LESSON 1
Vocabulary: Blocks, CLEAR command, Costume, Interior Angle, Exterior Angle, GO TO X: Y: command, MOVE command, PEN DOWN command, PEN SIZE command, Polygon, Scratch, REPEAT command and MOUTH of the Repeat Command, SAY command, Script, SET PEN SIZE command, SET PEN COLOR command, Stage, Sprites, Stack, THINK command, TURN command, WAIT command

Paragraph below in italics is from the Scratch Reference Guide which you can download at http://info.scratch.mit.edu/support/reference_guide_1.4
Even though this Scratch Online is now called 2.0, this guide is useful.

Scratch projects are made up of objects called sprites. You can change how a sprite looks by giving it a different costume. You can make a sprite look like a person or a train or a butterfly or anything else. You can use any image as a costume: you can draw an image in the Paint Editor, import an image from your hard disk, or drag in an image from a website. You can give instructions to a sprite, telling it to move or play music or react to other sprites. To tell a sprite what to do, you snap together graphic blocks into stacks, called scripts. When you click on a script, Scratch runs the blocks from the top of the script to the bottom.

Here are the dimensions of the Stage (480 x 360 pixels with 0,0 in the middle)
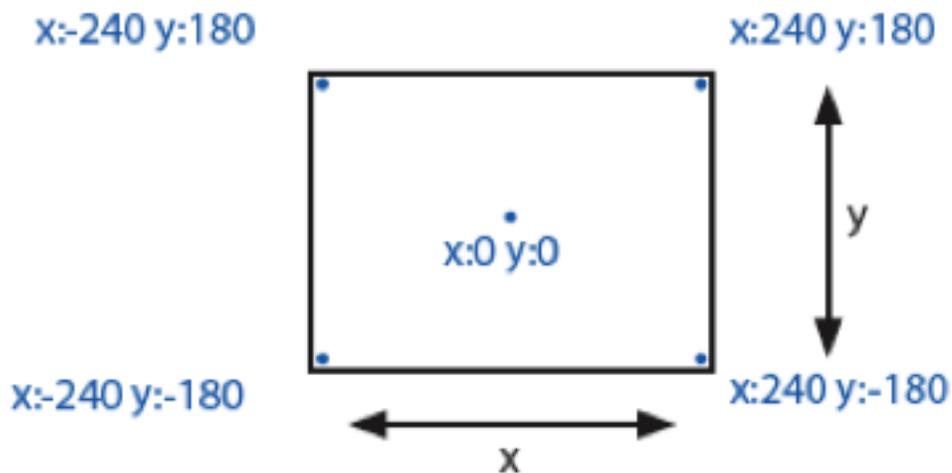
Content
This week we want to gain comfortable skill with writing, modifying and preserving our first few programs on Scratch. I am going to use polygons as the focus since it adds a nice element of meaningful curriculum integration. Scratch does not work on

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an iPad so I am hoping you are all working on a laptop or desktop. Later in the course, we will look at Hopscotch and SNAP which run on an iPad. Most of the concepts we are learning in Scratch will transfer over!

You all know that a square has 4 equal sides and 4 equal angles of 90 degrees. You may not instantly know that a regular pentagon has 5 equal sides of 108 degrees but here's the trick. If you draw a pentagon by walking it with your body, you need to make 5 turns that add up to 360 degrees since you return to where you started. Since 5 goes into 360 exactly 72 times then the angle you turn each time is 72 degrees. This is called the exterior angle and this means the interior angle is 180-72 or 108 degrees. Got it? If not, let's talk ASAP so I can make this clearer!

One more example, just in case or just to reinforce. If you walk thru a regular octagon ("regular means equilateral and equiangular") you are turning 8 times. Since the total is still 360 degrees, then each turn of your body is 360/8 or 45 degrees. So each exterior angle is 45 degrees, which makes each internal angle of the regular octagon into 135 degrees.

So let's set this as our focus for lesson 1, not because this is a math course, but because it is powerful, relatively easy and can be used to connect Scratch with math for your kids.

To get to Scratch Online which has advanced beyond 1.4 you go to SCRATCH.MIT.EDU or just type SCRATCH into GOOGLE and do a search.

A few starter tips

How to make the program run after you are happy with the script?
A: Click on the first line of the script.

How to delete the entire program?
A: Drag it from the programming area into the middle area.

How to clear the screen?
A: Use the CLEAR command at the start of your program.

How to separate a stack?
A: Just grab any block from the middle and the ones below it will come with you.

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After you login and are at the home screen of Scratch Online 2.0

Choose CREATE on the top of the page to write your first program.
This will take you to the screen below
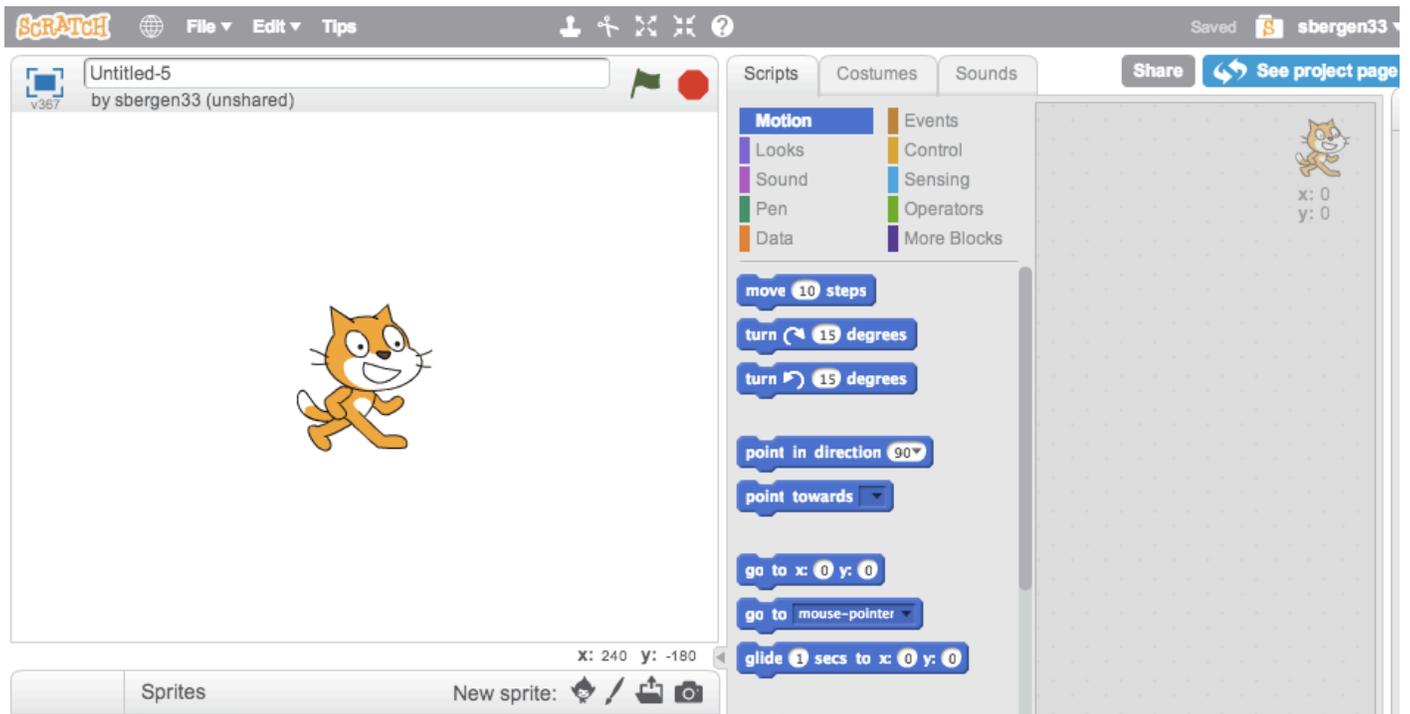
The left hand side with the cat is where your program will run. The middle area shows the commands in smorgasboard style that you drag onto the right side where you build your program. You can snap the blocks together or keep them separate. If you snap them together, then clicking any one will execute the program. You can separate them after they are snapped together. Our first challenge is to draw a square.

Feel free to try it first before watching my video or even before looking at the next page. Programming is like playing with clay or building a sandcastle at the beach. It is great to try things and fine to make mistakes. Each mistake you make will lead to some good realization that will get you better. I promise you that one little mistake can cause the program to not succeed and when that happens, it is normal to be frustrated. But the joy of programming is that when you see the light -- whether you figure it out yourself or because someone helps you, the logic is so wonderful! That is why programming is good for kids! It is a playspace of logic and precision.

Okay, so here is one way of doing the square. A common mistake is to not put the pen down or sometimes not have a color that is viewable. I love the way the repeat command snaps around other commands or you can just drop it and move a block of commands into its "mouth."
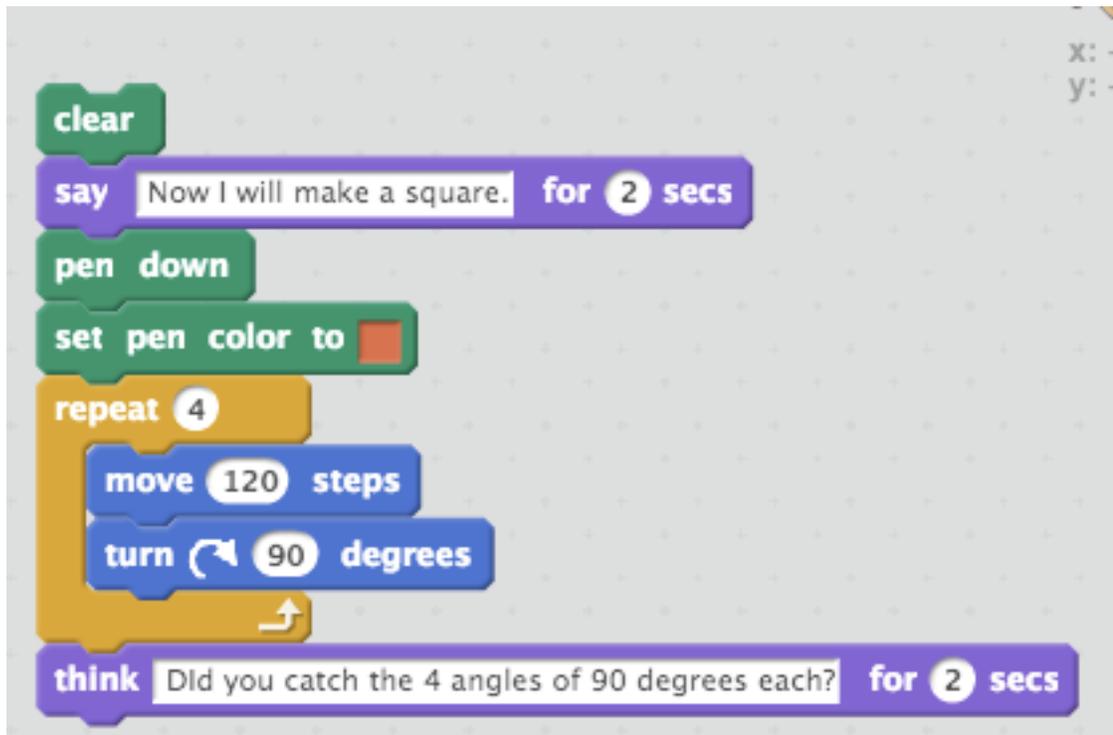
Now modify a few things to get a triangle. Why make your students use the SAY and THINK commands? The rationale is to get them to write and explain well, using proper English. That is the only reason that I have added these two commands, to model for you requiring your students to use quality English to enhance their programs.

The next page contains the solution for a triangle so feel free to try it first before you look. Remember from before that when your body walks a triangle, you are making 3 equal angles that add up to 360, so each exterior angle must be 120 degrees.

```
clear
say  Now I will make a triangle.  for  2  secs
pen  down
set  pen  color  to  ▇
repeat  3
    move  120  steps
    turn  ↻  120  degrees
think  DId you catch the 3 angles of 120 degrees each?  for  2  secs
```

x: -1
y: -4

Here is what the THINK command does. Notice the "think" bubble which is adorable!

DId you catch the
3 angles of 120
degrees each?
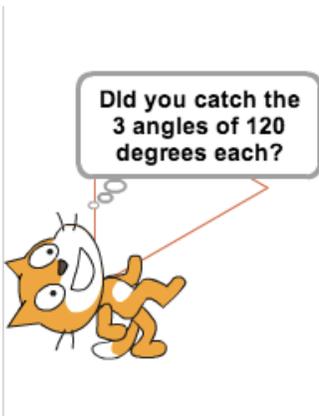
Okay, let us write one more program that illustrates where the ink comes out of the cat. The GO TO command is new but reasonably clear, sending the cat back to the origin of the x-y coordinate grid. My rationale for the two WAIT commands involves the fact that I want the user to see each step instead of it happening magically.
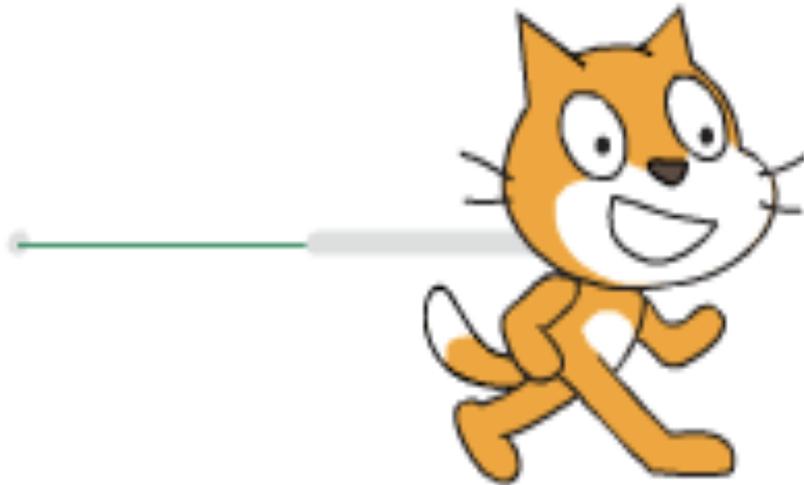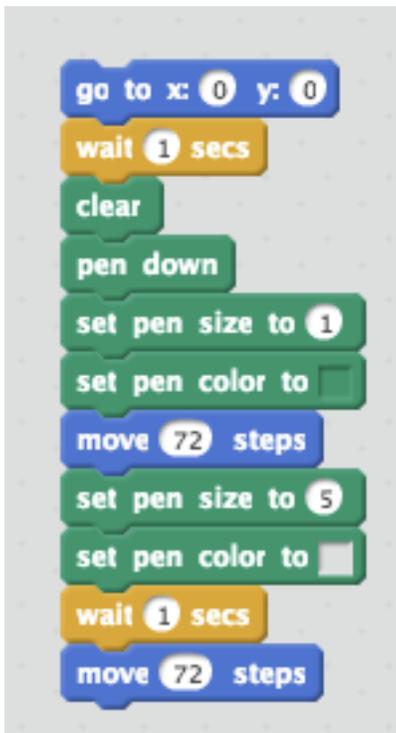
On the right you see the result of the program with the ink coming out of the back of the cat's neck. The cat used thick green ink (pen size 1) for the first 72 steps (one inch) and thick gray ink in (pen size 5) for the next 72 steps.

Okay, end of lesson 1 and time to pass the ball to you!

Assignment 1A: Read this handout

Assignment 1B: Watch these two videos (you rarely need the www)

tinyurl.com/sc008sc
First lesson (7 minute video) is making a square (or triangle) and learning to use the interface.
tinyurl.com/sc026sc replaces tinyurl.com/sc019sc which was a mistake
2 chunks in Scratch (3 minute video) to show how the ink comes out of the back of Cat's neck

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Assignment 1C: Schedule a 30 minute phone call or skype with me

Assignment 1D: Please contribute several entries to our WIKI which is located at the tinyurl.com/sconlinec webpage. You can either type some answers or helpful info about a few items or you can ask a question or you can improve the writing of someone else. You will love the fact that others are contributing to this (including me) and that this will be a summary at the end of our 10 weeks of important info in alphabetical order!

Assignment 1E: Write the programs for every shape from triangle to octagon (3 sides to 8 sides). Take a screen snapshot of one of them and send to me. I will help you with the screen snapshot technique on the phone or skype this week if this is not easy for you

Have a good week,

phone = 781-953-9699
skype name = stevebergen (no spaces)
Email = sbergen33@gmail.com

Challenge (totally optional) on next page

See if you can write the program for this design that appears to be 36 squares. If you want a hint, just email me and say "I want a hint for the challenge problem" and it will be my pleasure!