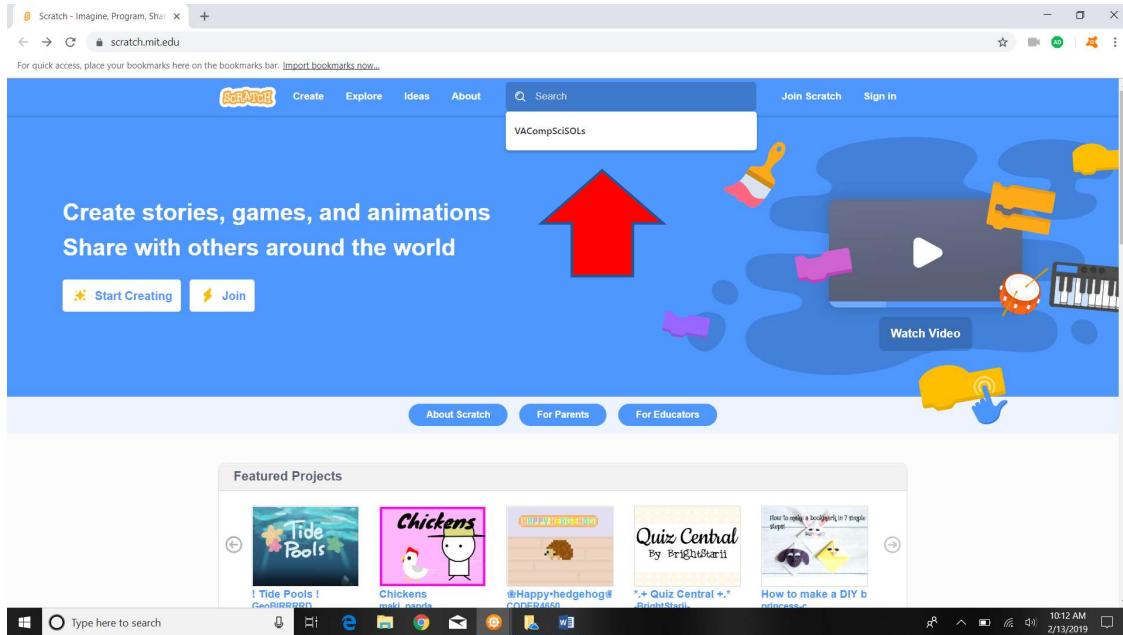


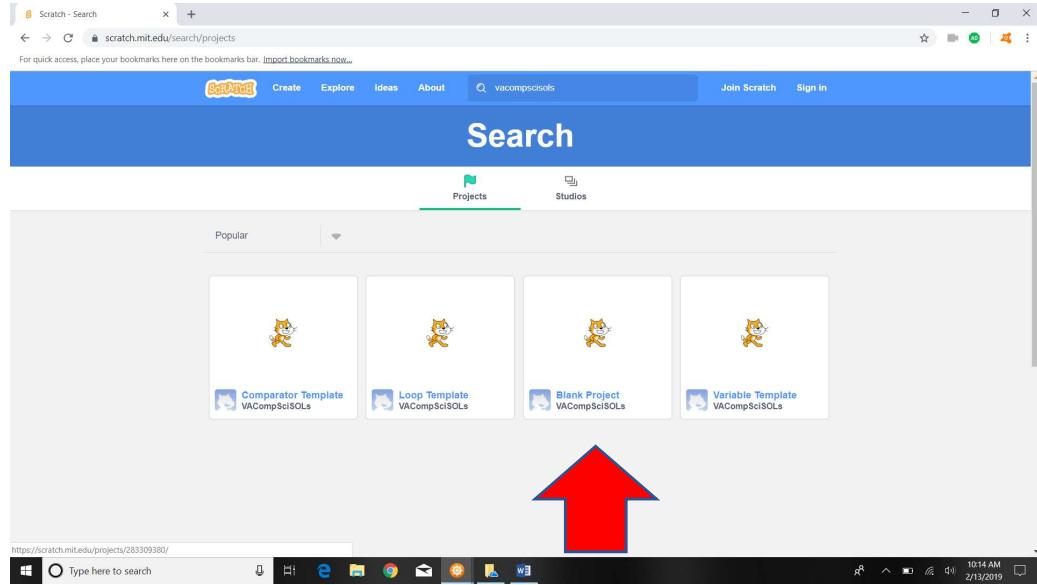
Scratch exercises

Getting started tutorial

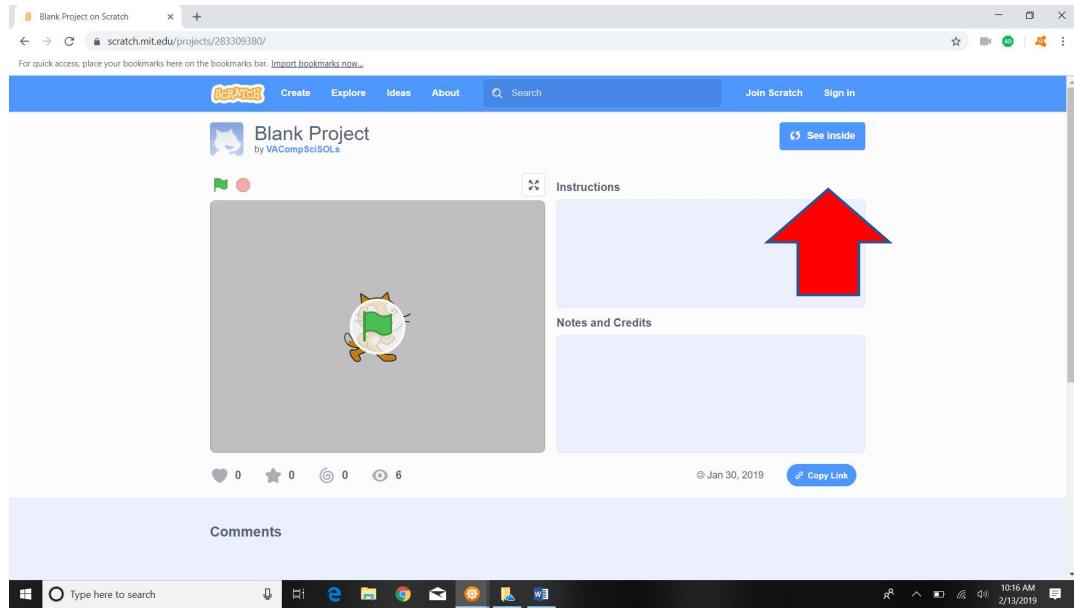
1. Instructions: go to <https://scratch.mit.edu> and type in “VACompSciSOLs” into the search bar and press enter.



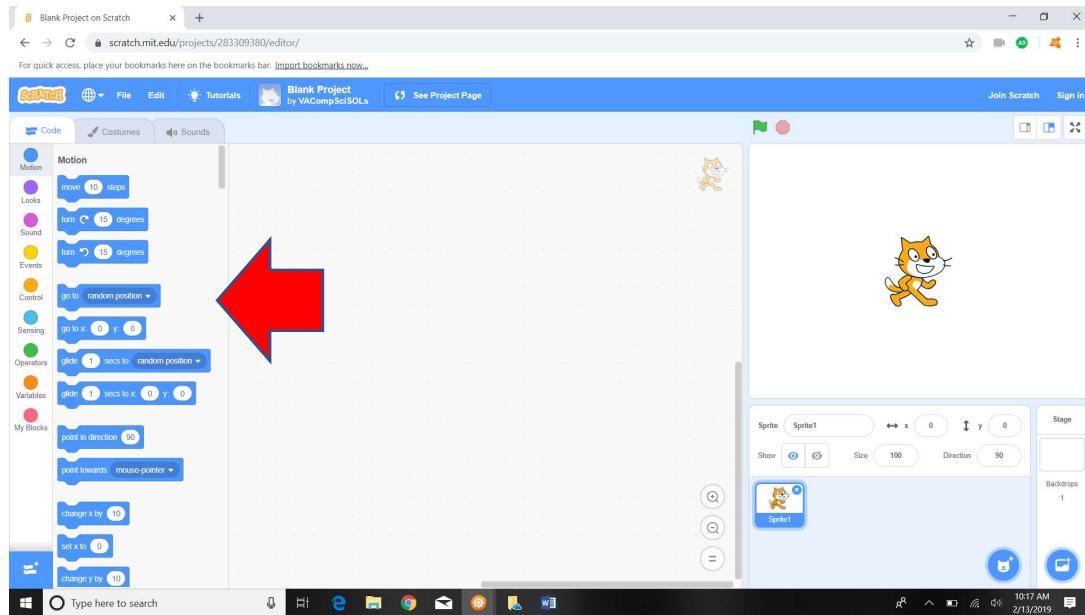
2. Click on “Blank Project”



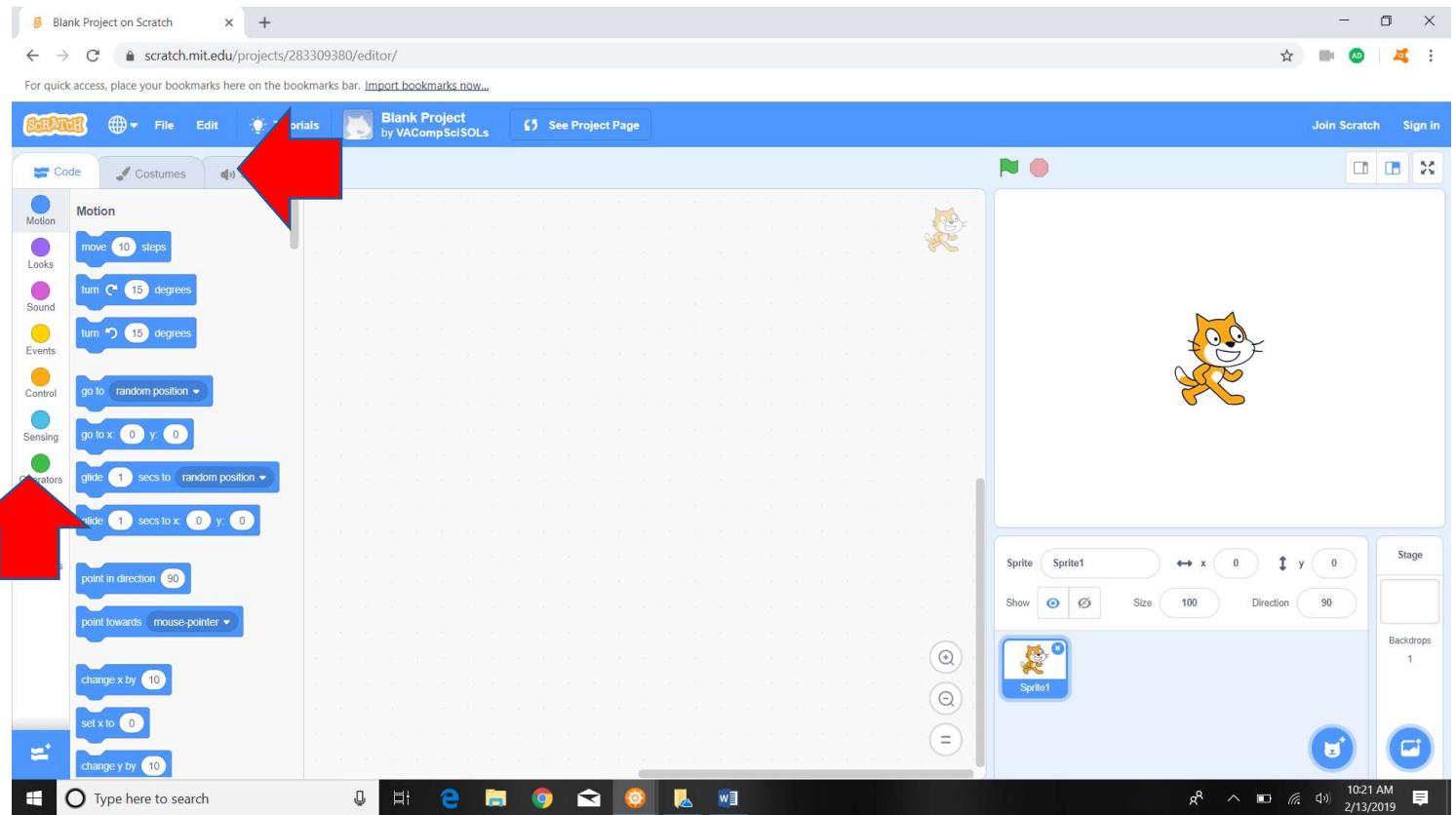
3. Then click the see inside button.



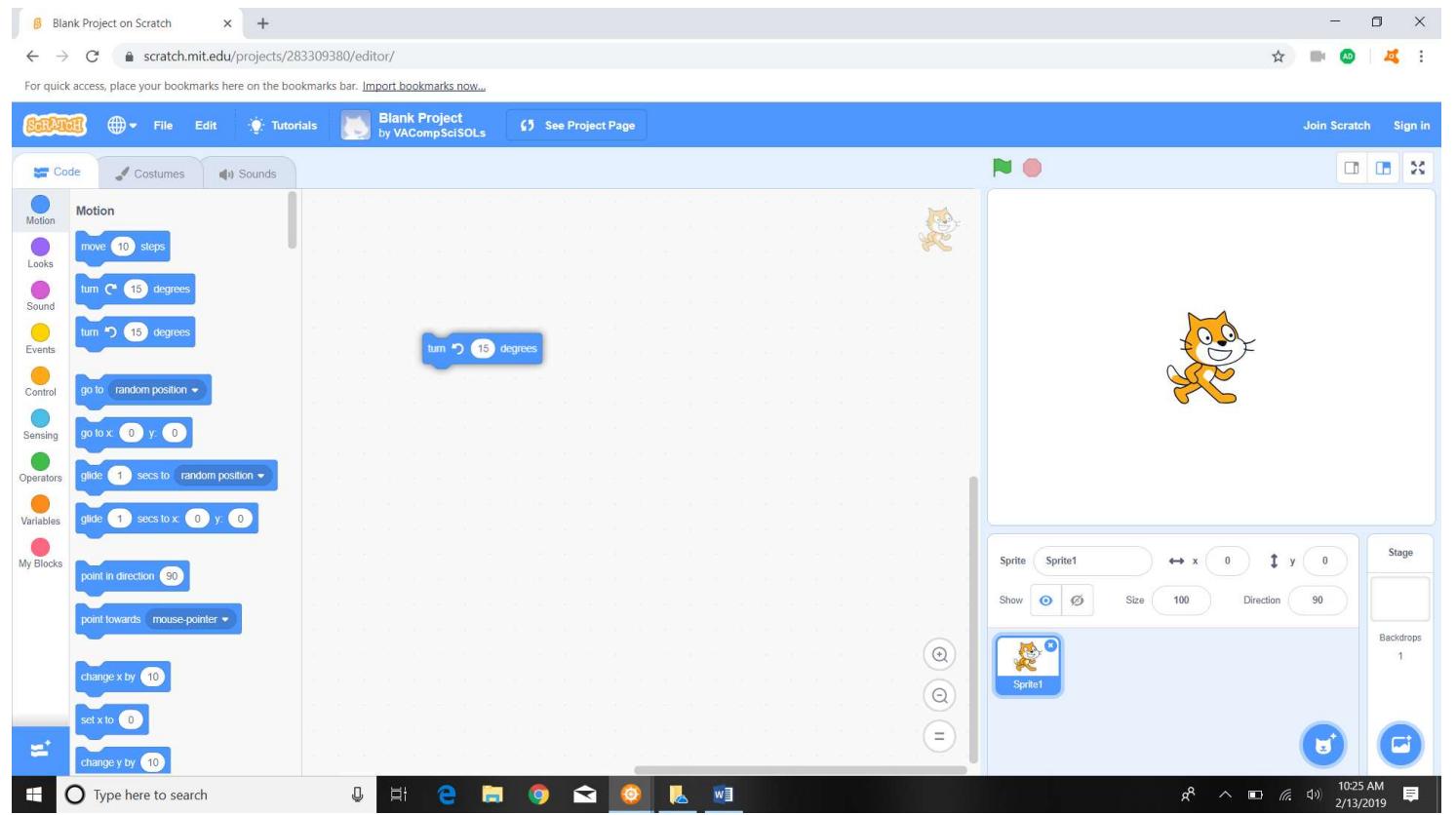
4. The “code” in Scratch is on the left panel



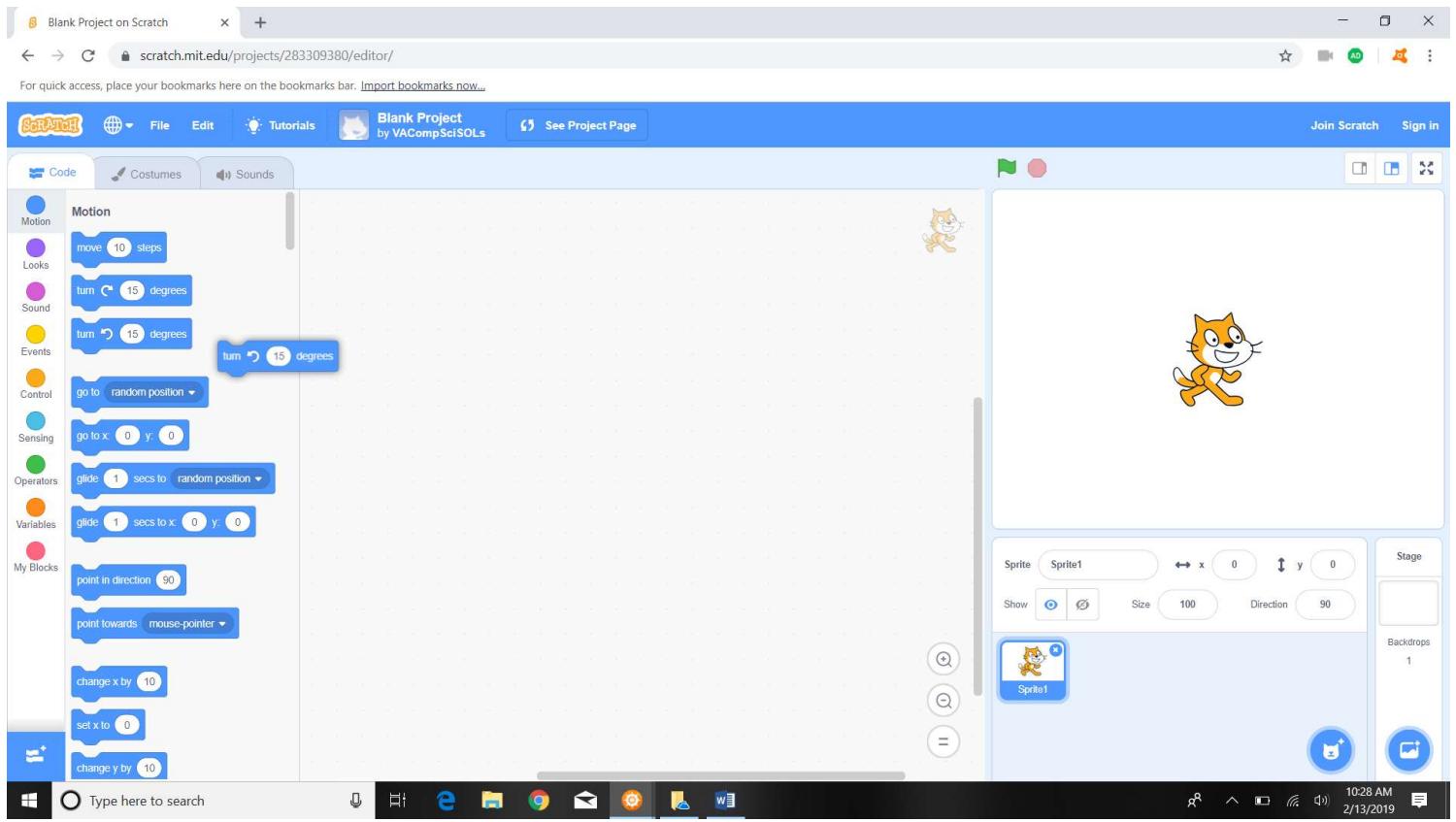
5. The “code” contains different actions which can be scrolled to or jumped to quickly using the buttons such as “motion”, “looks”, “sound”, “events”, etc.



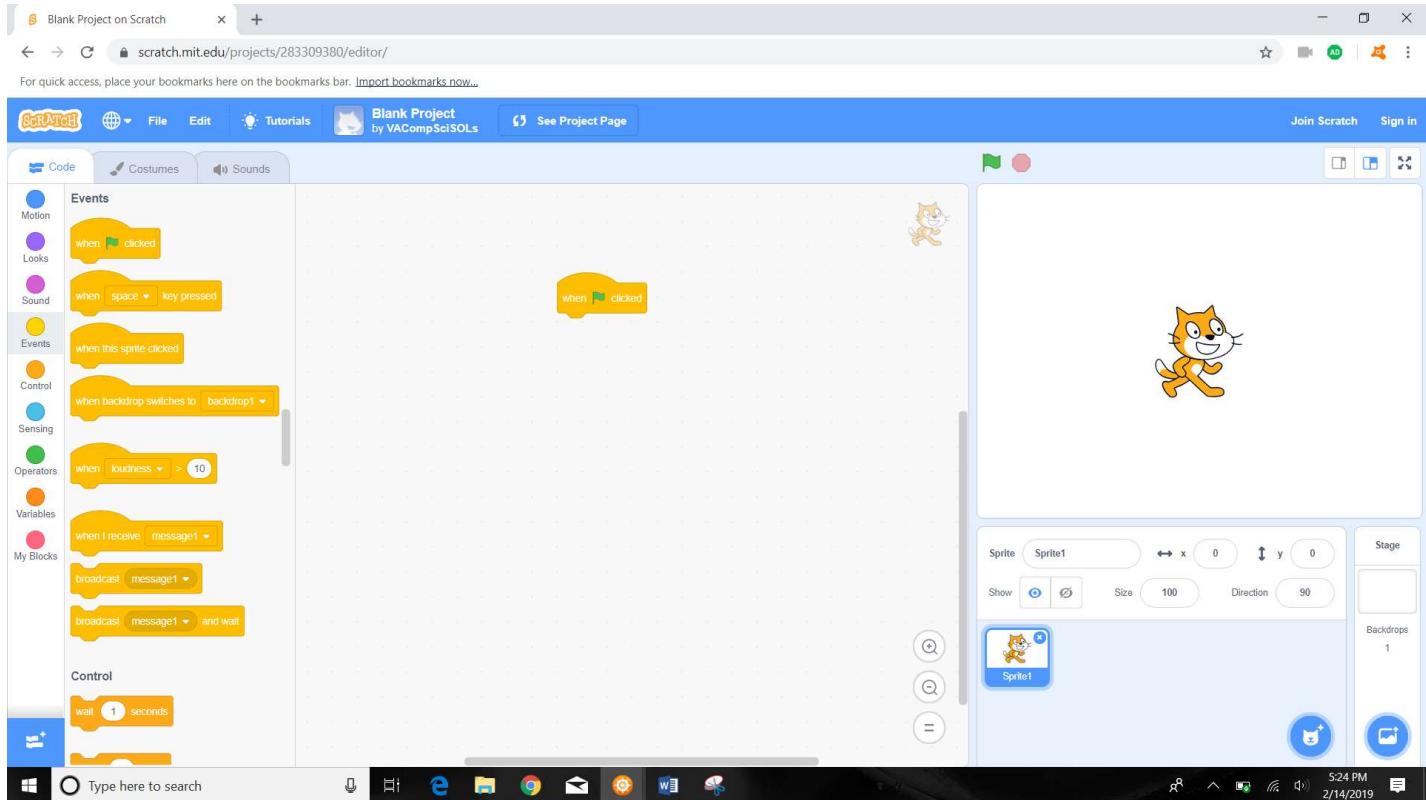
6. Code is “dragged” from the code panel into the middle panel by clicking an action with the mouse, holding and dragging the action until it is in the middle panel, and unclicking or releasing the mouse click while the action is in the middle panel.



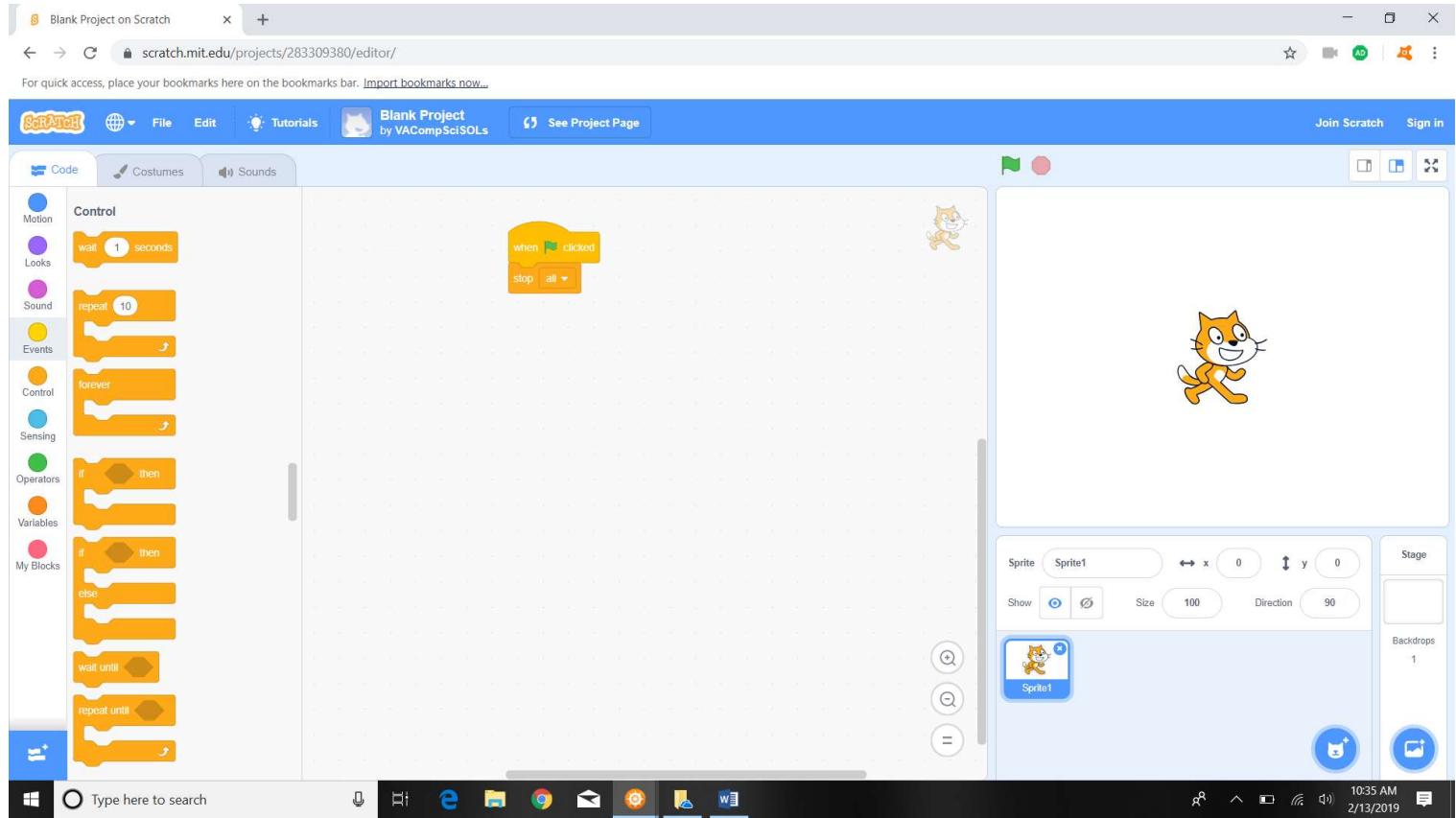
7. To “delete” or remove code click on the action segment in the middle panel you wish to remove and drag the action segment back to the left panel.



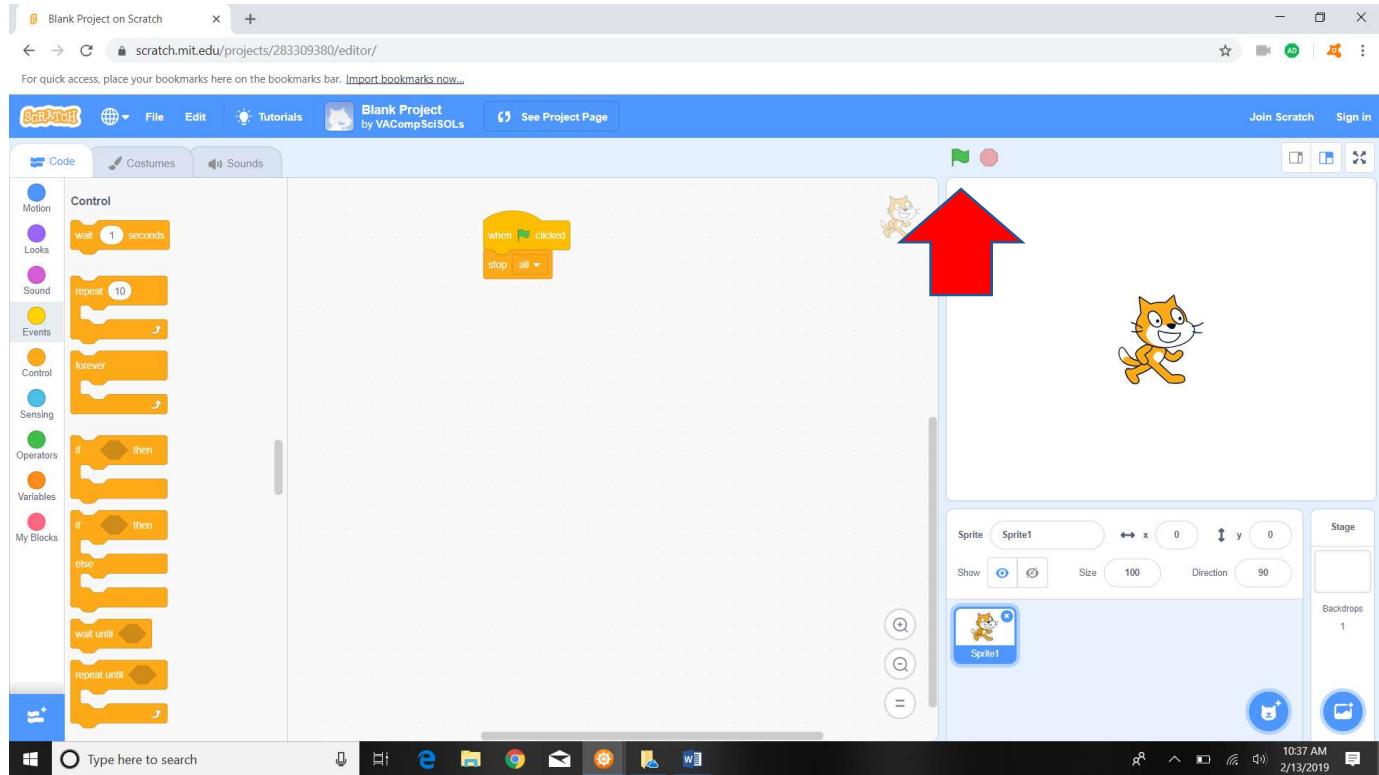
8. The user designed code created in the middle panel must know when to “start”. As such, the code must begin with the proper action piece. In Scratch the piece is and is located in “events” section and look as follows:



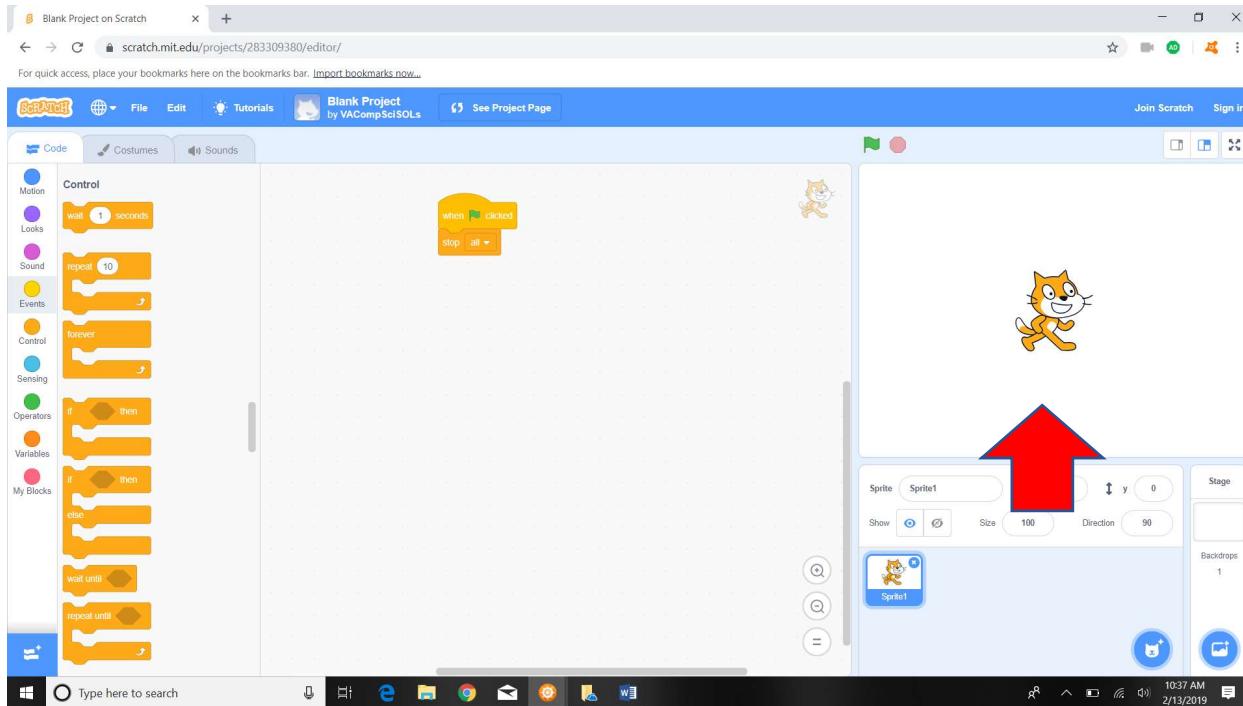
9. In order for the code to work, the action pieces must be “linked” together by fitting the puzzle pieces together. The screenshot above shows an “unlinked” chain and would not run. Below is a screenshot of the start and stop actions “linked”.



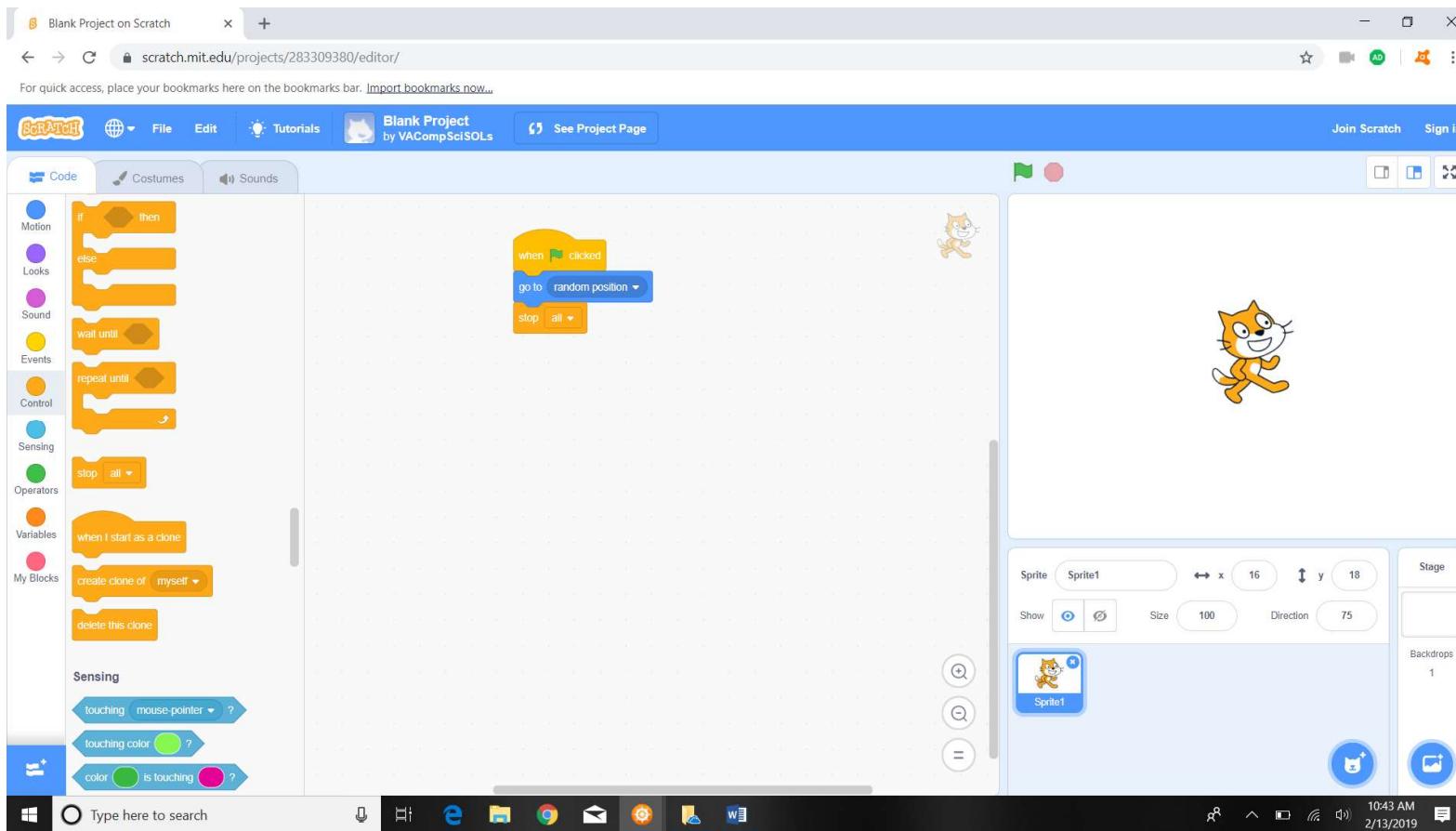
10. To “run” the code, press the green flag. Code that is incomplete/incorrect may need to be forcibly stopped after the green “run” code is pressed. To force stop code that is running, press the stop button that is located next to the green flag. This allows a student to fix the mistake and run the code again.



11. The scratch cat in the right panel should perform the coded actions.

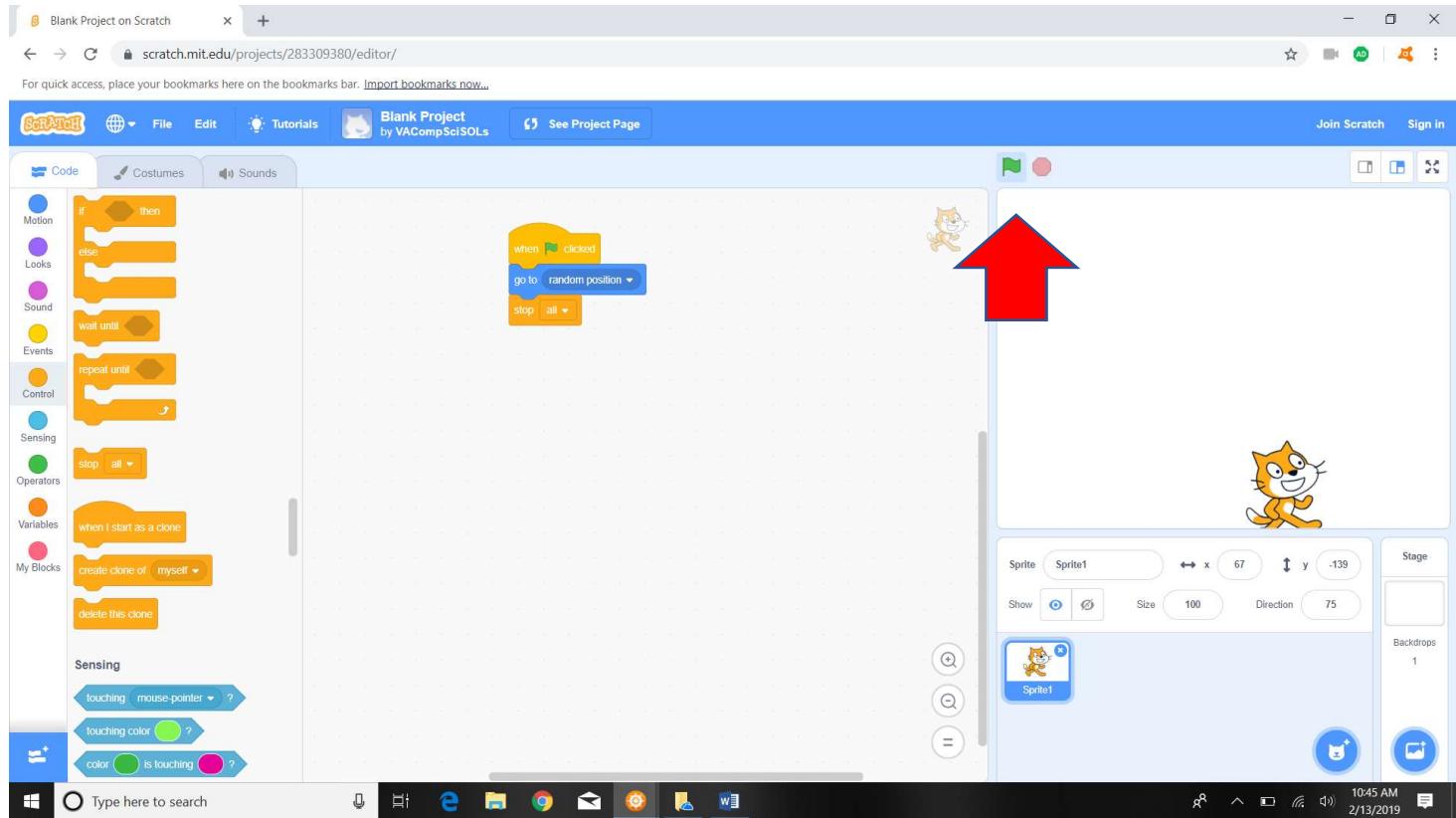


12. To get familiar with Scratch, code this simple exercise (the go to random position action can be found in the “motion” section) see next picture for zoomed in code:





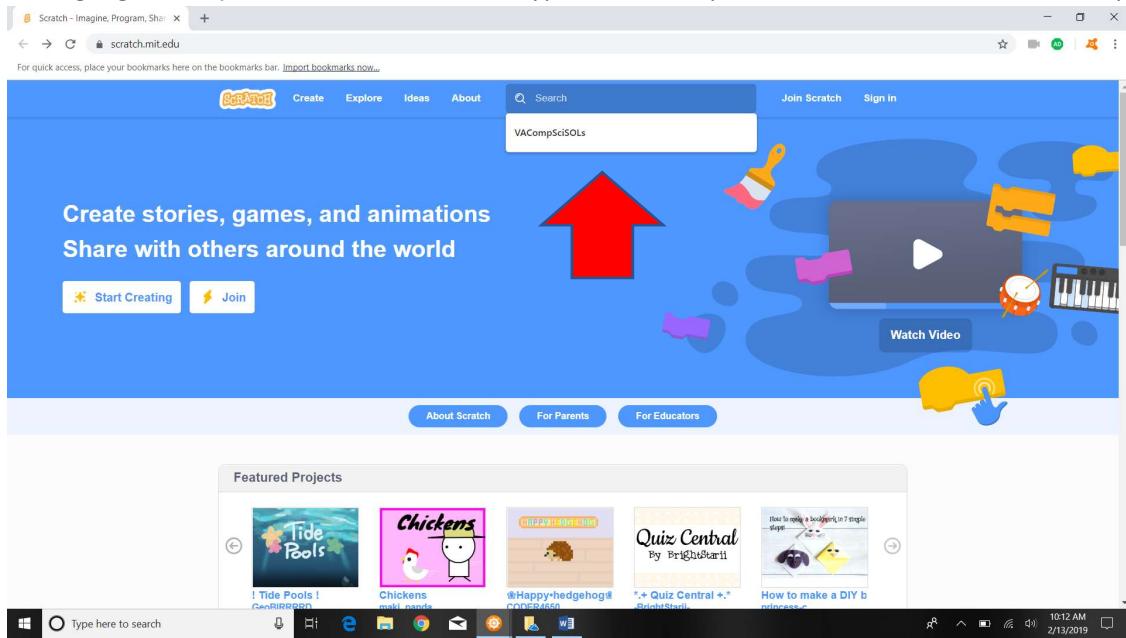
13. Once this code is linked together in the middle panel, press the green flag to run the code and the scratch cat in the right panel should move around every time the green flag is pressed.



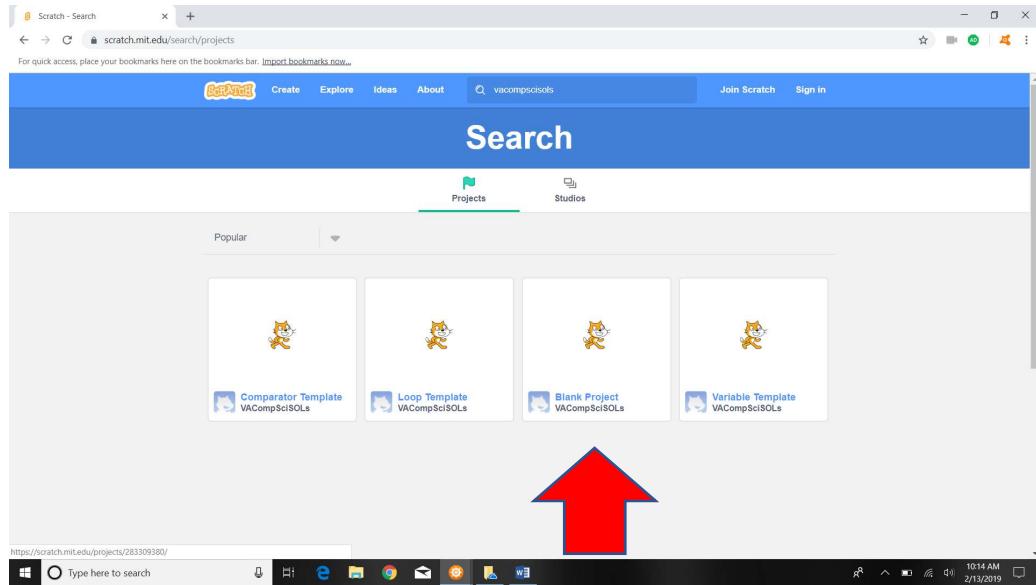
Exercise #1

Question #1

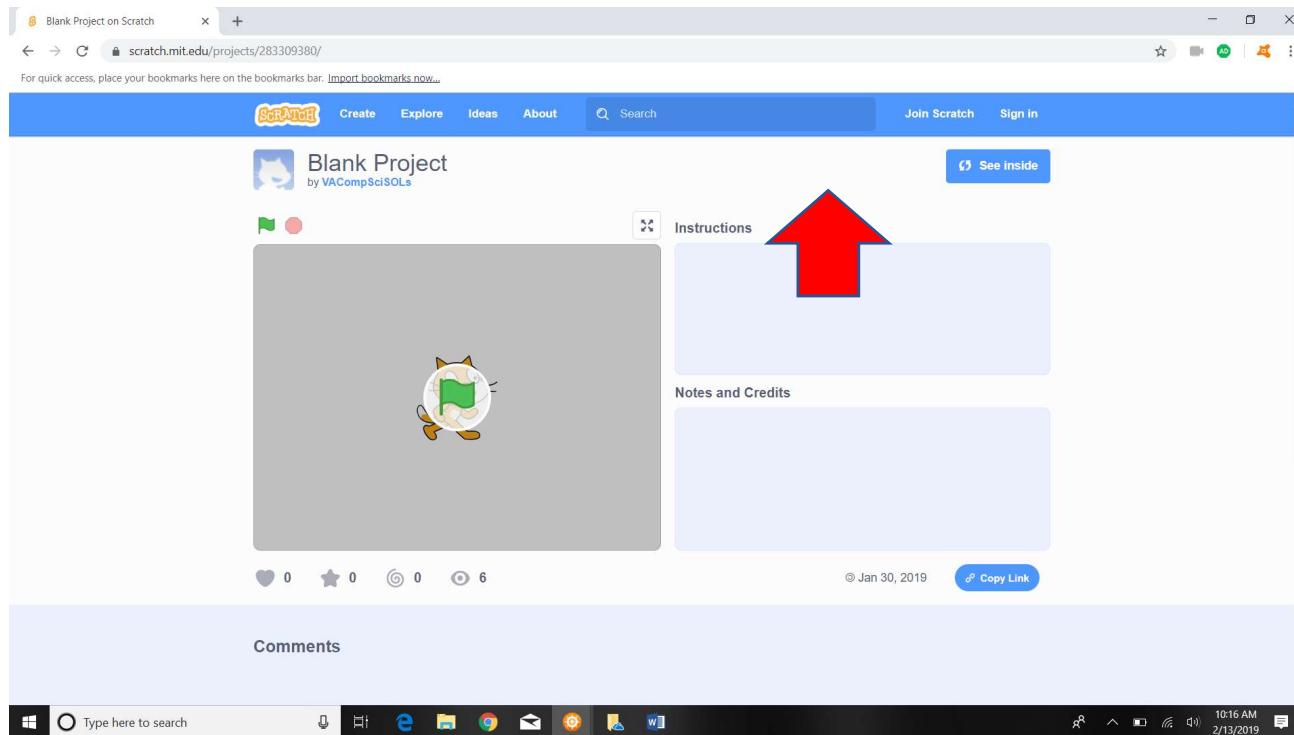
1. To begin go to <https://scratch.mit.edu> and type in “VACompSciSOLs” into the search bar and press enter.



2. Click on “Blank Project”



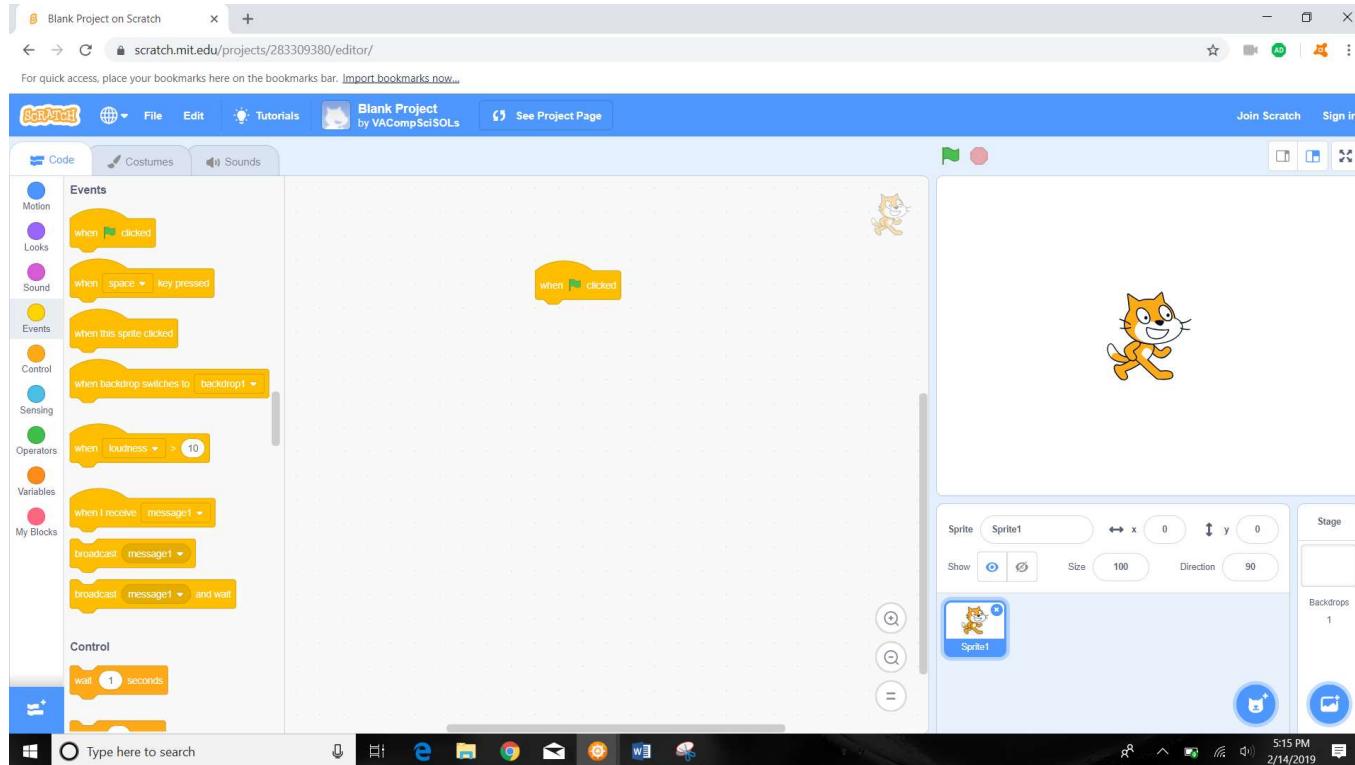
3. Then click the see inside button.

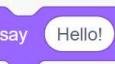


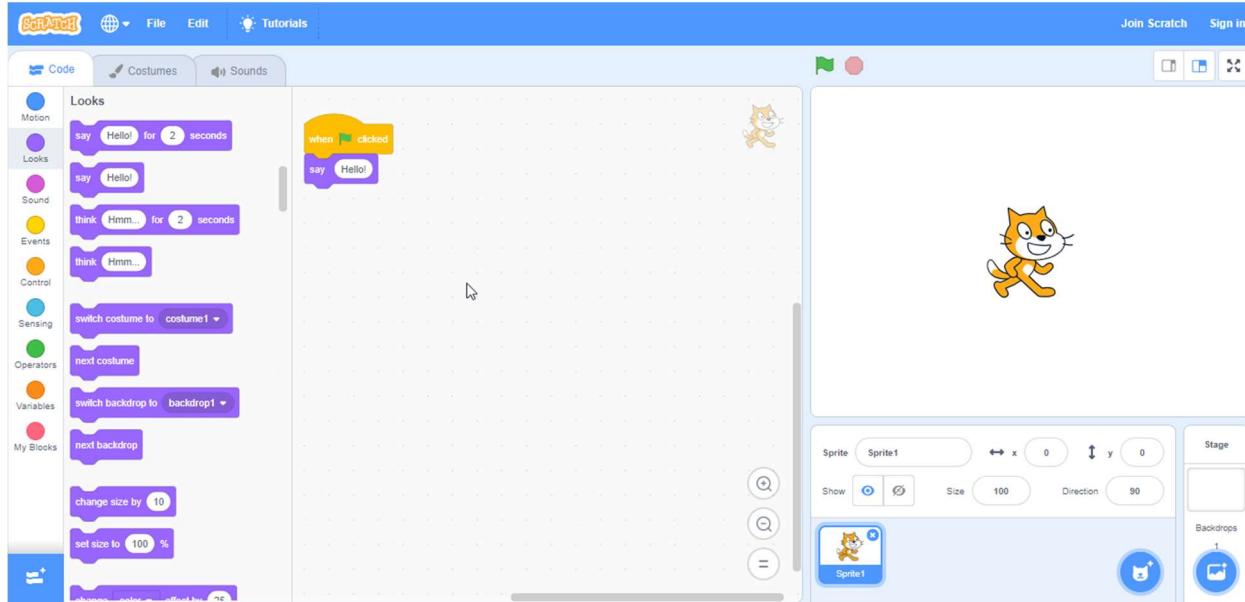
4. To begin, add the “start” code by going to the code section on the left and clicking on the “events” button. Drag the



action to the middle of the screen.



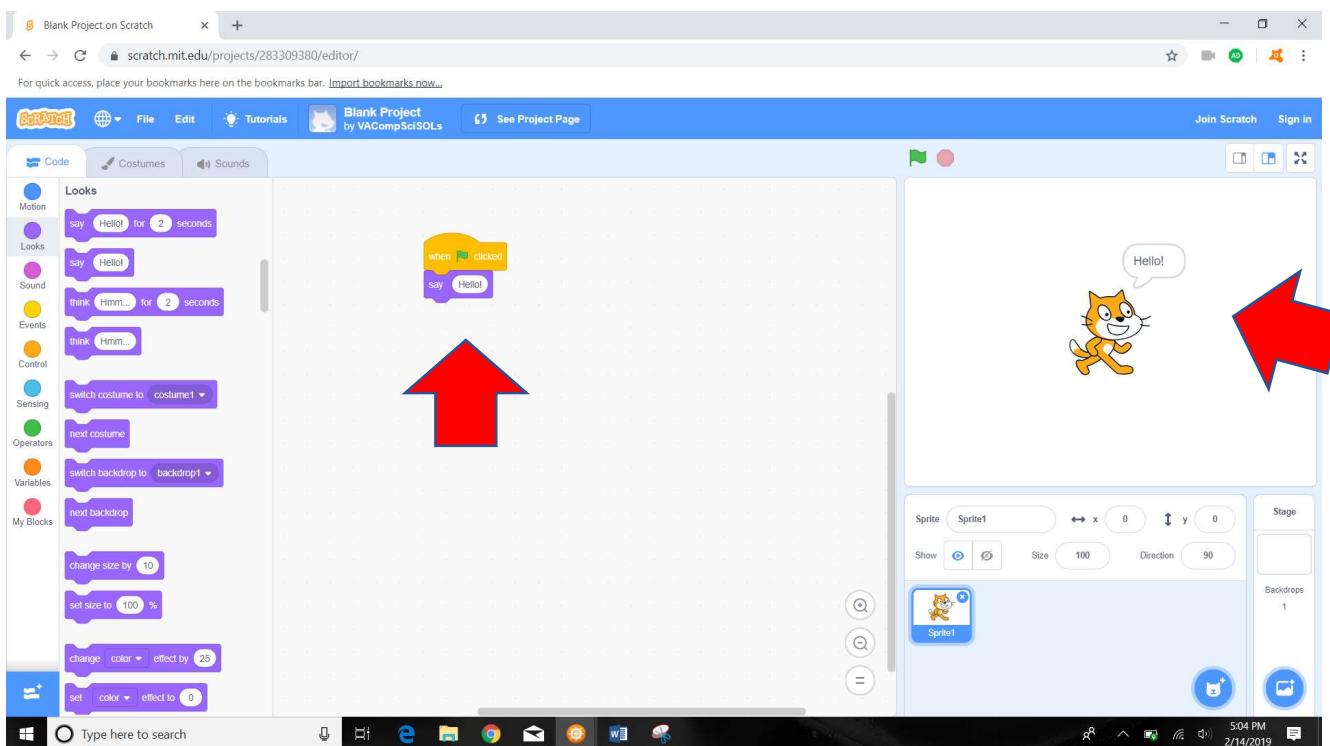
5. Next, in the code panel, click on the “looks” button  and drag the “say Hello!” piece  to the middle panel and snap it to the bottom of the other piece.



6. Click on the green flag  to run the program.



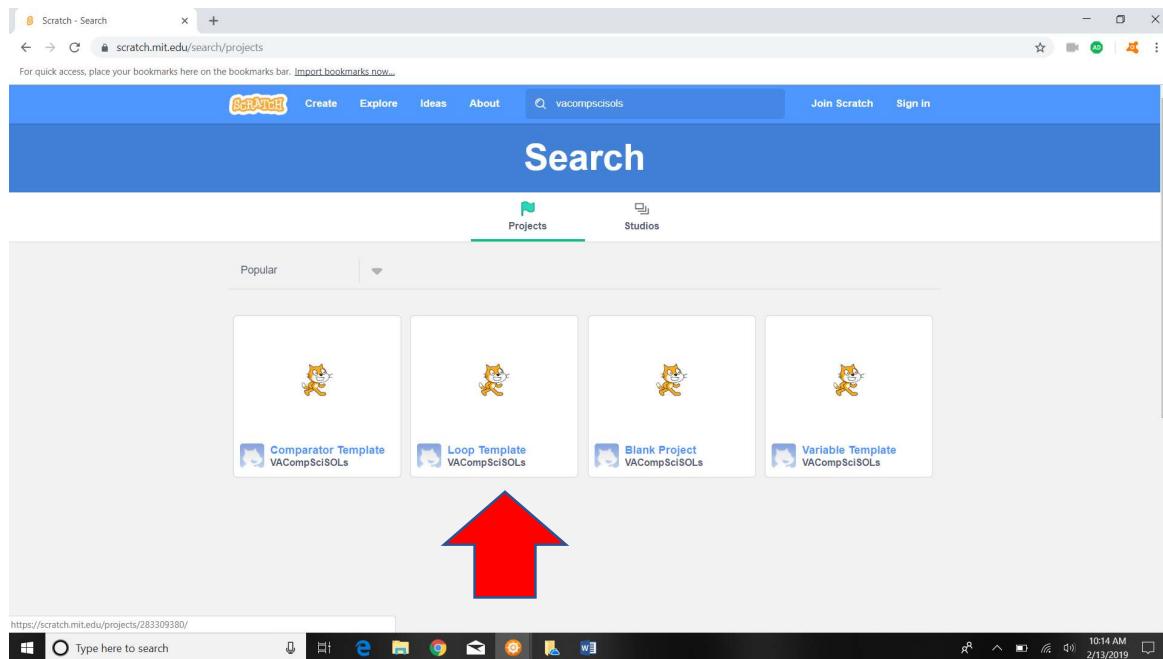
7. Students will raise their hand and show you the screen before they move on to the next question. The final screen should look like this:



Question #2- Loops

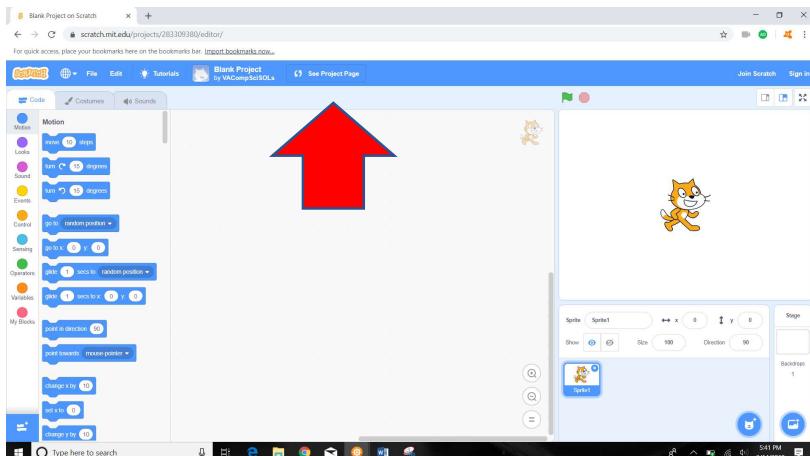
8. We need to enter the “Loop Template”.

- To do so you can repeat Step 1 of Question 1 and in Step 2 of Question 1 instead of clicking “Blank Project” click “Loop Template” instead.

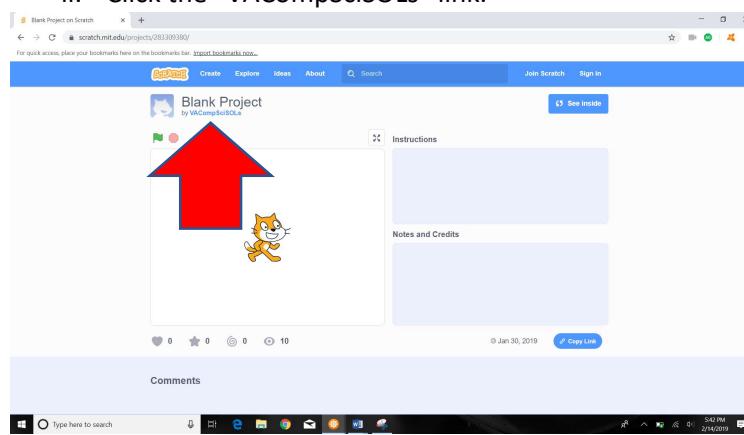


b. If you are currently in the “Blank Project” template of Question 1:

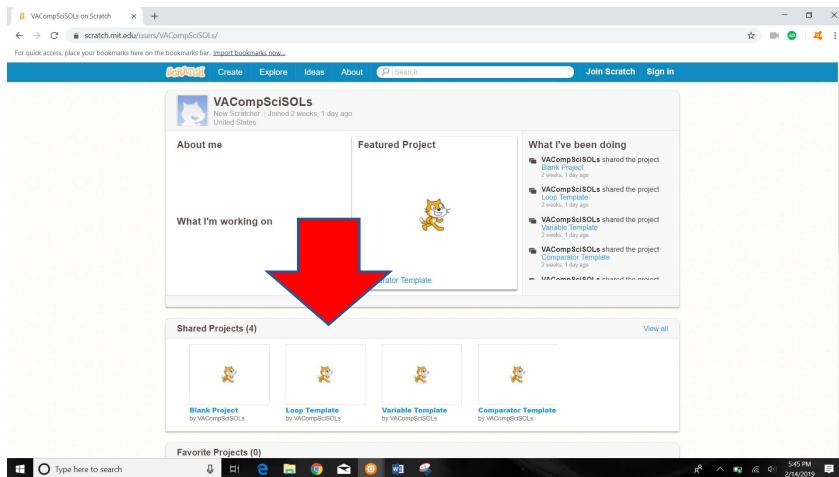
- click the “see project page” button.



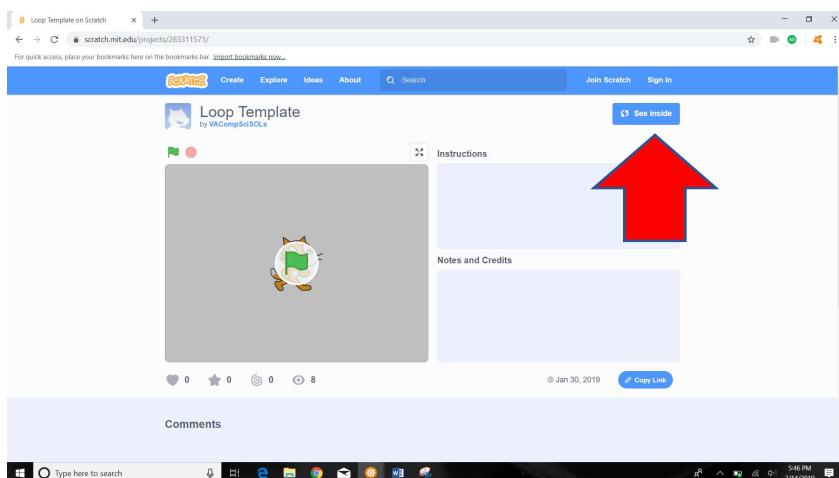
- Click the “VACompSciSOLs” link.



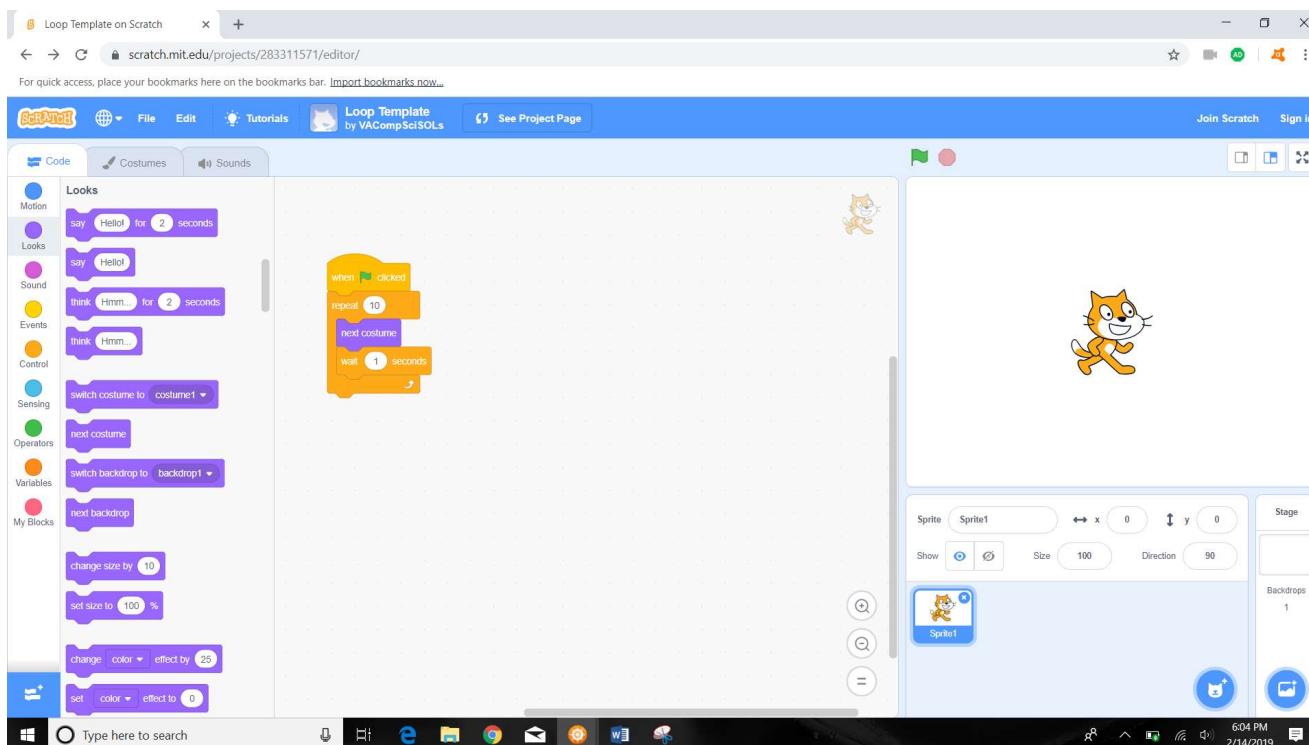
iii. Click on the “Loop Template” link.



9. Click the see inside button.



10. The default Loop Template should look like this:



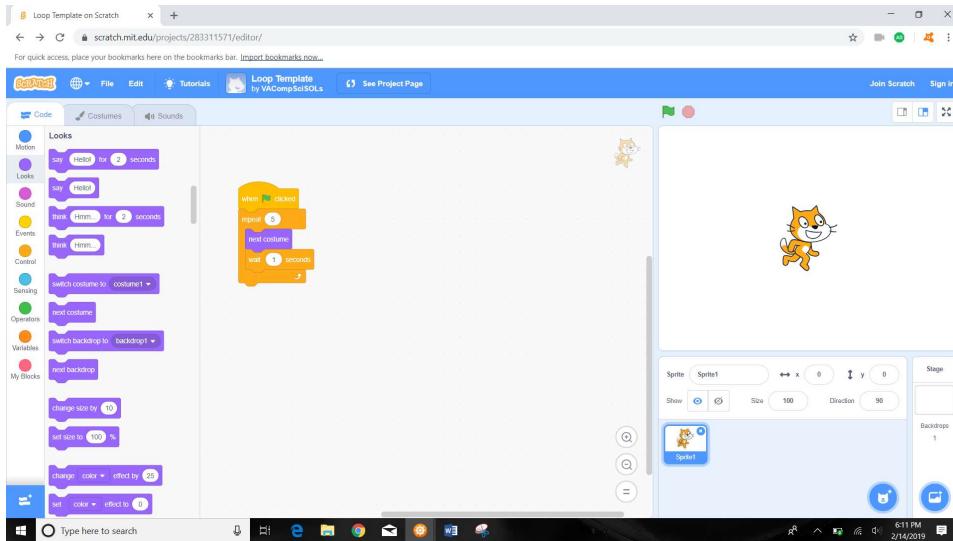
11. A loop is an instruction that repeats an action. The current instruction is coded to start when the green flag is clicked.

Once clicked, the cat moves and waits one second and moves again 10 times.

12. Click on the green flag to run the program and count the number of times the cat moves.



13. Change the number “10” within the “repeat 10” to a number less than 10 and run the program again to see how the loop has changed by counting the number of times the cat moves again. For example:



14. ****Student Looping Challenge****: we want to rotate the cat 90 degrees 4 times. Using the provided code, remove the “next costume” action, add a turn action (located within the motion code section), and change the numbers within repeat code step to 4 and the turn code step to 90.

a. Hint:

i. remove from the code

ii. change to



iii. add one of these actions:



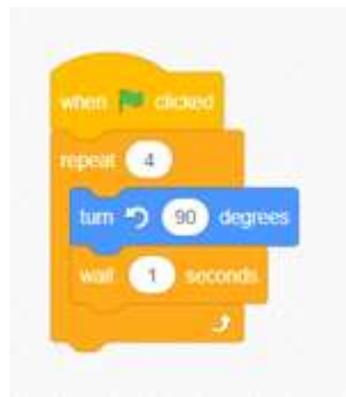
iv. Change degree in action to



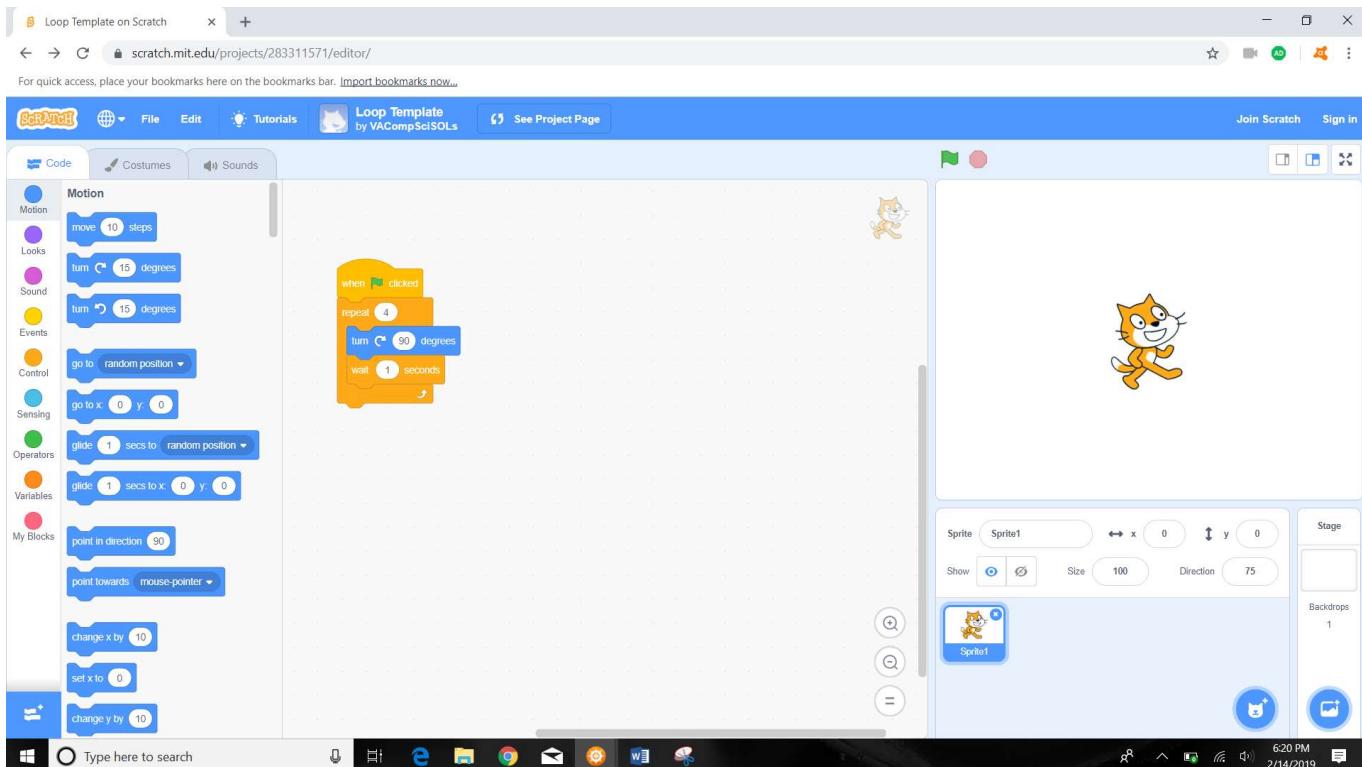
v. make sure the action is after the action but on top of action.

15. Raise your hand and show your teacher your work before you move to the next question.

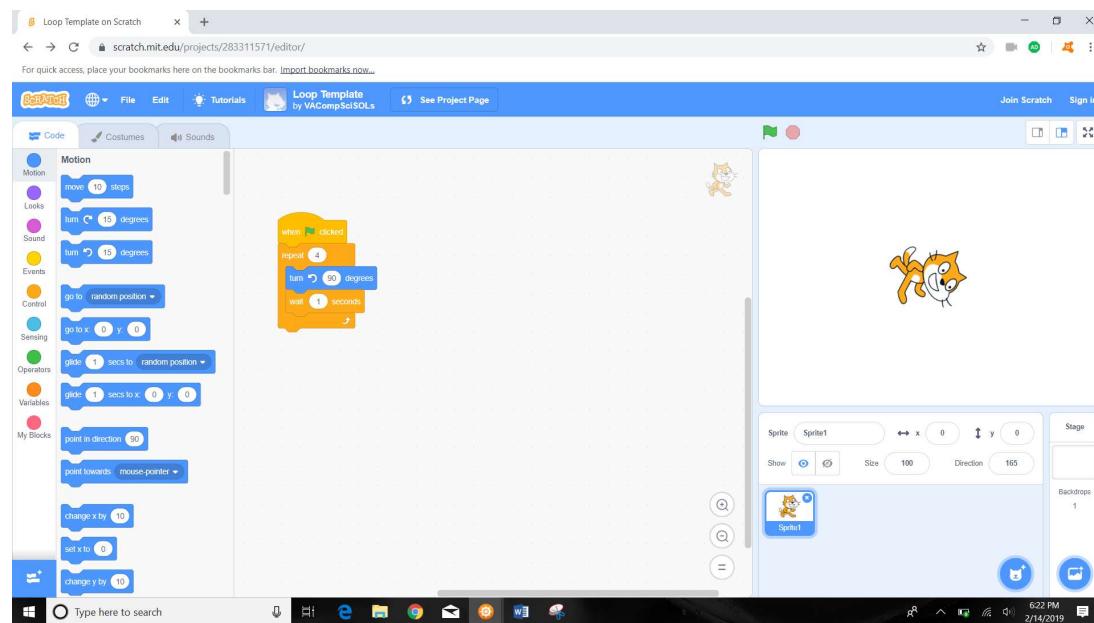
16. Answer should look like (the first two pictures are zoomed in version of code from the pictures which show the full screen):



OR



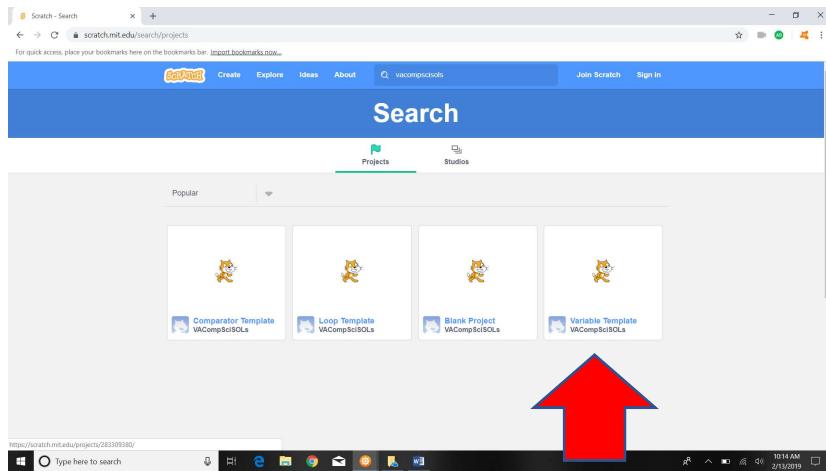
Or



Question #3- Variables

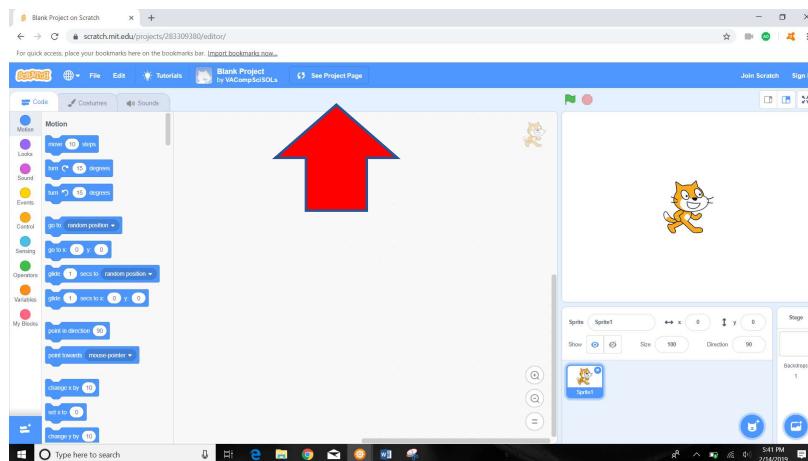
1. We need to enter the “Variable Template”.

- To do so you can repeat Step 1 of Question 1 and in Step 2 of Question 1 instead of clicking “Blank Project” click “Variable Template” instead.

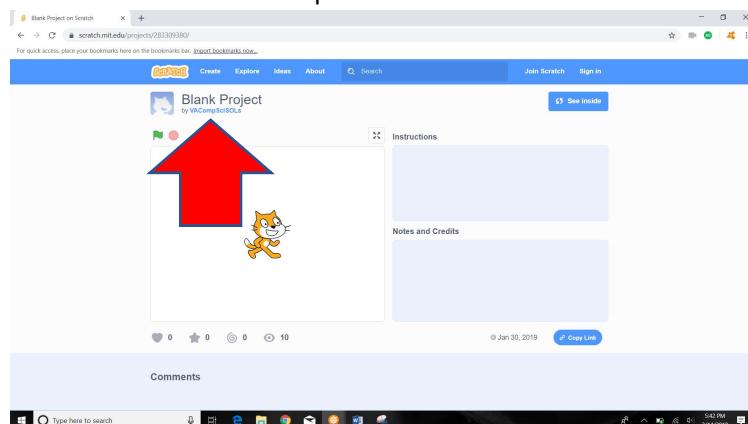


b. If you are currently in the “Blank Project” template of Question 1 or the “Loop Template” of Question 2:

- Click the “see project page” button.



- Click the “VACompSciSOLs” link.



- Click on the “Variable Template” link.

VACompSciSOLS

What I've been doing

Featured Project

What I'm working on

Shared Projects (4)

Favorite Projects (0)

Blank Project by VACompSciSOLS

Loop Template by VACompSciSOLS

Variable Template by VACompSciSOLS

Comparator Template by VACompSciSOLS

2. Click the see inside button.

Variable Template on Scratch

Instructions

Notes and Credits

Comments

3. The default Variable Template should look like this:

Variable Template on Scratch

Code

Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

a [0 v]

b [0 v]

c [0 v]

d [0 v]

e [0 v]

f [0 v]

set [a] to [0]

set [b] to [0]

set [c] to [0]

set [d] to [0]

set [e] to [0]

set [f] to [0]

repeat (10) [random position]

set [a] to [random position]

set [b] to [random position]

set [c] to [random position]

set [d] to [random position]

set [e] to [random position]

set [f] to [random position]

end

set [x] to [0]

change [x] by [10]

set [y] to [0]

change [y] by [10]

point in direction [90 v]

point towards [mouse-pointer v]

Stage

Sprites

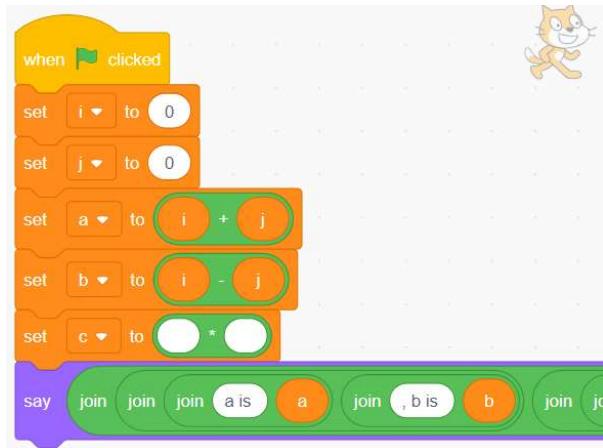
Show

Size

Direction

Backdrops

Zoomed in default code:



4. Click on the green flag  to run the program and see what changes on the screen.



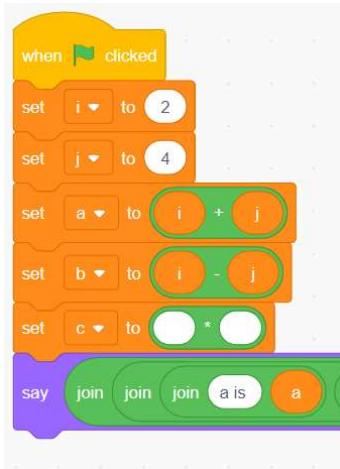
5. Notice that once the green flag is clicked on and the program runs, the numbers displayed in the right panel change and the cat speaks.

A screenshot of the Scratch interface showing the script running. The stage area shows a cat sprite with a speech bubble containing the text 'a is 0, b is 0, c is 0, d is 0'. A large red arrow points upwards from the stage towards the speech bubble. On the right side of the interface, the script is visible in the script editor, and the variable values (a=0, b=0, c=0, d=0) are shown in the variable list. The bottom status bar shows the date and time as 2/15/2019 1:17 PM.

6. ****Student Variable Challenge****: we want to change the i and j variables to different numbers (currently both i and j are set to 0).

- In the coding panel, click on the action button  and delete the zero and change to the number 2 
- Do the same on the action button  and delete the zero and change to the number 4 

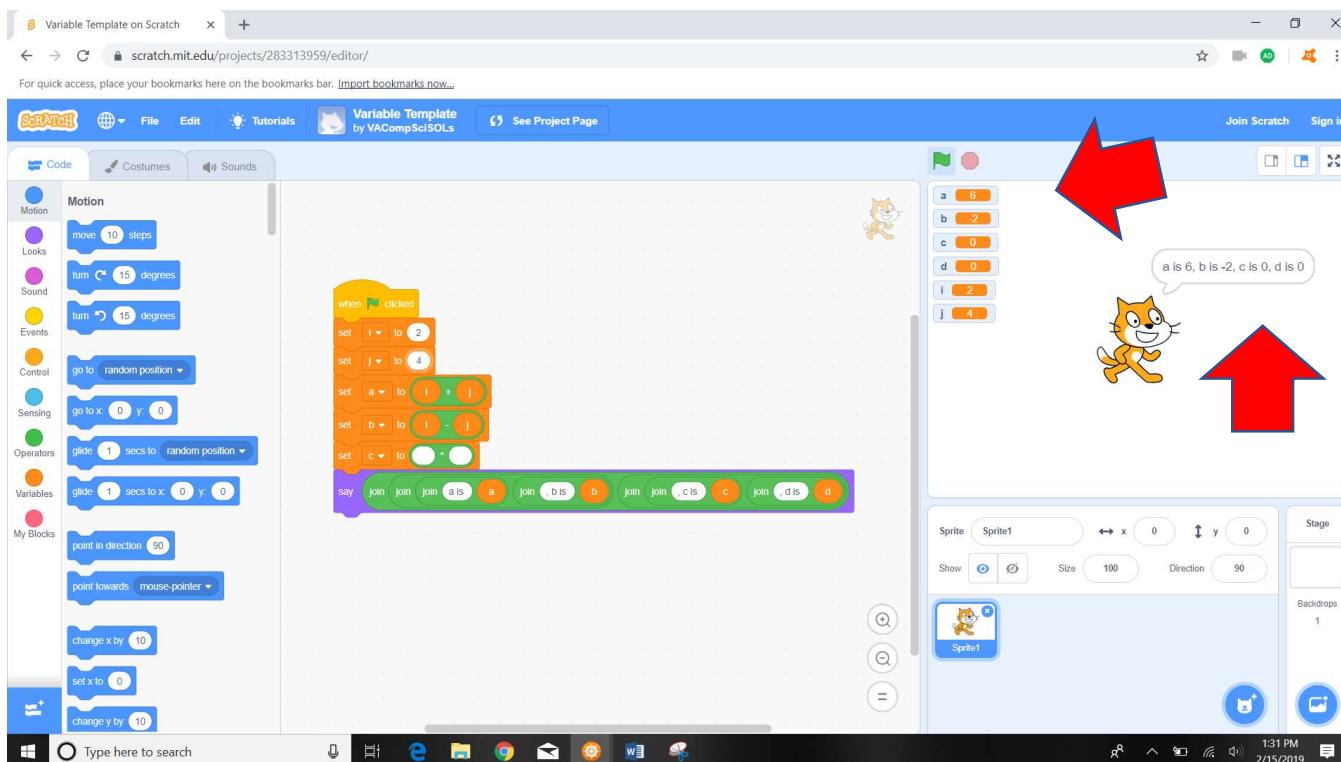
Instructor: Code should look like this-



7. Click on the green flag  to run the program and see what changes on the screen.



8. Notice the changes that happen once the green flag is clicked on and the program runs.



The screenshot shows the Scratch editor with the following details:

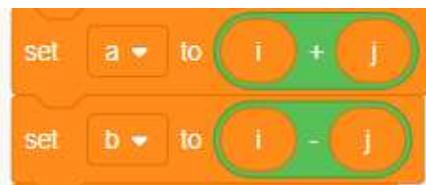
- Title Bar:** Variable Template on Scratch
- Address Bar:** scratch.mit.edu/projects/283313959/editor/
- Toolbar:** Back, Forward, Stop, Run, Help, File, Edit, Tutorials, Scratch Wiki, Join Scratch, Sign in
- Scratch Stage:** A yellow cat sprite is running across the stage. A speech bubble says "a is 6, b is -2, c is 0, d is 0".
- Scratch Script:** A 'when green flag clicked' hat triggers the following sequence:
 - Set i to 2
 - Set j to 4
 - Set a to (i + j)
 - Set b to (i - j)
 - Set c to (i * j)
 - Say [join (join (join a is a) join b is b) join (join c is c) join d is d]
- Scratch Library:** Shows categories: Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, My Blocks.
- Variables Panel:** Shows variable values: a = 6, b = -2, c = 0, d = 0, i = 2, j = 4.
- Stage Panel:** Shows Sprite1 settings: x = 0, y = 0, Size = 100, Direction = 90.
- Backdrops Panel:** Shows 1 backdrop.

Zoomed in:



9. Why does the cat panel show that $a = 6$ and $b = -2$?

a. Hint: look in the middle coding pane, specifically at this code:



10. We are now going to code in the middle coding panel. We want to set c to $i * j$. In order to do so we must complete

the coding action that is already in the middle coding panel.

a. First on the left most “code” panel we must select the variables button to reveal the variable options:

A screenshot of a Scratch project on scratch.mit.edu. The project title is "Variable Template on Scratch". The stage shows a cat sprite. The script editor contains the following script:

```
when green flag clicked
  set [i v] to [2]
  set [j v] to [4]
  set [a v] to [i + j]
  set [b v] to [i - j]
  set [c v] to [i * j]
  say [join [join [join [a is] [a] [join [b is] [b] [join [join [c is] [c] [join [d is] [d]]]]]]]
```

The left sidebar shows the variable panel with variables a, b, c, d, i, and j defined. A red arrow points to the "Variables" button in the sidebar. The status bar at the bottom right shows the date and time as 2/15/2019 1:47 PM.

b. We then drag the orange *i* variable into the first open spot within



The screenshot shows the Scratch 3.0 interface with a project titled "Variable Template on Scratch". The stage features a cat sprite. A speech bubble from the cat says "a is 6, b is -2, c is 0, d is 0, e is 2, f is 4". The script for the cat sprite is as follows:

```
when green flag clicked
  set [i v] to [2]
  set [j v] to [4]
  set [a v] to [i + j]
  set [b v] to [i - j]
  set [c v] to [i * j]
  say [join [a is ] [a] join [b is ] [b] join [c is ] [c] join [d is ] [d]]]]]]]]]]]
```

The Variables palette on the left lists variables a through j, each with a value: a=6, b=-2, c=0, d=0, e=2, f=4. The Stage palette shows the cat sprite with x=0, y=0, size=100, and direction=90.

c. Once the *i* variable is dragged into place, the code should look like this:

The screenshot shows the Scratch 3.0 interface. The top bar includes the title "Variable Template on Scratch", the URL "scratch.mit.edu/projects/283313959/editor/", and standard browser controls. Below the bar, a message encourages users to import bookmarks. The main workspace features a cat sprite. On the left, the script palette displays a script starting with "when green flag clicked". This script uses variables *a*, *b*, *c*, and *d* to calculate values for *i* and *j*, then prints the results. The variable palette on the right shows the current values: *a* is 6, *b* is 2, *c* is 0, *d* is 0, *i* is 2, and *j* is 4. The stage palette at the bottom shows "Sprite1" selected, with settings for x: 0, y: 0, size: 100, and direction: 90. The bottom navigation bar includes icons for file operations, search, and help.

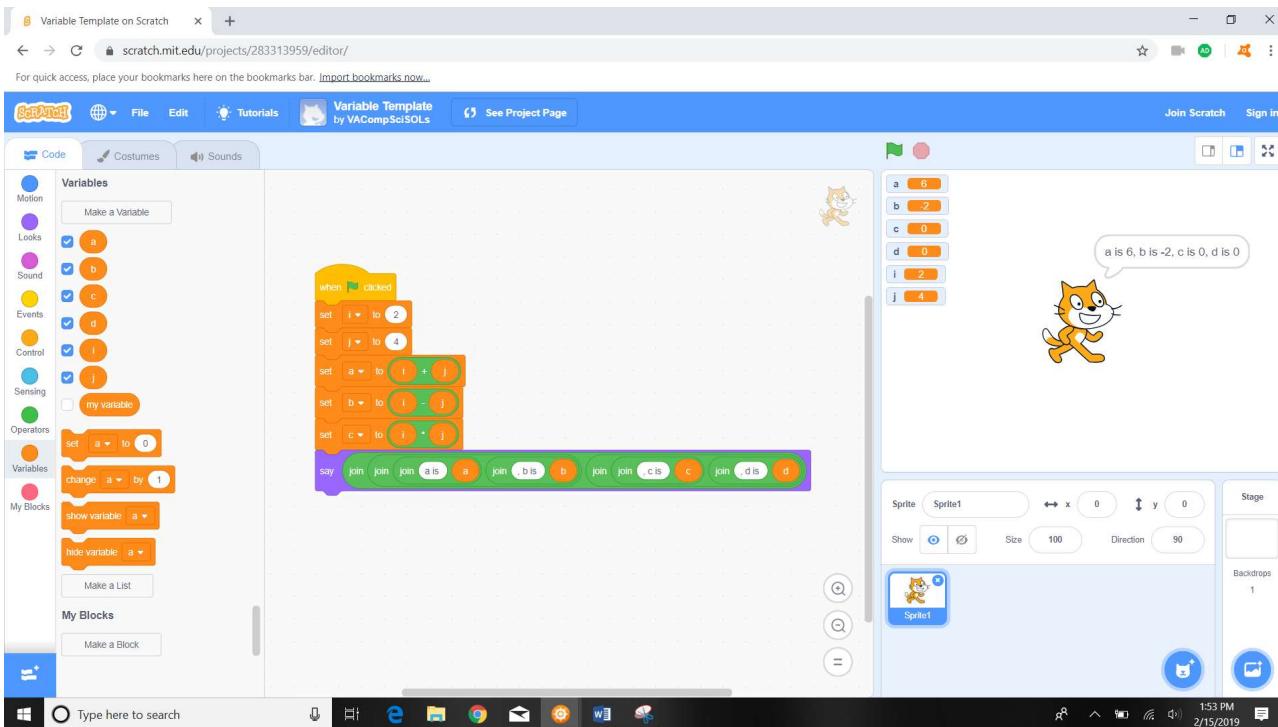
Zoomed in:

```

when green flag clicked
set i to 2
set j to 4
set a to (i + j)
set b to (i - j)
set c to (i * j)
say [join (join (join a is ) b is ) c is ) d is ]

```

- d. We now do the same for the j variable, but drag the j variable to the second slot (now the only open slot), and the code should look like this:



Zoomed in:

```

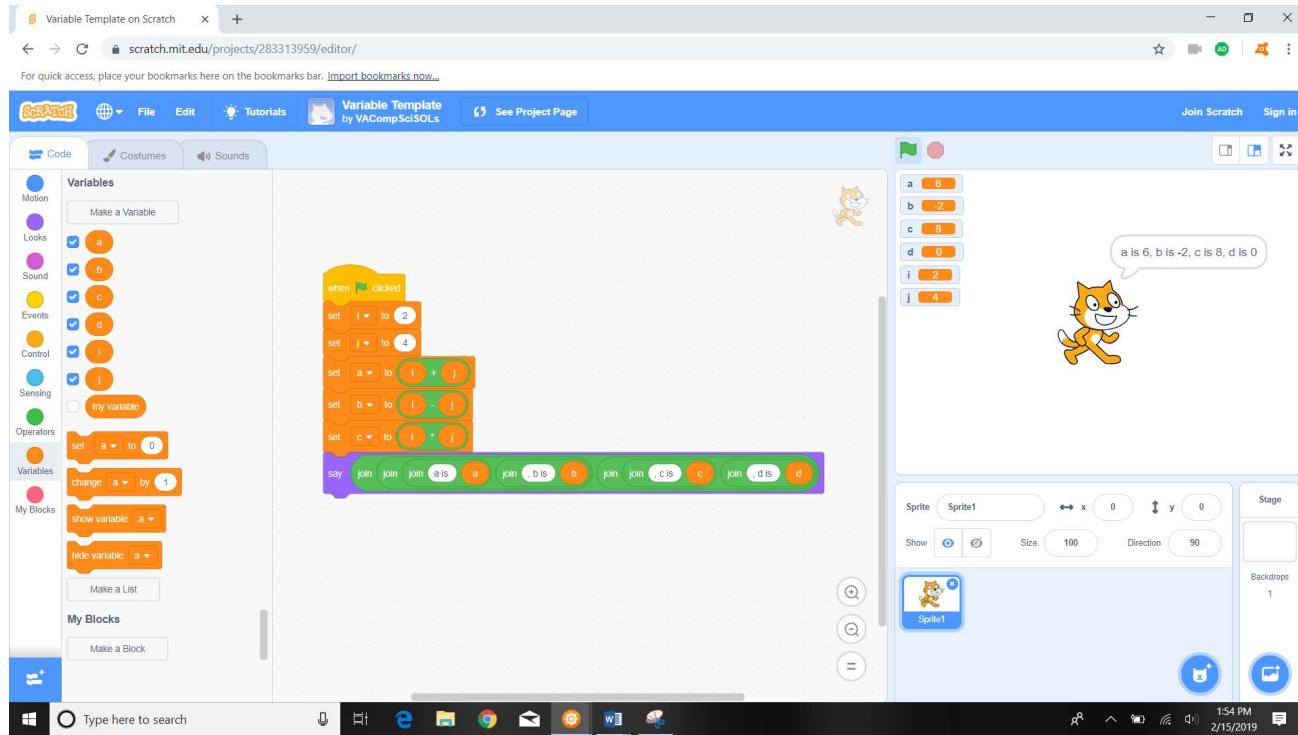
when green flag clicked
set i to 2
set j to 4
set a to (i + j)
set b to (i - j)
set c to (i * j)
say [join (join (join a is ) b is ) c is ) d is ]

```

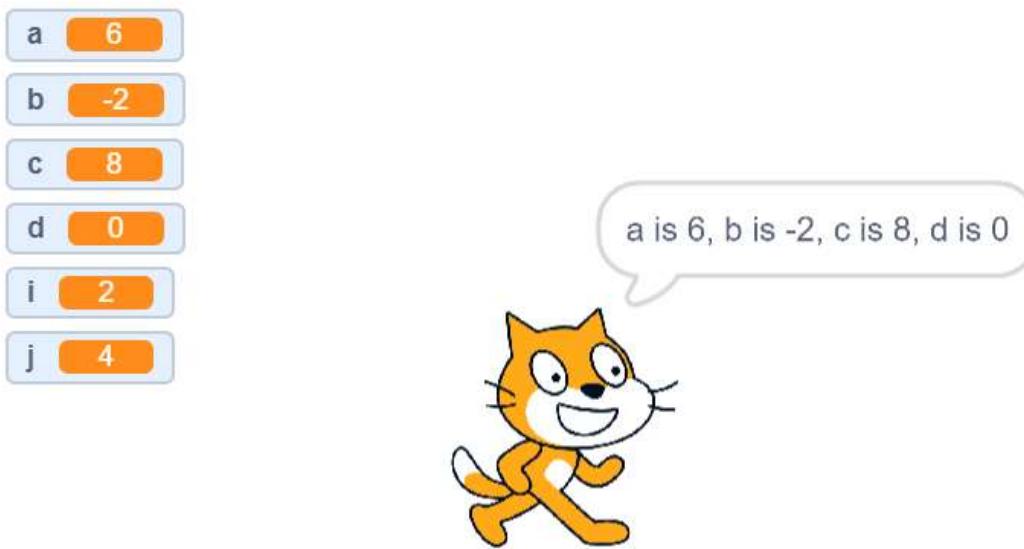
11. Click on the green flag  to run the program and see what changes on the screen.



12. Notice the changes that happen once the green flag is clicked on and the program runs.



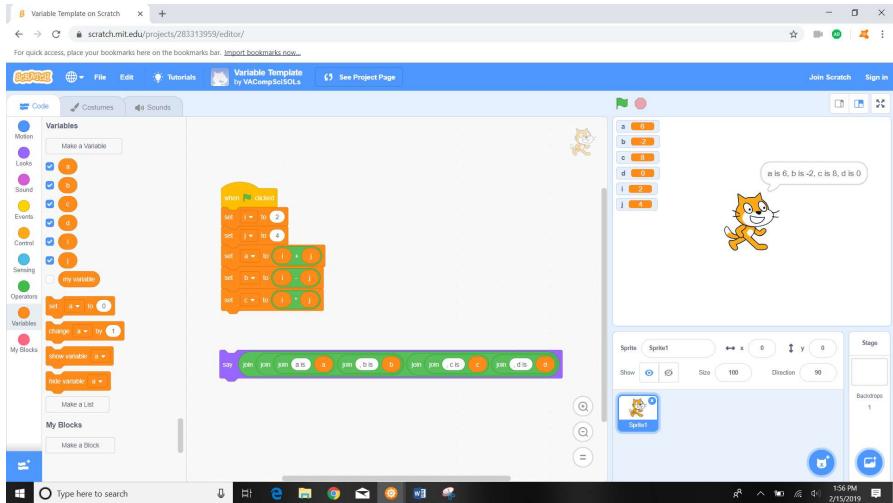
Zoomed in:



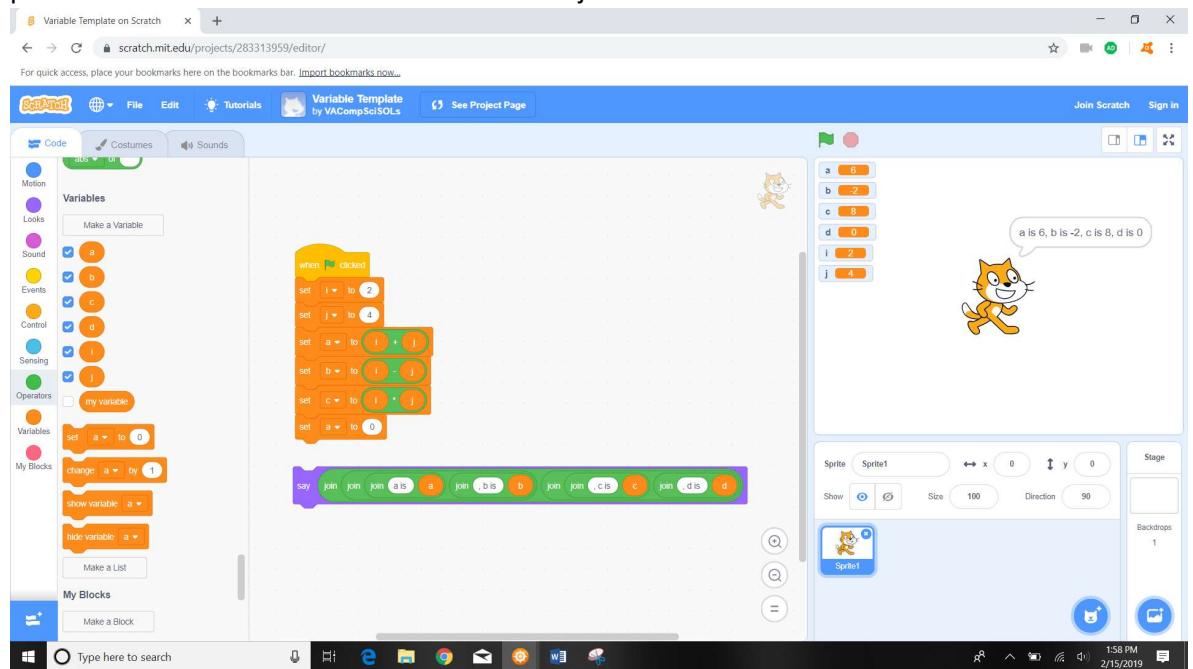
13. ****Advanced Student Variable Challenge****:

a. Code a d variable

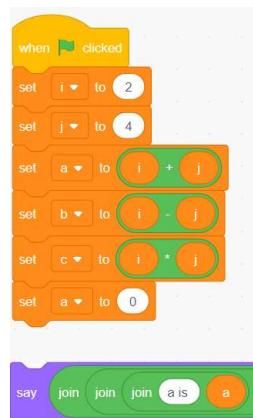
- To do so first detach the last code from the chain in the middle panel



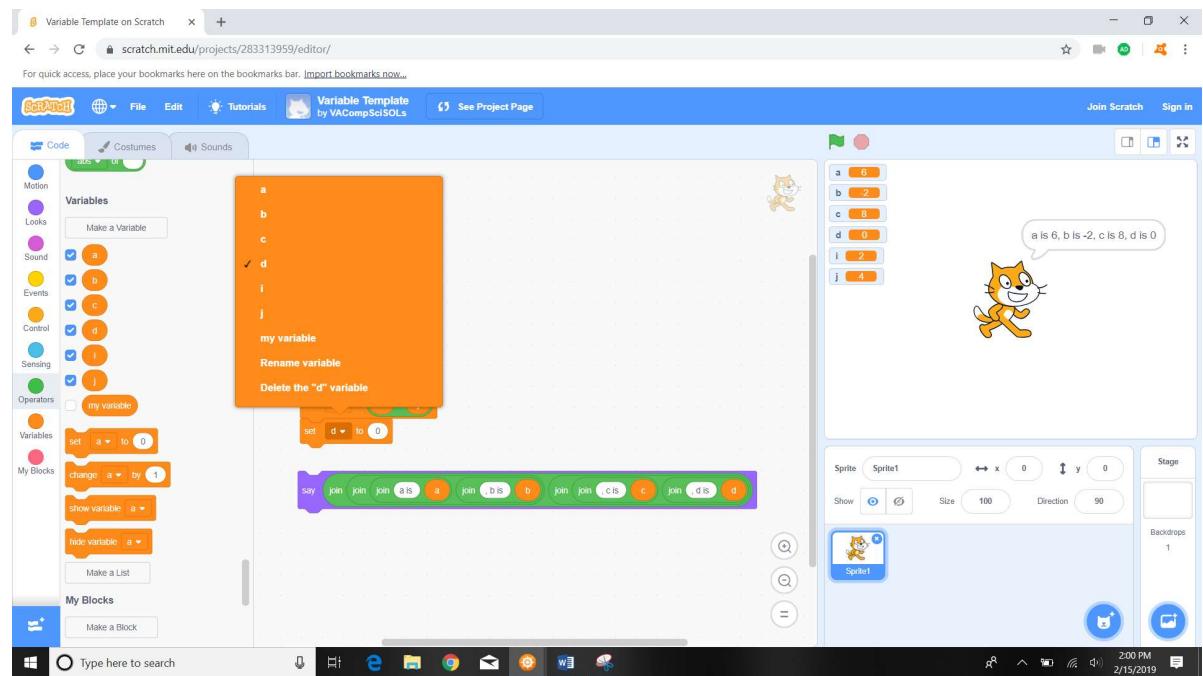
- on the left most “code” panel we must select the “set a to 0” button and drag it to the middle coding panel screen and attach it below the “set c to i*j” action.



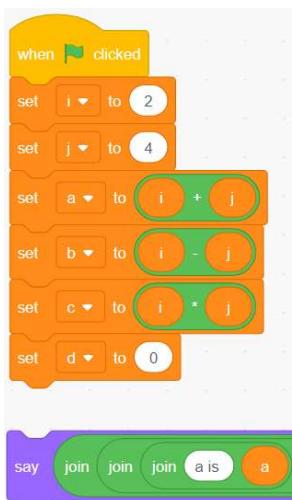
Zoomed in:



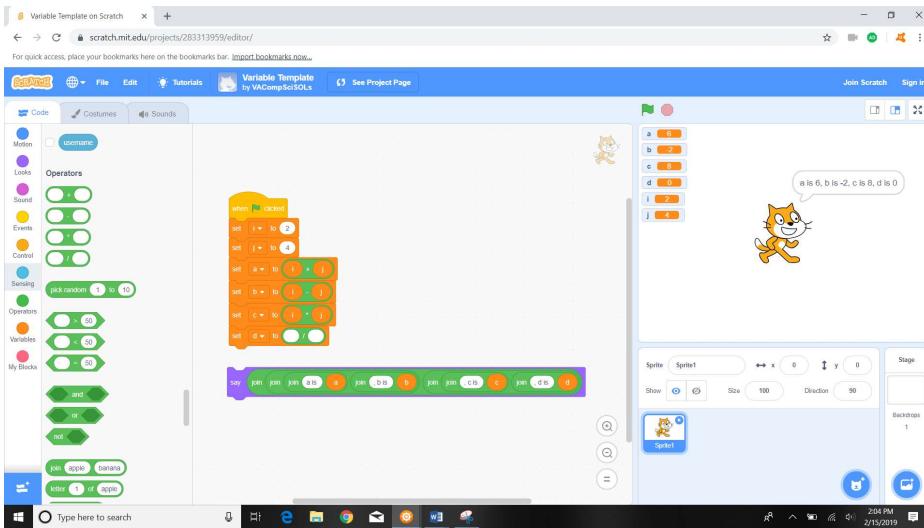
iii. using your mouse change the “a” in the drop down to “d”



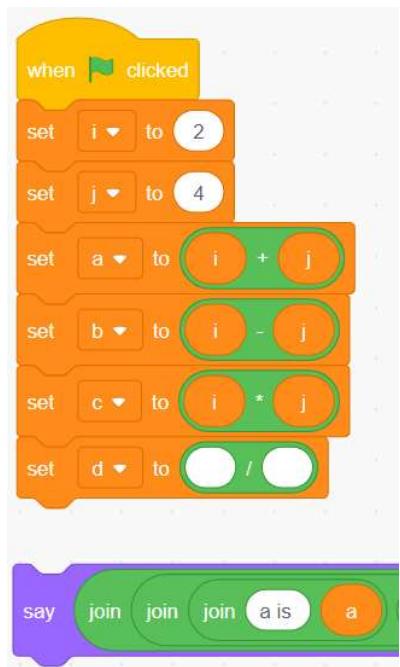
Zoomed in:

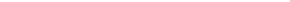


iv. On the left most “code” panel we must select the “operators” button and drag the to the middle coding panel screen and attach it to the “set d” action. The code should look like:



Zoomed in:



- v. We then drag the orange `i` variable into the first open spot within  . Once the `i` variable is dragged into place, the code should look like this:

Variable Template on Scratch

scratch.mit.edu/projects/283313959/editor/

For quick access, place your bookmarks here on the bookmarks bar. [Import bookmarks now...](#)

SCRATCH Tutorials See Project Page Join Scratch Sign in

Code Costumes Sounds

Variables

Motion Looks Sound Events Control Sensing Operators Variables My Blocks

Make a Variable

a 6
b 2
c 8
d NaN
i 2
j 4

when green flag clicked

- set i to 2
- set j to 4
- set a to $i + j$
- set b to $i - j$
- set c to $i * j$
- set d to i / j

say join join join a is a join , b is b join join c is c join d is d

Sprite1

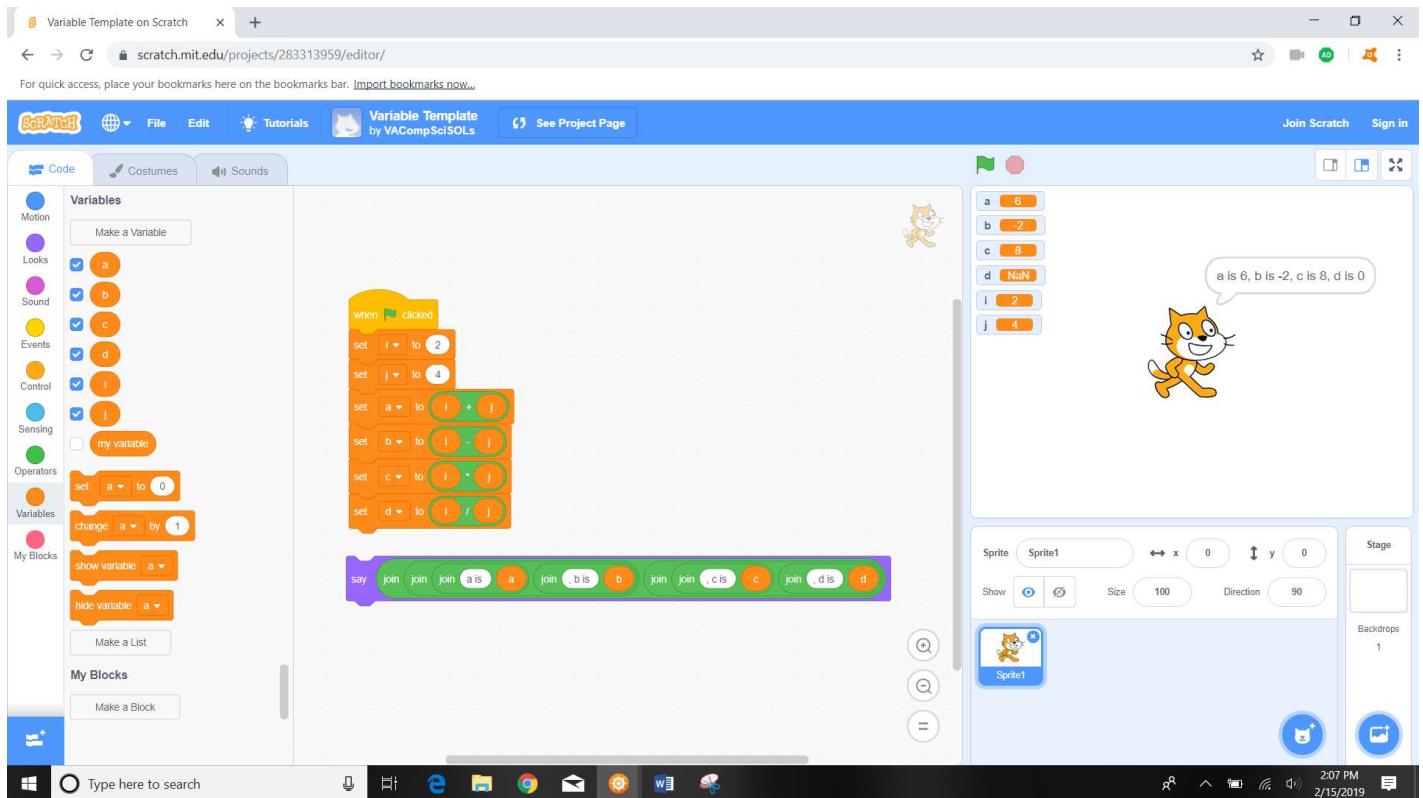
Show Size Direction

Sprite1

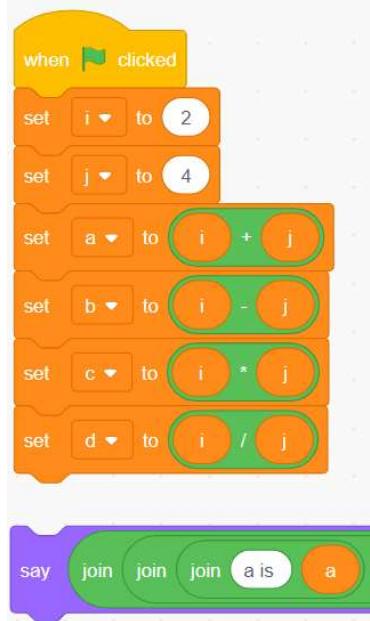
Type here to search

2:06 PM 2/15/2019

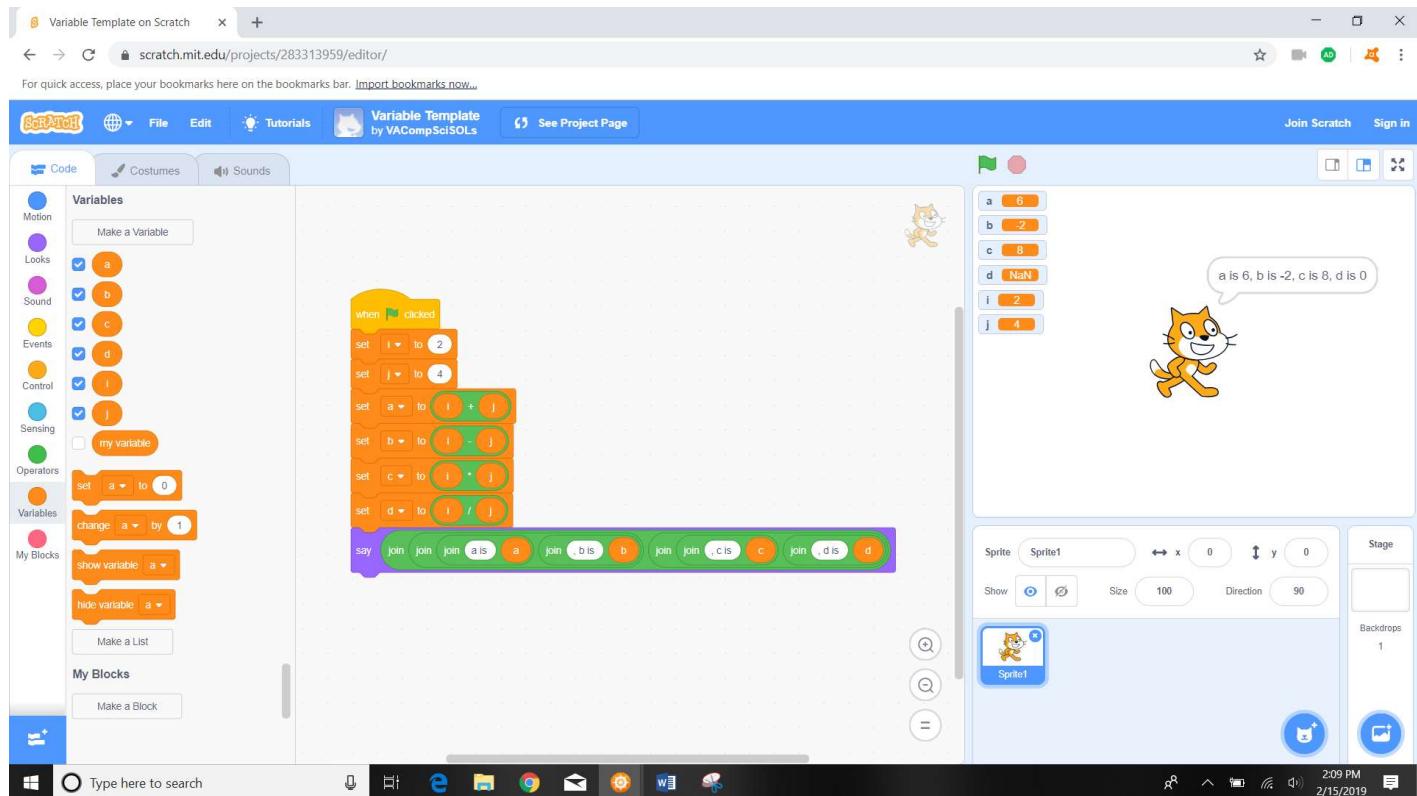
- vi. We now do the same for the j variable, but drag the j variable to the second slot (now the only open slot), and the code should look like this:



Zoomed in:



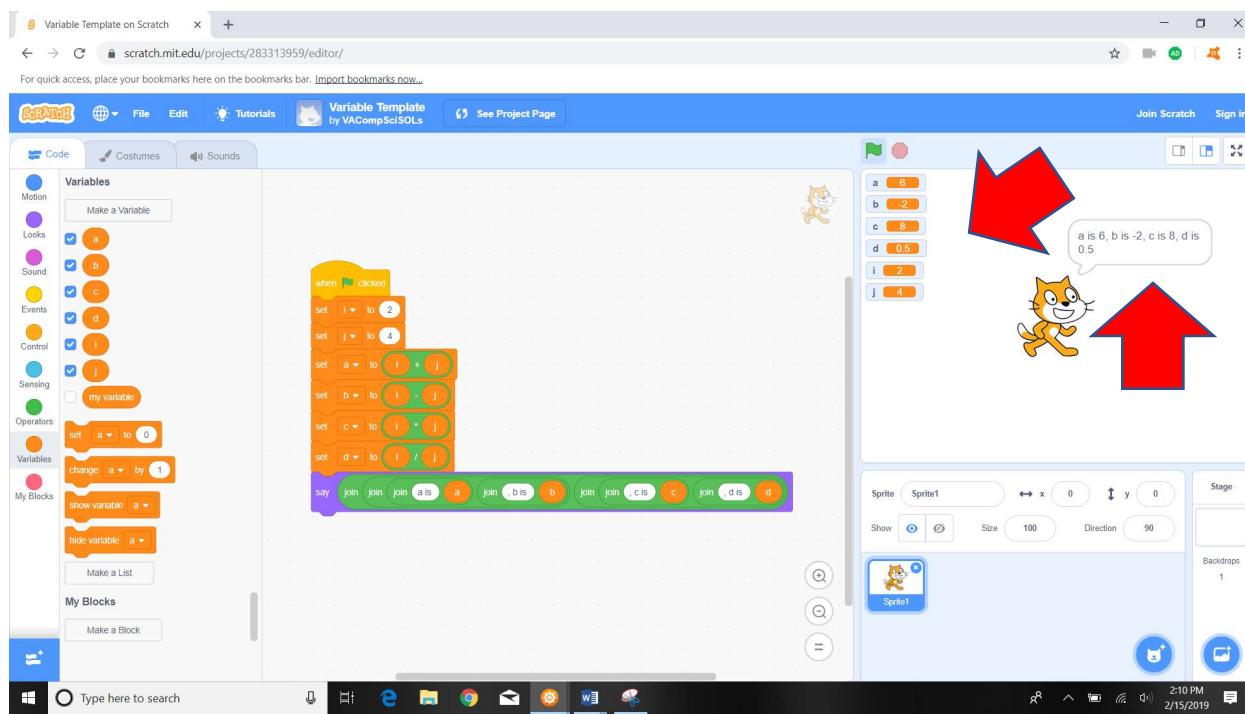
14. Re-attach the “say” action code in the middle panel below the  so the code looks like:



15. Click on the green flag  to run the program and see what changes on the screen.



16. Notice the changes that happen once the green flag is clicked on and the program runs.



Zoomed in:

a	6
b	-2
c	8
d	0.5
i	2
j	4

a is 6, b is -2, c is 8, d is
0.5

