



# Minds in Motion

## Activity Title: Scratching the Surface

### Activity Rundown:

In this activity you will be using the application called Scratch as an introduction to coding! Scratch is an interactive online program that allows participants to learn coding through a drag and drop format. As you work through our challenges and games you will learn the skills needed to code your very own online game!

### You will need:

- + Internet
- + Computer

### Let's do it!

- 1) To open up the program scratch follow this weblink: (<https://scratch.mit.edu/>)
- 2) Write down the list of mini-challenges and search around the platform until you are able to complete all of the following challenges. By completing these mini challenges you will gain the basic knowledge needed to work with the platform! Good luck!





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## **Mini Challenges:**



- a. When the green flag is clicked, get the cat sprite to say “Hello world!”
- B. Change the background. Do this by clicking “Stage” on the far-left hand side, then “Backdrops” in the middle section of the coding area. Then you may paint their own, use one of the existing ones, or import one.
- c. Create a second sprite, using one from the library.
- d. Using the arrow keys, have your sprite move left, right, up, and down.
- e. Make the cat sprite “walk” across the screen. (Hint: use costumes)
- f. Make the sprite draw a rectangle/square/other shape when the green flag is clicked. (Hint: use the pen feature)
- g. Now draw a square using a loop
- h. When the B key is pressed, make the sprite get larger. When the S key is pressed, make the sprite get smaller. When R is pressed, reset the sprite to its original size.
- i. Make the sprite follow the cursor around the screen after you have clicked on the sprite.
- j. Make the sprite move randomly around the screen when the green flag is clicked.
- k. Make the sprite draw a line as you move it around with the arrow keys.

**\*\* Solutions to all challenges are provided in the background information section, along with a very high-level overview of Scratch and how it works.\*\***

## **Making your own games:**

If any of you at home are completing all the challenges very quickly, then you can begin to create playable games. You can make up your own idea or use one of the following ideas:

### **1. Collect the Coins Mini-Game**

- In this game, get your cat sprite to move with the arrow keys to collect coin Sprites
- You will need a character sprite and a coin sprite.



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- **Step 1:** Get your character to move with the arrow keys
  - **Step 2:** Detect if a coin is touching the cat and make the coin hide
  - **Step 3:** Make the coin reappear after a random amount of time
  - Duplicate the coin sprite to add more coins to the game.
  - **Extra challenge:** Find a way to keep a score of coins collected (**Hint:** use a broadcast, and create a data variable)
  - **Extra challenge:** Have coins appear and disappear after random amounts of time
2. **Cat and Mouse Mini-Game**
- In this game, you will play a mouse trying to escape from a cat!
  - Create a cat sprite and a mouse sprite.
  - **Step 1:** Get your mouse to move with the arrow keys
  - **Step 2:** Make the cat follow the mouse sprite and check if it has caught the Mouse.
  - **Step 3:** Make it so that if the cat touches the mouse, the cat eats it and says “Game over!”
  - **Extra Challenge:** Change your game into a two player game, where one player controls the cat and one player controls the mouse.
3. **Maze Mini-Game**
- **Step 1:** Create a maze. You may download one from a maze generator or you may draw your own.
  - **Step 2:** Make your chosen sprite or character move with the arrow keys
  - **Step 3:** Make it so that the sprite cannot go through the walls of the maze (hint: use the color of the maze walls...)
  - **Step 4:** Make it so that when the green flag is clicked, your sprite goes to the beginning of the maze.
  - **Step 5:** Create a goal for your sprite to reach at the end of the maze. When the goal is reached, display a message.
  - **Extra challenge:** add obstacles, moving parts, or enemies to avoid
  - **Extra challenge:** add different levels to your maze

**\*\* Solutions to all challenges are provided in the background information section, along with a very high-level overview of Scratch and how it works.\*\***



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## Background:

### *Scratch*

#### How does Scratch work?

- Programming is done by dragging and dropping blocks into the coding space.
- The coding changes the actions and functions of sprites - which are essentially objects. A sprite can be a character, a line or picture you draw in the editor, or even an image from google.
- You can program each sprite individually to perform functions or tasks.
  - **Note:** make sure you have selected the proper sprite when you are trying to code something specific to that sprite
- Sprites can interact with one another and the background.

#### Code Block Categories

- **Motion:** for moving a sprite around, rotating it, etc.
- **Looks:** talking and thinking bubbles, showing and hiding sprites, changing costumes and backgrounds, changing sizes of sprites
- **Sound:** playing sounds; edit volume, duration, tone etc.
- **Pen:** using sprites for drawing as part of a program, clearing drawings, changing pen size and color
- **Data:** used to make variables and lists... probably won't need to know much about this except for keeping track of a score in a mini game
- **Events:** use these to make a statement like "when SOMETHING happens, do (CODE HERE)"
  - Always start a block of code with one of these or nothing will happen
- **Control:** loops and if else type logic statements
- **Sensing:** used for sensing things like keys being pressed, location of sprites, whether something is touching a certain color, inputting data from the user
- **Operators:** used for making mathematical comparisons and doing mathematical operations
- **Other:** Make your own blocks. You probably shouldn't try to do this - if you have more experience with scratch, they can probably do it.



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## ***Mini Challenges Solutions***

1. When the green flag is clicked, get the cat sprite to say "Hello World!"



2. Change the background. Do this by clicking "Stage" on the far left hand side, then "Backdrops" in the middle section of the coding area. You may paint their own, use one of the existing ones, or import one.

3. Create a second sprite, using one from the library.



4. Using the arrow keys, have your sprite move left, right, up and down.



OR



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5. Make the cat sprite “walk” across the screen. (Hint: use costumes)



6. Make the sprite draw a rectangle/square/other shape when the green flag is clicked.



(This is for a square. If you want to do a rectangle, you cannot use a loop)

7. When the B key is pressed, make the sprite get larger. When the S key is pressed, make the sprite get smaller. When R is pressed, reset the sprite to its original size.



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8. Make the sprite follow the cursor around the screen after you have clicked on the sprite



(You don't necessarily need the "point towards" block)

9. Make the sprite move randomly around the screen when the green flag is clicked.



10. Make the sprite draw a line as you move it around with the arrow keys.





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## *Mini Games Solutions*

### 1. Collect the Coins Mini-Game

- **Step 1:** Get your character to move with the arrow keys

(Code for the cat sprite)

- **Step 2:** Detect if a coin is touching the cat and make the coin hide

(Code for a coin sprite)

- **Step 3:** Make the coin reappear in a different location after a random amount of time

(Code for a coin sprite)

- **Extra challenge:** Find a way to keep a score of coins collected
  - Create a new variable (for all sprites) called Score. Do this by clicking on the “Data” section, then “Make a Variable”
  - When you add the broadcast block in the if statement, make sure you name your message (ie. coin collected)
  - Add the following code to the coin sprite
- **Extra challenge:** Make your coins move around the screen to make the game more difficult
  - The motion sequence added at the bottom of the loop can be changed/written in a lot of different ways; it doesn't have to be exactly like mine

### 2. Cat and Mouse Mini-Game

- **Step 1:** Get your mouse to move with the arrow keys

(for the mouse sprite)

- **Step 2:** Make the cat follow the mouse sprite and check if it has caught the mouse.

(for the cat sprite)

- To increase the difficulty, increase the number of steps for each loop.





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- **Step 3:** Make it so that if the cat touches the mouse, the cat eats it and says “I won!”

(for the cat sprite) AND (for the mouse sprite)

- **Extra Challenge:** Change your game into a two-player game, where one player controls the cat and one player controls the mouse.

### 3. Maze Mini-Game

- **Step 1:** Create a maze. You may download one from a maze generator or you may draw your own.
  - upload the maze as a new sprite, or as a backdrop
- **Step 2:** Make your chosen sprite or character move with the arrow keys
  - as above
- **Step 3:** Make it so that the sprite cannot go through the walls of the maze (**hint:** use the *color* of the maze walls...)

(For the character sprite)

- **Step 4:** Make it so that when the green flag is clicked, your sprite goes to the beginning of the maze.
  - You will have to figure out the coordinates that you want to start at. A good way to do this is to move your mouse to the location that you would like your sprite to start at, and look in the bottom right corner to find the coordinates at this point.
  - Then add the following block at the top of the code from step 3

(For the character sprite)

- **Step 5:** Create a goal (another sprite, a red x) for your sprite to reach at the end of the maze. When the goal is reached, display a message.

(For the character sprite)

- **Extra challenge:** add obstacles, moving parts, or enemies to avoid
- **Extra challenge:** add different levels to your maze



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## **Reach out!**

We would love to hear from you about all the amazing STEM projects you are doing at home! Show us your finished products on any of the following social media platforms by tagging us or by using the following hashtags. We hope these projects have brought some excitement to your day during these difficult times.

Let us know how we did! Please [click here](#) to fill out a short survey on how well we did and what you would like to see more of in the future. Thank you!

Twitter: **@MyMindsInMotion**

Facebook: **@mindsinmotion2014 & @ucactiveliving**

Instagram: **@ucalgaryactive**

Please use the following hashtags!

**#ucalgarycamps #ucalgarytogether**