Student Sheet: "iGRASSHOPPER"

Name: _____ Date: _____ Session #: ___

## Part I: Creating Original Sprites

Follow the steps below in order.

1. In the last session, you created an account and explored the Scratch interface. Please go to an Internet browser and type in: scratch.mit.edu. Then, please log in using your login credentials. (Remember to keep your username and password safe!)

2. Select "Create" from this bar.

3. In the bottom right, delete Scratch the Cat by clicking on the "X".
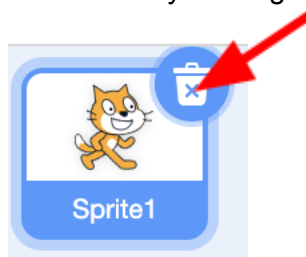
4. You will now learn how to create a sprite of your own. In the sprite pane, click on the "New Sprite" icon. When you do, you will see the following. Select "Paint" (as shown).
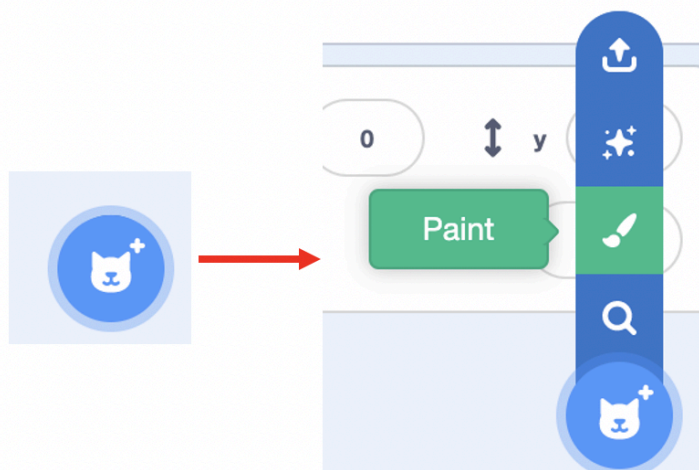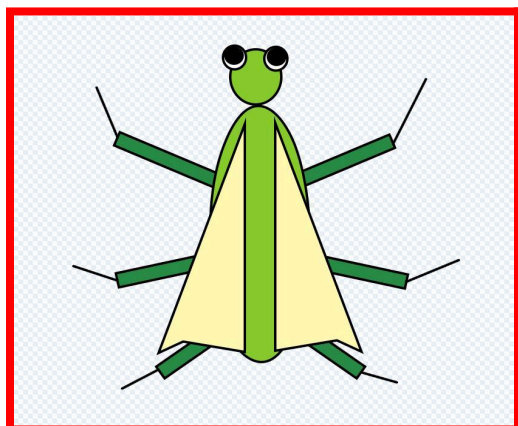
(continued)

5. Use the tools in the left of the center pane to create the grasshopper "robot" (shown below). You will need to experiment with the "Drawing Tools", the "Fill" and "Outline" (all circled in red below).
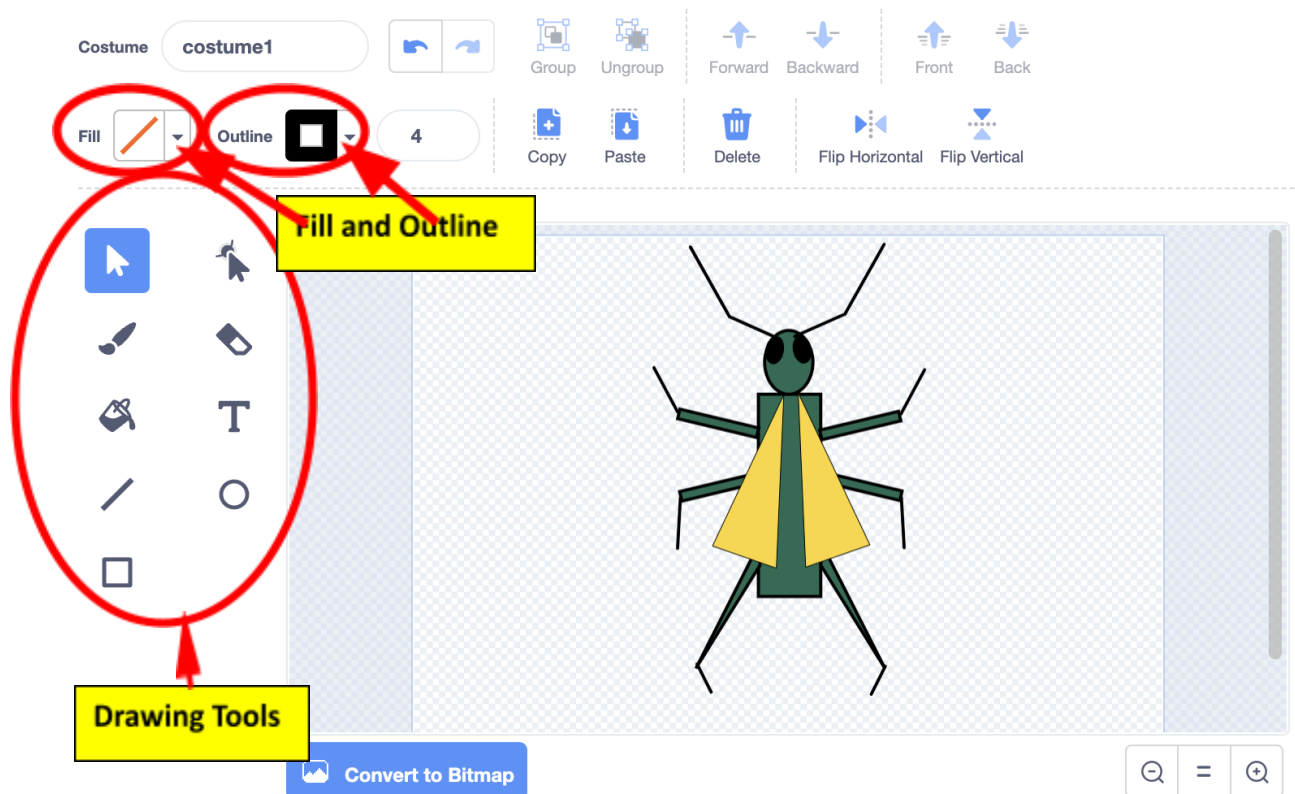
6. When you have finished drawing/making your grasshopper robot, take a screenshot of it, and place it in the box below.
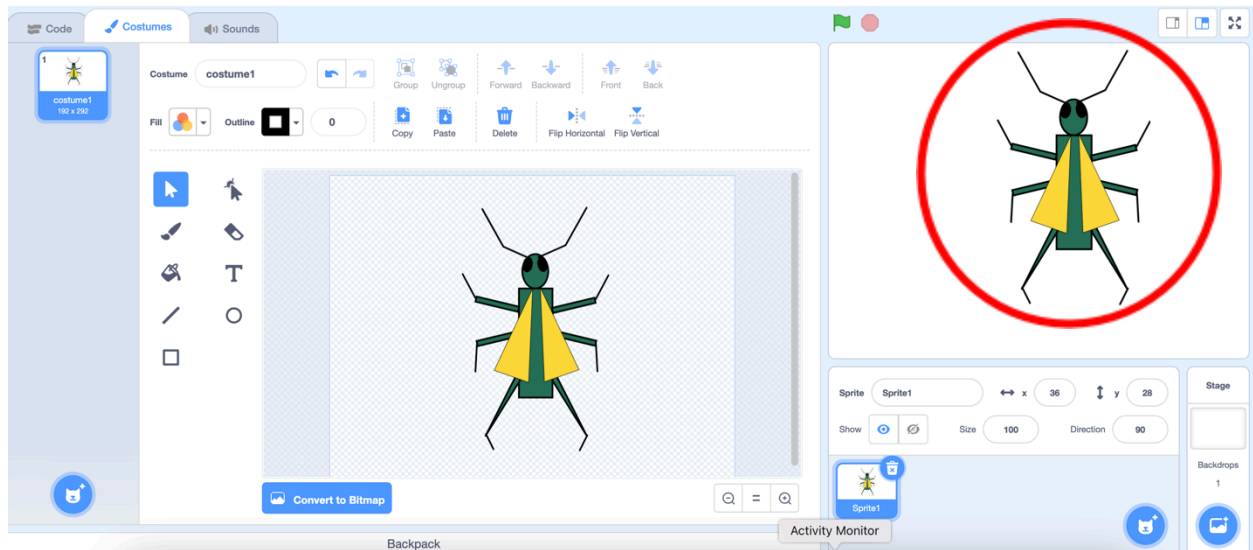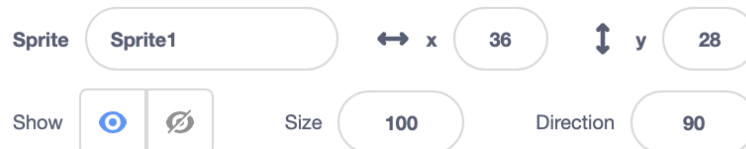
My Grasshopper Robot

Part II: Making It Move

Congratulations! You have created your own sprite! As you created this grasshopper robot, you may have noticed it also appeared in this pane on the right (circled in red in the image below).

7. Experiment with these command functions in this pane.

A. What happened when you changed the "*x*" value?

   Changing the x value causes the sprite to move across the x-axis (left and right)
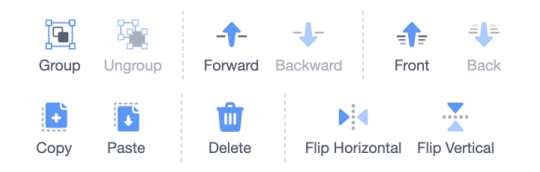
B. What happened when you changed the "*y*" value?

   Changing the y value causes the sprite to move across the y-axis (up and down)

C. Make the "*x*" value 0 and the "*y*" value 0. Where is the grasshopper when you do this?

   The sprite is in the center of the screen

8. Return to the drawing pane in the center of the screen, and experiment with these "buttons".

Group Ungroup | Forward Backward | Front Back

Copy Paste | Delete | Flip Horizontal Flip Vertical

(continued)

A. What happens to the grasshopper when you press "Flip Horizontal"?

Flip Horizontal

The value of x is multiplied by -1 causing the image to flip over the y-axis

B. What happens to the grasshopper when you press "Flip Vertical" ?

Flip Vertical

The value of y is multiplied by -1 causing the image to flip over the x-axis

9. Using the arrow (that looks like this   select the entire grasshopper robot that you have created.

10. Press "Copy"   make a second grasshopper by pressing "Paste"   .

Copy   Paste

11. Select BOTH grasshopper robots using the "select arrow". With both selected, press "Group"   .

Group

12. Now hover the arrow over the center of the larger square and grab the "crosshairs"   . Move the two grasshopper robots. (*You can also use the arrow keys on a computer keyboard to make them move*).

A. What did the "Group" tool do?

Combined all individual shapes to act as one

B. Make a sketch of the "Ungroup" button in the box to the right.

Ungroup Button

13. Delete one of the grasshopper robots and center the remaining grasshopper robot in the window.
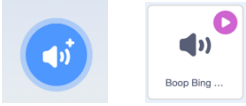
Part III: Using Code To Control Movements

Now it is time to use code blocks to make your grasshopper sprite move in a specified way. Use the table on the following page to change your grasshopper robot's looks. **IMPORTANT: When you want to reset the code for your sprite, use the following blocks.**
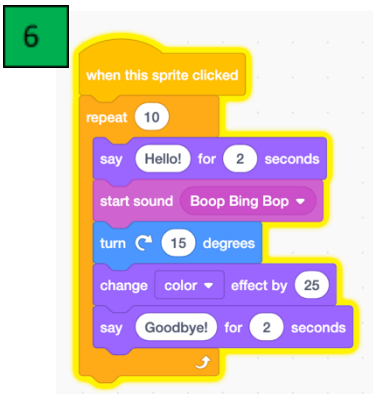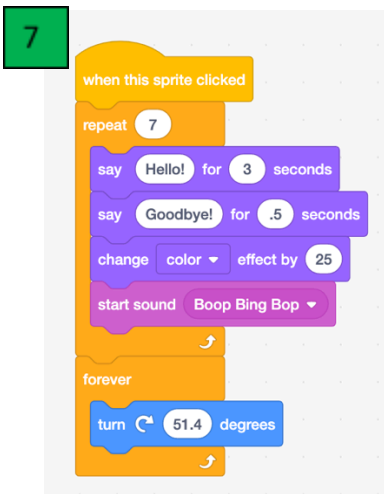
Note: It is handy to leave this block combination in the block pane to avoid having to re-build it over and over.

Task & Instructions	Code Blocks	Question(s) To Answer
Changing Color Assemble the blocks as shown in #1. Change colors. Then, assemble the blocks in #2 and experiment with the colors.		What colors can you make your grasshopper robot? Dark green, cyan, blue, purple, pink, red, orange. Which one of the effects in #2 is your favorite? Pixelate!
Other "Looks" Blocks Experiment with other "Looks" blocks. To start, assemble the blocks as shown in #3. Then, add the "repeat control" block in #4.		What happened when you added the "repeat control" block? The command will loop X amount of times
Adding Sounds 	Add a "play sound block" as shown below.	What happens to the grasshopper robot each time you hear the sound? The grasshopper robot changes color each time the noise is played

Task & Instructions	Code Blocks	Question(s) To Answer
Go to the "Sounds" tab. Click once on the "Add sound" button. Search for the sound called "Boop Bing Bop" and click on it.	**5** when this sprite clicked — repeat 10 — say Hello! for 2 seconds — start sound Boop Bing Bop — change color effect by 25 — say Goodbye! for 2 seconds	

(continued)

Task & Instructions	Code Blocks	Question(s) To Answer
Make It Spin Click on the blue "Motion" blocks. turn 15 degrees Place this block into the group of blocks so that the grasshopper robot turns 15 degrees before changing colors.	**6** when this sprite clicked — repeat 10 — say Hello! for 2 seconds — start sound Boop Bing Bop — turn 15 degrees — change color effect by 25 — say Goodbye! for 2 seconds	Let's assume we wanted the code to run forever. Which block would have to be changed, and which block would have to be added in its place? The "repeat" block should be a "forever" block" What values would you need to use in the "repeat" block and the "turn" block to make the grasshopper robot change colors once and make only 1 full rotation? The repeat block should say "repeat 1" and the turn block should say "turn 360 degrees"
Add a Forever Loop forever Add a forever loop to the block of codes and re-arrange to show the blocks in #7. (Make sure to change the numbers to match what is shown).	**7** when this sprite clicked — repeat 7 — say Hello! for 3 seconds — say Goodbye! for .5 seconds — change color effect by 25 — start sound Boop Bing Bop — forever — turn 51.4 degrees	What happens when you run this code? The grasshopper says "Hello" and "Goodbye" then it changes color and plays a noise. It does this 7 times in that same order. After the code has looped 7 times, the sprite spins by 51.4 degrees forever (until the program is stopped). What color is the grasshopper robot at the end? Brown Remove the "repeat" block. What happens now?

		The first four blocks (following the event block) each happen once. They no longer loop 7 times.

EXTEND YOUR THINKING: Admiral of Algorithms

Type the following link into an Internet browser and read the information found on that page.

https://www.engineergirl.org/123598/Grace-Hopper

After you have read the information on this page, view the video embedded there.

1. For what was Grace Hopper awarded the Naval Ordnance Development Award?

   For her success in programming the first computers.

2. What did Grace Hopper believe was the key to opening up new worlds to computing?

   Developing a computer language which could be understood without advanced mathematical or computer science knowledge.

*Answers to the following questions are **not found** in the article or in the video.*

3. Grace Hopper developed a coding language called COBOL (which stands for **CO**mmon **B**usiness **O**riented **L**anguage). This language is described as being "kept simple to allow non-programmers (or "The Business") to read it and understand it".

   Why do you think this is important?

   It allows for more people to create things using the power of computers without have advanced computer science knowledge. People with passions outside of technology can spread and develop their work "easily".

4. One night, when Grace Hopper was working on the Mark II, she and her colleagues faced a problem with this (room-sized) early computer. After taking the computer apart, the team realized that the cause of the problem was an actual moth. From this

experience, Hopper coined the phrase: "debugging" a computer. What do you think it means to "debug" a computer?

To remove or fix any issues ("bugs") interfering with the execution of the program.

To understand more about the timeline of computer development, type the following link into an Internet browser.

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

This will take you to the "Computer History Museum: Timeline of Computer History". Glance at some of the events. You will actually use this information again in a future lesson.