once that is done, you want to make a script for your **falling object** that will make it go to the top once it touches the bowl.



6. Finally, you can add to your game and experiment such as by making a scoring system or making the game harder with time. Once you are satisfied with your project, you should add it to the CT Stem Studio.



Name \_\_\_\_\_ Date \_\_\_\_\_

**Homework: Create a Catch Game**

1. Briefly describe you made your catch game:

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2. What blocks did you use for your catch game? What was their purpose?

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# Chapter #21: Snake Game

## Key Terms:

- **Blocks:** Where commands are stored
- **Command:** Something that is told to be done
- **Keyword:** A word that allows you to execute a command.
- **Sprite:** An image that can be controlled through code.
- **Background:** The scenery of your project.
- **Script:** Set of instructions to be executed.

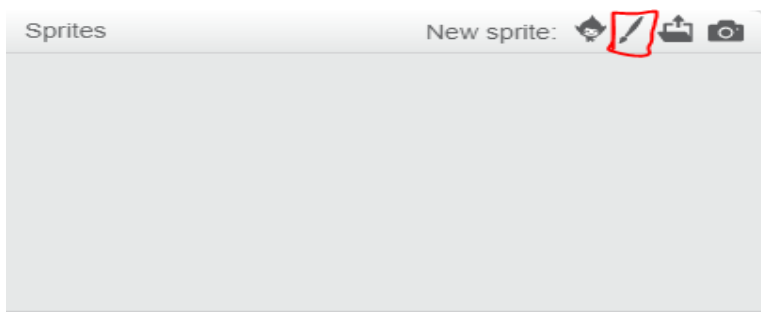
## Objective:

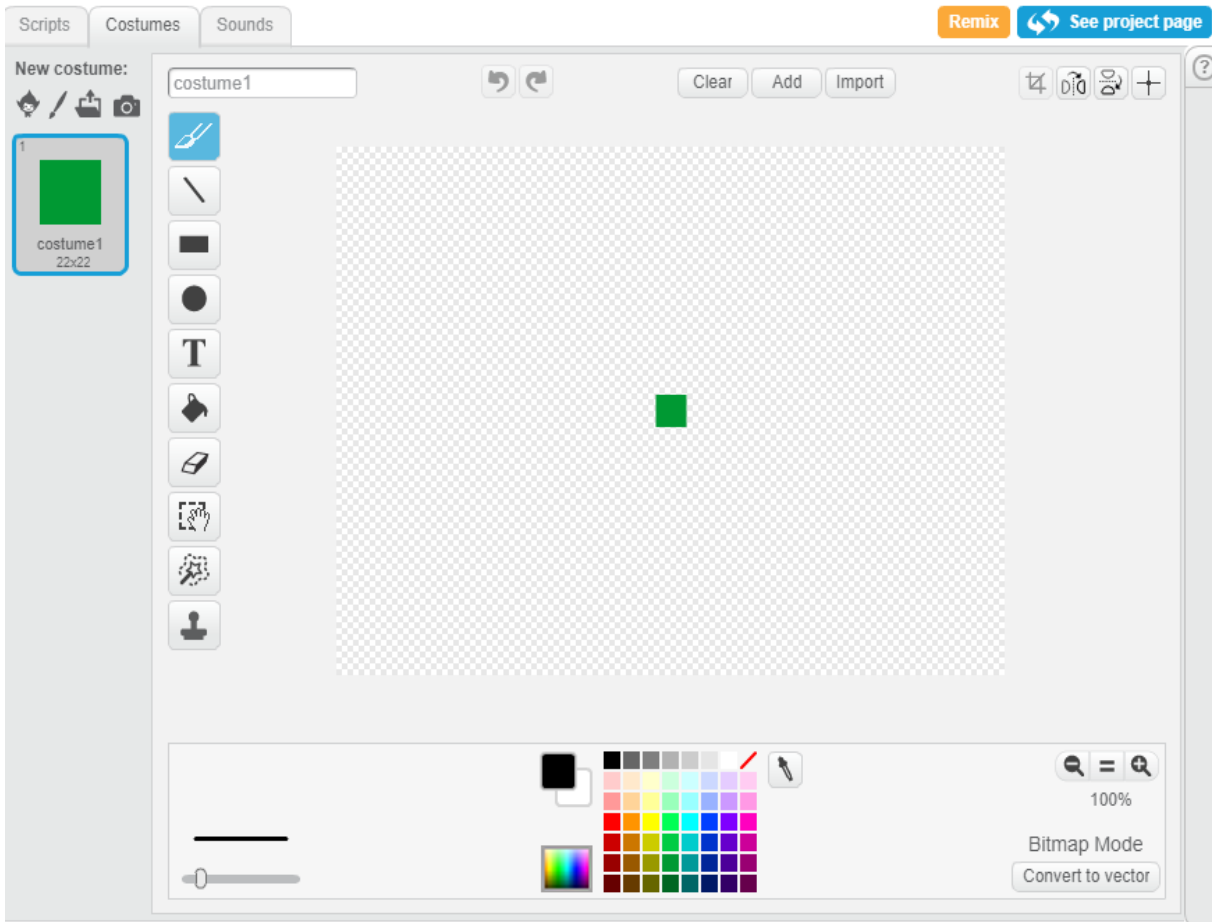
In this chapter, students will learn how to create the game. Snake is a famous video game which was default installed into some older cell phone brands. To get started, they should log into their account at [scratch.mit.edu](http://scratch.mit.edu) and create a new project. Once they are done with their project, they should add it to the CT Stem Studio.

Your goal is to accomplish a game, where a snake chases an apple around a stadium and if it touches the wall, it dies.

## How to make Snake game:

1. First, students must decide the background. We will keep it as a blank white screen.
2. Next, they should make sprites. The first sprite, is the head of the tail. So, they should go to the new sprite section, and click the pen. Then, they should make a block and duplicate it.



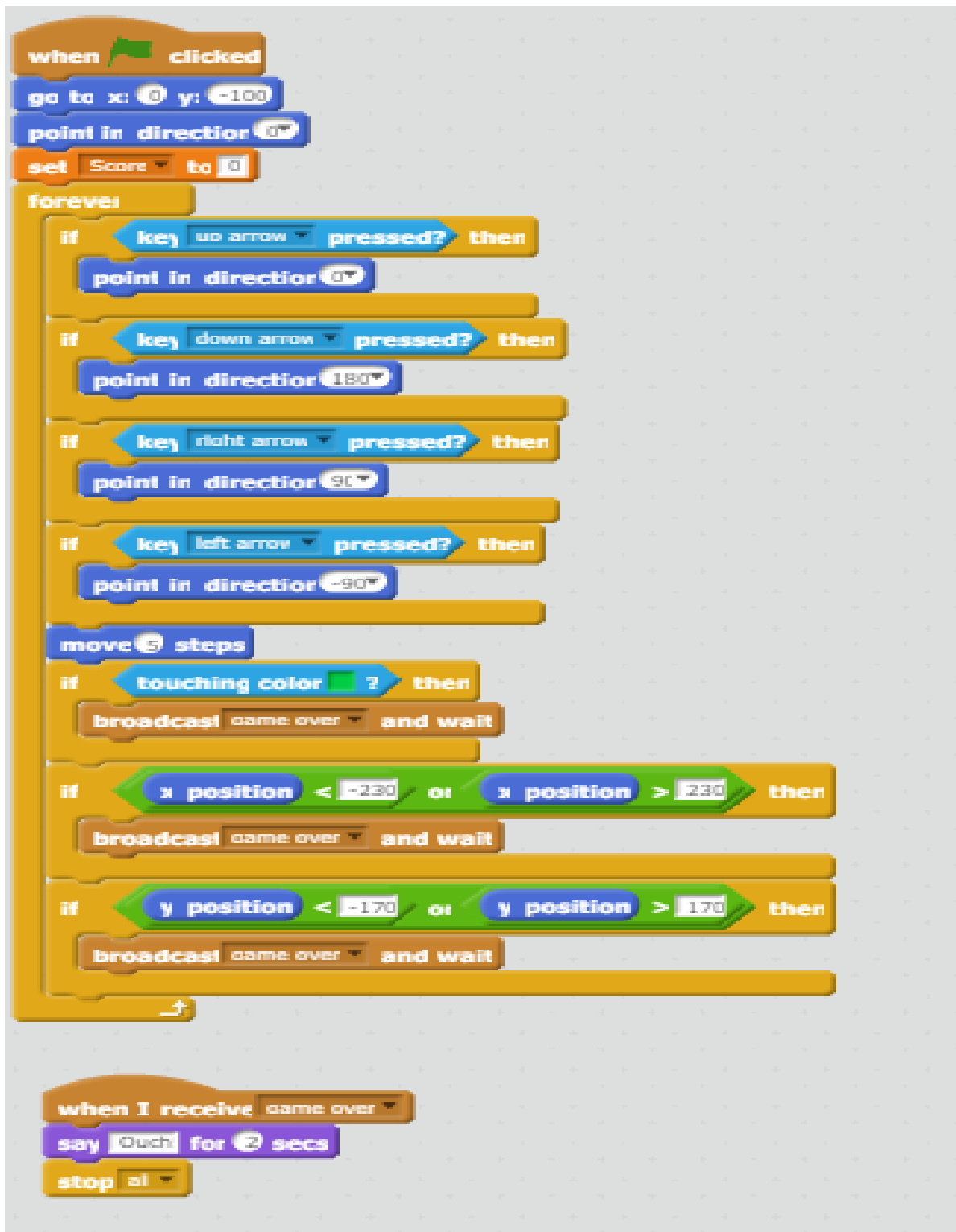


3. After this, students should write the function for the blocks.

The head moves based on the key the user presses. It starts off in a certain place. When you up, left, right and down the block goes up, left, right and down respectively. Then, you should set the settings so that when the x coordinate is less than what is occupied by the wall, the player dies. duplicate this block and switch w and s for up and down. Next, you have to make the ball. Also, make the setting so that when it touches anything for the color green, you die as well.

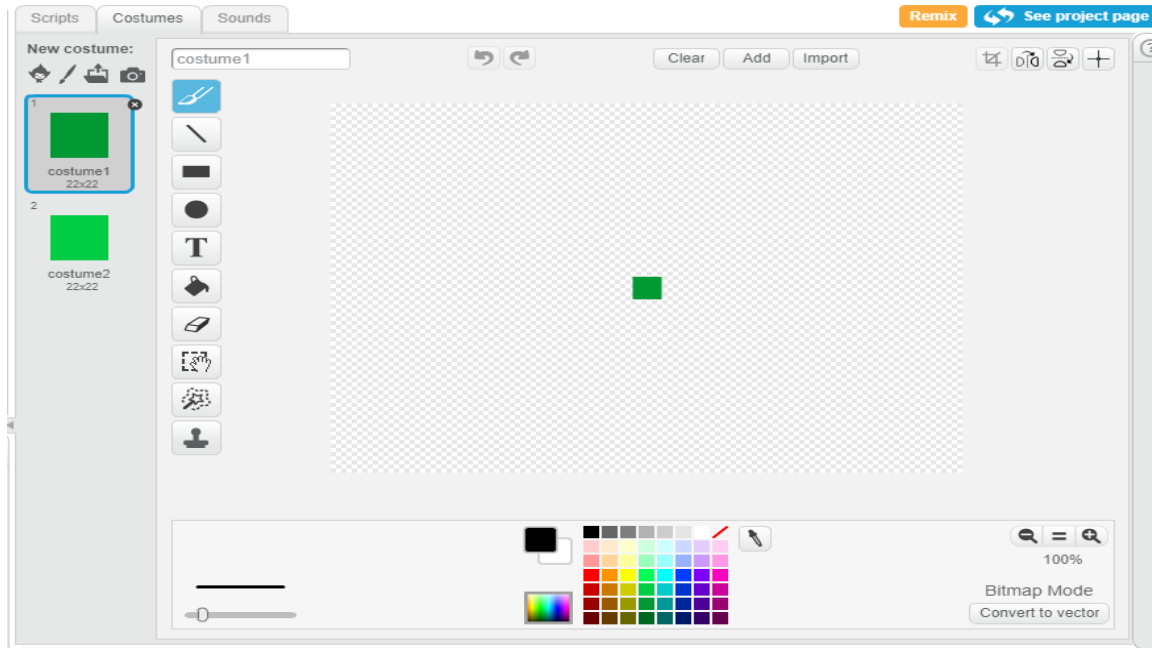
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4. Next, you make the body of the snake.



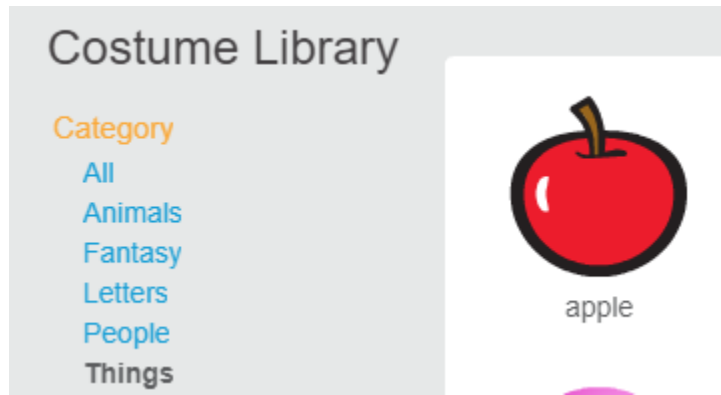
5. Then, you make the functions for the body:

The body is always going to its head, and it creates a clone of itself, changes the costume. Then depending on the score, it changes its costume.





6. Finally, you have to make the apple.



7. Next, make the code.

This apple is constantly moving. So, whenever it touches the snake, the score increases and it randomly moves to a new spot.



8. Once you are satisfied with their project, they should add it to the CT Stem Studio.



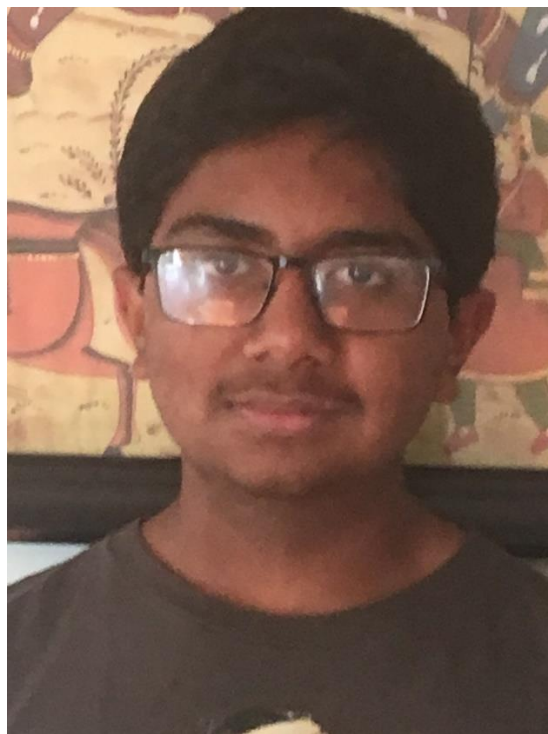


The material has been contributed by

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&

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