



Monday 9/28/15 -- we begin our Scratch course and Scratch journey! All aboard!

To get to Scratch Online you go to <http://SCRATCH.MIT.EDU> or just type SCRATCH into GOOGLE and do a search. If you are interested in the history of Scratch, it has evolved from 1.4 to 2.0 and 2.0 is now the most popular version which we will be using -- the online version. Please do not use any other version but please stick with the online version at the <http://SCRATCH.MIT.EDU> website.

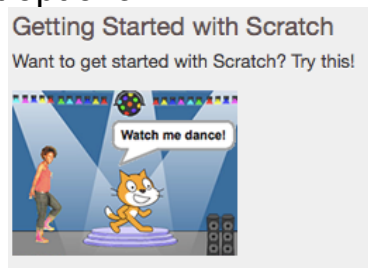
Join Scratch Sign In

At the upper right you will see

Unless you have done so already, you should JOIN and use a simple username that will contain your library of programs that you will share with me (and eventually your students). So choose a username you are comfortable with, i.e. I might choose SteveBergen or MrBergen depending on what I wanted to give out to kids.

HW 1.0 -- Please email me your username ASAP. This is super important. My username is sbergen33 so the URL is <https://scratch.mit.edu/users/sbergen33>

To make a new program you choose CREATE from the main menu then FILE and NEW. At first, you will encounter a tutorial called GETTING STARTED WITH SCRATCH that is excellent but optional.



Once you click the X to get rid of the tutorial, you are ready to write your own program. Or you can choose NEW under the FILE menu. Please SHARE every HW problem and use the assigned name. Sharing is easy using the **Share** button at the top right of any program. When it takes you to the screen where it asks for INSTRUCTIONS and NOTES and CREDITS, just skip those things!

Here are the first two starter videos to watch.

<http://tinyurl.com/sc008sc> (7 minute video) making a square (or triangle) and learning to use the interface

<http://tinyurl.com/sc026sc> 2 chunks in Scratch (3 minute video) to show how the ink comes out of the back of Cat's neck

Coding

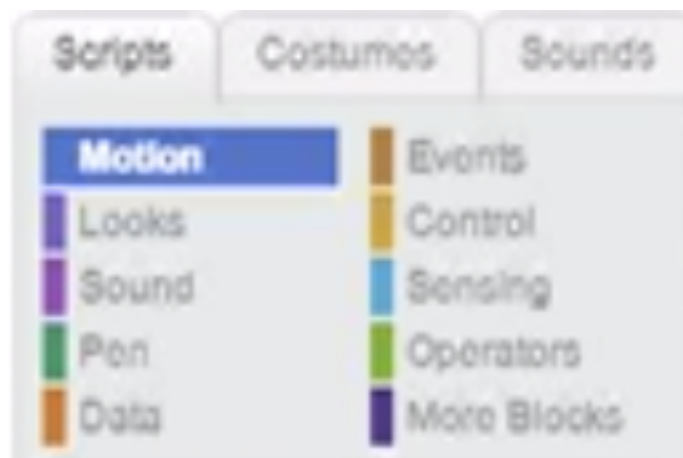
All lessons stored at <http://teachingcompany.com/F15>



Lesson 1 page 2 • 9/28



The left hand side with the cat is where your program will run. It is called the STAGE. The middle area shows the commands in smorgasboard style that you drag onto the right side where you build your program. Notice the 10 categories at the top of the middle area. When you click on each of the 10 categories, you will see the specific programming commands of that type below.




Each type (MOTION, LOOKS, SOUND, PEN, etc.) has a different color and in a few weeks, you will get used to finding what you are looking for. Please observe for now




the 3 TABs above called SCRIPTS, COSTUMES and SOUNDS. We will use COSTUMES later in this lesson.


You take blocks out of the middle area and drop them into your programming area on the right. You can snap the blocks together or keep them separate for a while when thinking and planning. If you snap them together, then clicking any one (usually the top) will execute the program. You can separate them after they are snapped together. Our first challenge is to draw a square.

To run the program after you build the script, click on the first line of the script. To delete the entire program or any individual commands, drag from the programming area into the middle area.

To clear the screen, Use the CLEAR command  at the start of your program. Clear is in the PEN category which is green. To separate a stack, grab any block from the middle and the ones below it will come with you.

The CLEAR command "erases the stage" but does not move the CAT back to its starter location. To do that, you need the  command.

Also, you might want the CAT to reorient and face the same angle as when it started. To do that, you need the  command.

Finally, if your cat is moving but not leaving ink, you might need to fix this with the  command.

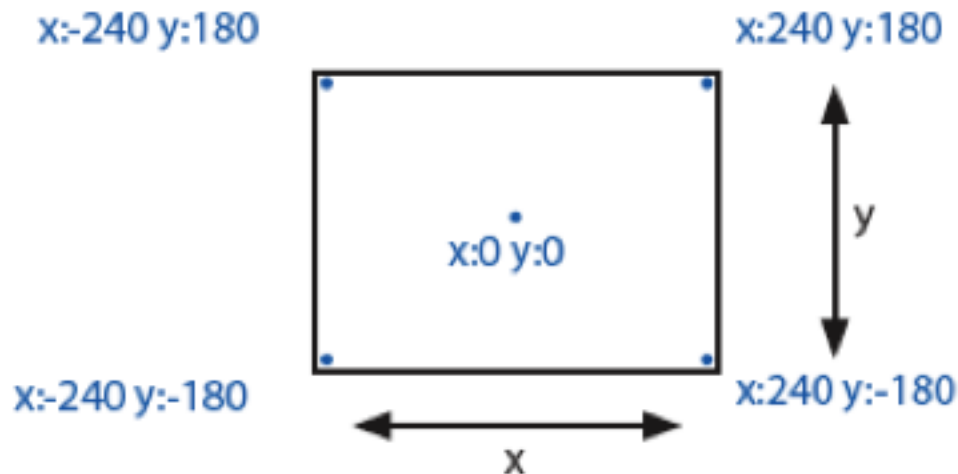
HW Exercise 1.1 -- Draw a small square and a larger square. Please name your program "Exercise 1.1 Small Square and Larger Square." Share it!

Feel free to create a square first before watching my video or looking at the next page. Programming is like playing with clay or building a sand castle 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.

Here are the dimensions of the Stage (480 x 360 pixels with 0,0 in the middle). You may not think it important now to know these numbers of 480 x 360 but trust me that it will be relevant later in the course and you can always come back to Lesson 1 to see these important numbers. Try to memorize these numbers: 480 x 360.



In this first week, I want you 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 an iPad so I am hoping you are all working on a laptop or desktop. FYI, one can use Scratch Jr. or Hopscotch and/or SNAP (from Berkeley) that all run on an iPad. Many of the concepts we are learning in Scratch will transfer over. If one of these other environments interests you, please let me know!

You all know that a square has 4 equal sides and 4 equal angles of 90 degrees. So this program should make sense. You will find the brown REPEAT command in the BROWN section called CONTROL. You will find the blue MOVE command and the blue TURN command in the BLUE section called MOTION.





Observe that at the bottom right of the screen you will see which magnifies or demagnifies the programming commands.

Also observe that to the bottom right of the STAGE you will see which shows the coordinates of the CAT using the back of its neck as the coordinate point. To the right of the coordinates, you see the little triangle that gives you a larger programming area and makes the stage area smaller.

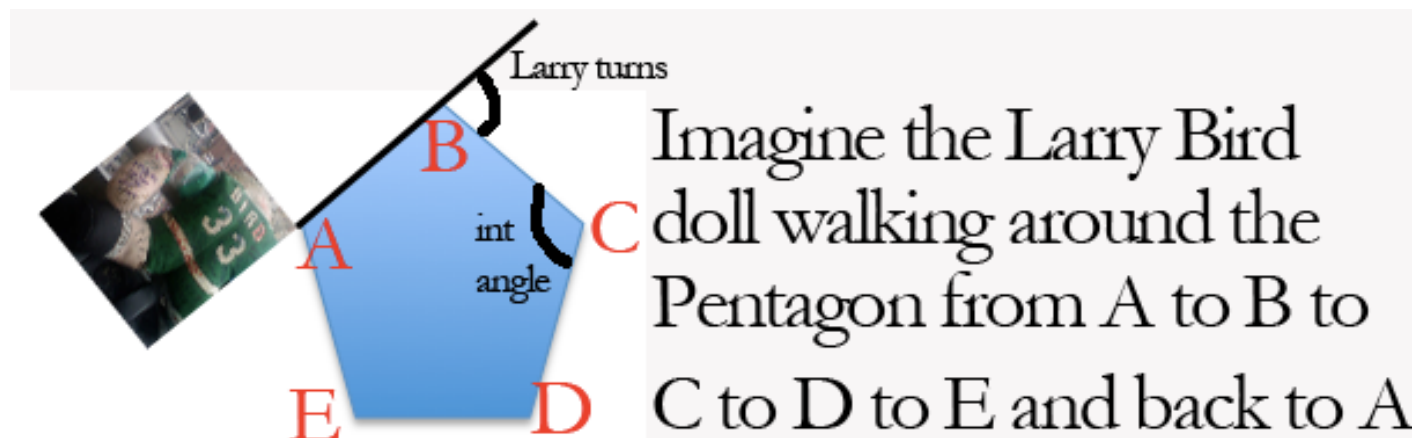
x: 82 y: -104

Hope you are doing well and practicing. Let us move on to a pentagon with 5 sides.

HW Exercise 1.2 -- Draw a small pentagon and a larger pentagon. Please name your program "Exercise 1.2 Small Pentagon and Larger Pentagon." Share it!

You may not instantly know that a regular pentagon has 5 equal sides of 108 degrees but here's the trick that you will one day pass on to your students. 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 as you see below where it says  and this means the interior angle is $180 - 72$ or 108 degrees.



Let me try with an example to make this clear, since many of you as teachers will have to explain this to your students one day! As Larry walks to each of the 5 corners of the pentagon and turns, the angle his body turns at each corner is called the exterior angle. You can see it marked at point B. Larry does this 5 times and gets



back to his starting point, having turned his body 5 times on his walk. Since he ends us where he started, the total trip was 360 degrees. Since he made 5 equal turns, then each one is $360 \div 5$ or 72. Since the exterior angle was 72 that means the interior angle must be 108. Got it?

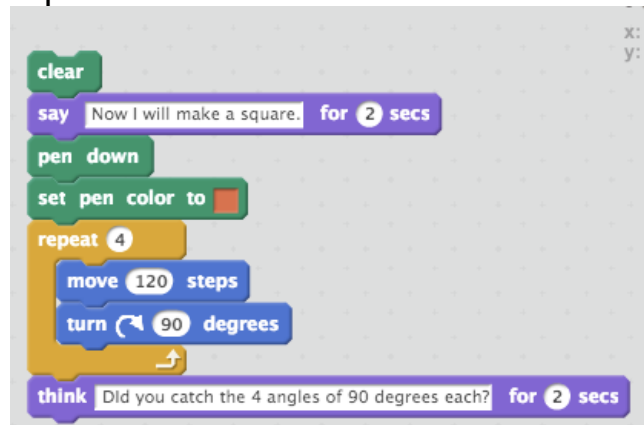
One more example, just in case or just to reinforce. If you walk thru a regular octagon ("regular means equilateral and equiangular") you are turning 8 times. Since the total is still 360 degrees, then each turn of your body is $360/8$ or 45 degrees. So each exterior angle is 45 degrees, which makes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

HW Exercise 1.3 -- Draw a small triangle and a larger triangle. Please name your program "Exercise 1.3 Small Triangle and Larger Triangle." Share it!

Now I will show you an enhanced program for 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."

The purple SAY command and purple THINK command are in the LOOKS section. The green PEN DOWN and SET PEN COLOR commands are in the PEN section. The SET PEN COLOR command can be quirky so beware. As you will read later, that is why many people prefer the SET PEN COLOR to a NUMBER command.

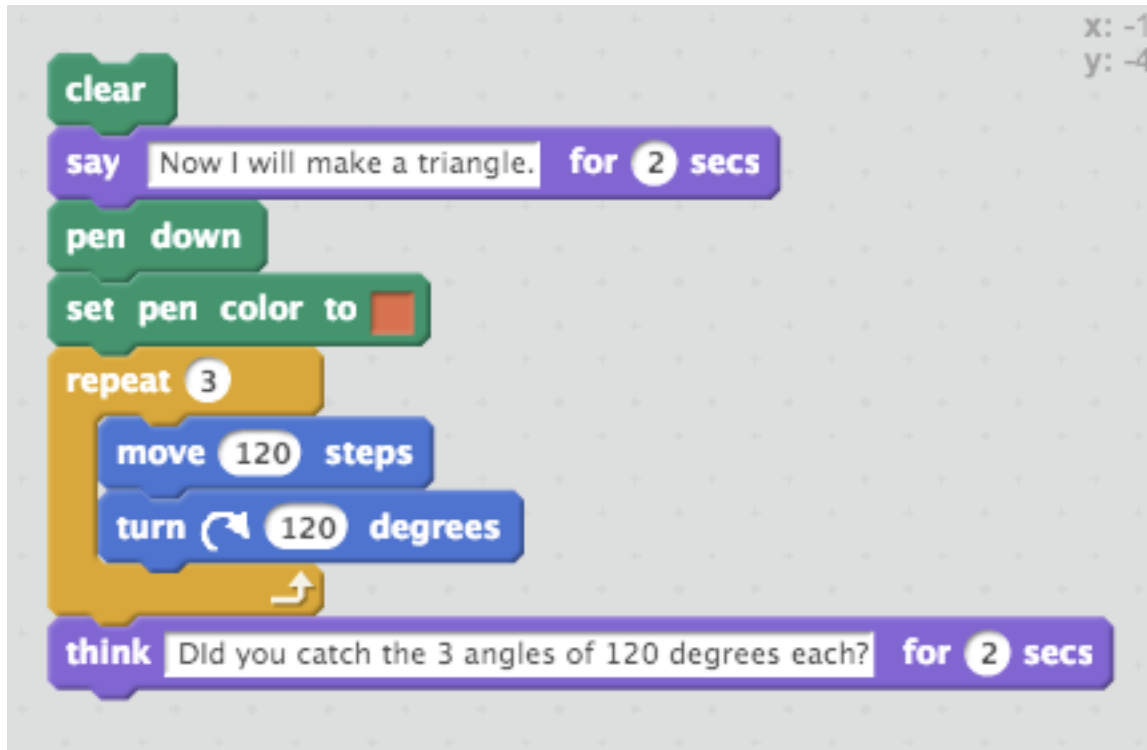


Now let us modify a few things to get a triangle. Why make your students use the SAY and THINK commands? The rationale is to get them to write and explain well, using proper English. That is the only reason that I have added these two

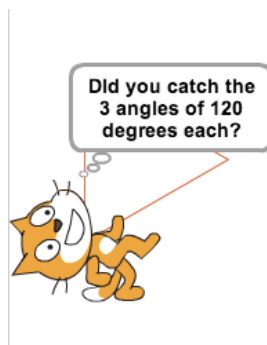


commands, to model for you requiring your students to use quality English to enhance their programs.

Below you will see 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.

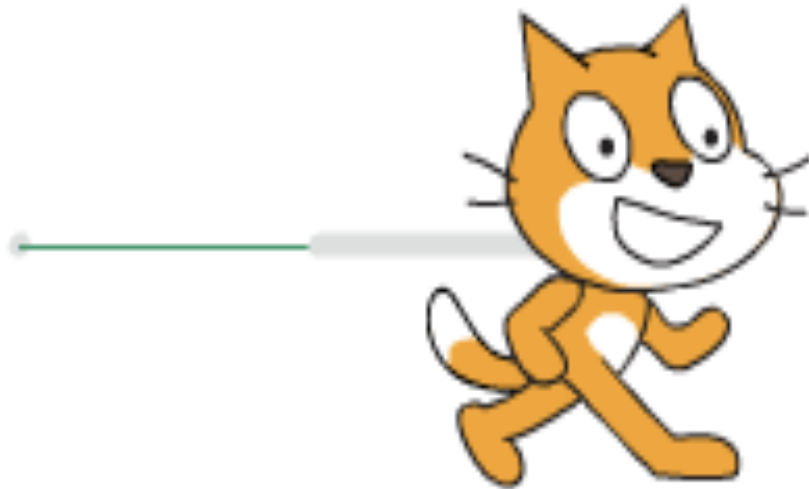
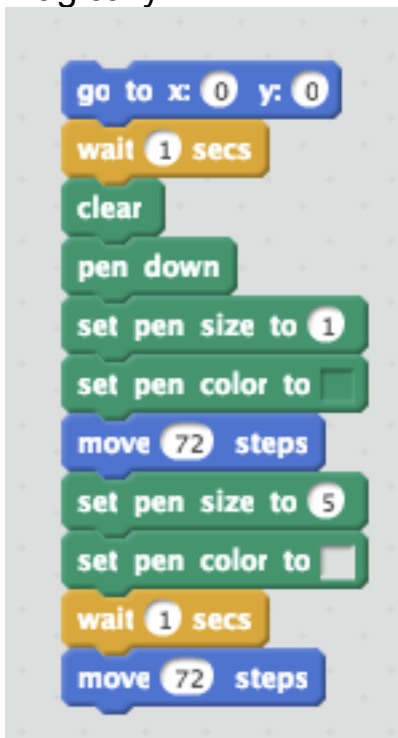


Here is what the THINK command does. Notice the "think" bubble that appears for a designated number of seconds if you like. You gotta love the cute bubble!





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 intuitive, 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 slowly instead of it happening magically.



On the right above you see the result of the program with the ink coming out of the back of the cat's neck. The cat used thin 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.

HW Exercise 1.4 -- Draw a decagon (10 sides). Please name your program "Exercise 1.4 Decagon." Share it!

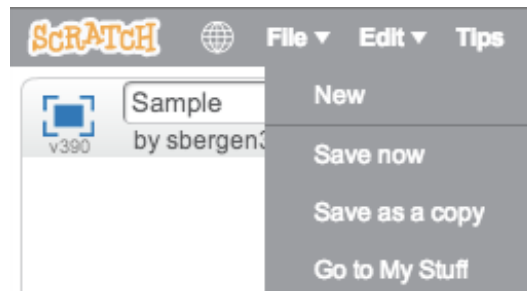
HW Exercise 1.5 -- Draw a polygon with 36 sides. You will need to keep the length of each side small. Please name your program "Exercise 1.5 Polygon With 36 Sides." Share it!

HW Exercise 1.6 -- Pick an uppercase letter of the alphabet and write a Scratch program to create the letter so that it is 100 pixels tall and 50 pixels wide. Please name your program "Exercise 1.6 Uppercase Letter." Share it!



summercore

If you have not figured out how to share your programs with me, then the Plan B is to send me a screen snapshot via email of the code when done. If you need help with screen snapshots for your Mac or PC, I have info at <http://teachingcompany.com/tips> but I am also happy to help you via our weekly 30 minute conversations.



Your program lives in MY STUFF which corresponds to this icon the next time you come back to SCRATCH and your account. Even cooler is the fact that when you look at any program in your MY STUFF library, you can SHARE or UNSHARE any of your programs. If you modify a SHARED PROGRAM there is nothing you need to do. The revised program will be the one that others will see.



By the way, later in this PDF, I show you how to change the CAT to a POINTER that makes it easier to debug programs and see which way you are facing.

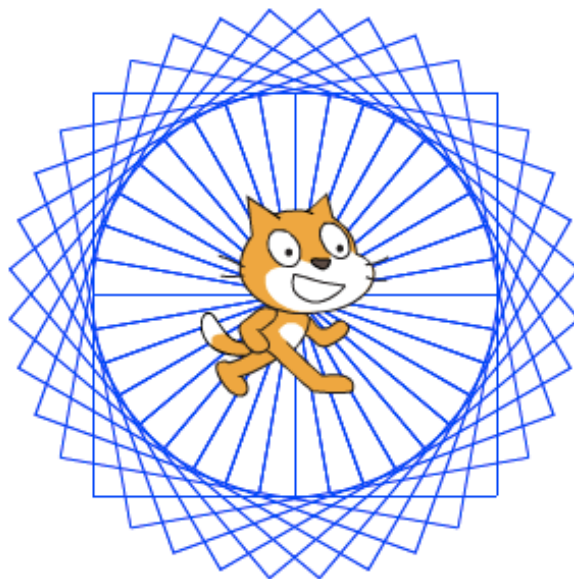
On the next page is a tough challenge that stumps most people, but believe it or not you know enough programming to do it!

IMPORTANT

I encourage you to "stay organized" in this course by maintaining either "a paper notebook" or "an electronic notebook" in which you keep track of

- things you learned
- things you want help on (so you can refer to when we talk each week)

OPTIONAL CHALLENGE 1.65 (not an assignment and not required): Write the program for this design that appears to be 36 squares. If you try it -- even if you don't succeed, please name your program "Exercise 1.65 Spinning Squares." Share it!



If you get frustrated and want to see the solution, it is in my library and is called Lesson 1 Challenge with 36 Squares. My Scratch name is SBergen33 so you can go to the URL of <http://scratch.mit.edu/users/sbergen33/> and my programs. Unfortunately, I have too many and so Scratch allows users to have studios of selected programs. The direct URL for this Lesson 1 challenge is <http://scratch.mit.edu/projects/10294460> but I have put it into a studio for this course called <http://scratch.mit.edu/studios/330558> to make it easier for you.

Each time you access a program from someone else, you can either RUN it or you can REMIX it. If you REMIX it, you can save it in your library and modify it.

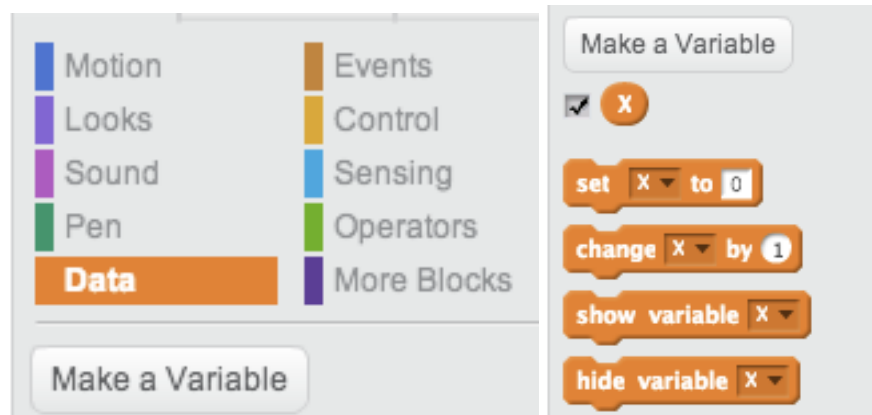
By the way, when you look at someone's library, you are seeing only the programs that the user has chosen to SHARE. The owner of the account chooses to SHARE or UNSHARE any program. Please share your programs! No downside and lots of upside in a course like this.

Okay, I hope you are doing fine. We are now marching forward with one new concept, a few more commands and one more challenge.

A variable is an important part of programming. It is also an important part of pre-algebra, algebra and math in general. Math people like to call variables X, Y, Z, T, and C or use a letter that stands for a word, e.g. T for Total or C for counter. Computer people like to use actual short words for variables such as COUNTER or TOTAL or HOWMANY. Different strokes for different folks; we all have our preferences!

Below is the first sample program that uses a variable to draw a square of variable size.

Here are the new ORANGE commands under DATA:





When you make a variable, you get this new set of 4 commands that you see on the right. The important ones are the SET command and the CHANGE command.

Below you can see that I am adding the starter command with the green flag



so that my program runs when you click the green flag. The first and only use of a variable in this program occurs when you see the ORANGE DATA command called SET SIZE TO ANSWER. Using the DATA option, I created a variable called SIZE. This automatically displays at the top left of the screen where your program is executed.

Now here is the important thing. When you use the BLUE ASK command, the result always goes into the BLUE temporary variable called . This is not a user

choice. The variable  is a special location in Scratch and always corresponds to what was entered via the last ASK.

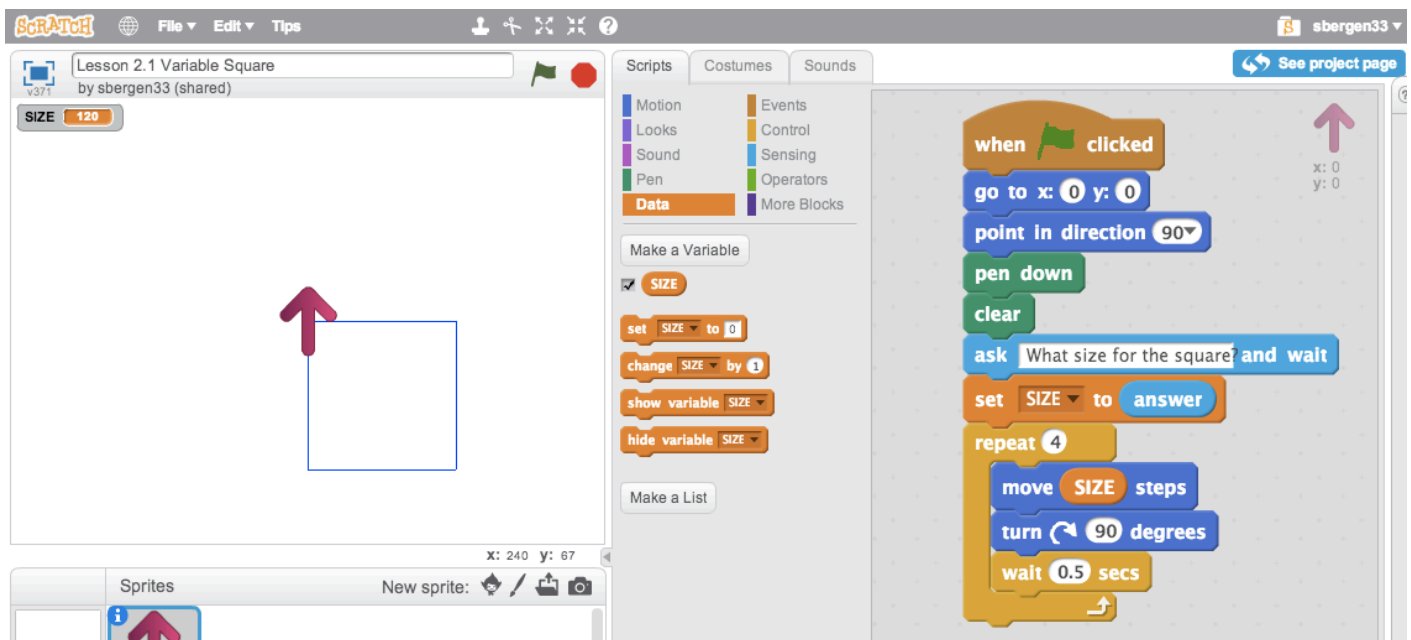
So as a programmer, the standard thing to do is to use the SET command to move ANSWER into a more permanent variable, in this case SIZE. Got it? I hope so, but like anything else, you need to do it yourself from scratch and then repeat it a few times to practice. Think BLUE and ORANGE. The blue command called ASK allows the human to interact with the program and puts the result into the ANSWER variable which you will see right in the blue SENSING set of commands. Meanwhile the ORANGE DATA section is where you make or rename your variables.

• [Arrow and Variable](#) • 9 minutes

<http://youtu.be/YhzaZrO84oo>

• [Change Cat to Arrow](#) • 6 minutes

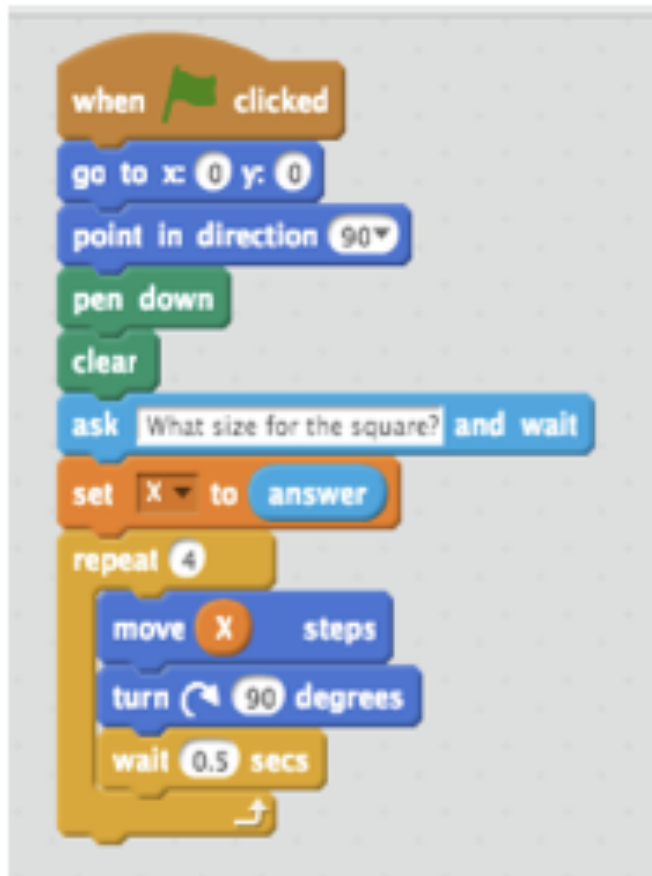
<http://youtu.be/JT2qnciGVJc>



Please notice that I have changed the CAT to a RED arrow pointer which I find much more useful in terms of the themes of directionality. I will show you below and also on video how to do this using COSTUMES. Also notice my personal preference of using WAIT to slow down the action a bit so you can see each side being drawn. And yes, you can use decimals like .5 to wait half of a second.

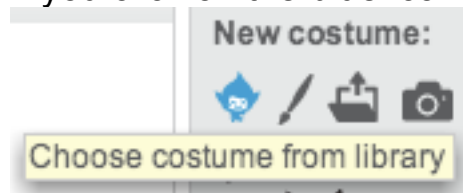


This program below is the exact same program using the variable X instead of the variable SIZE. The ability to rename the variable in DATA is wonderful. I want you to see both styles (math teacher and computer teacher) so you can decide what your own personal preference is when using variables. It is great that you can RENAME a variable and it renames it everywhere!



Let's talk about changing the CAT to my favorite icon, the arrow.

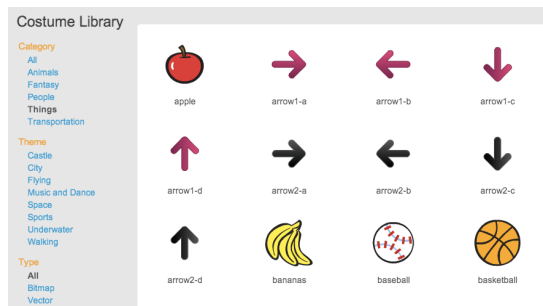
If you click on the blue icon below called CHOOSE COSTUME FROM LIBRARY



you get access to dozens of replacements for the CAT. They are organized by category on the left and my favorite category is THINGS.



summercore



The arrow pointing to the RIGHT is the one I like, either arrow1-a or 2-a. This is the arrow for which the ink that comes out matches your intuition.

HW Exercise 1.7 -- Draw a variable sized triangle where the user can specify the size of each side. Please name your program "Exercise 1.7 Variable Sized Triangle." Share it!

HW Exercise 1.8 -- Reminder to send your picture to me if you have not already done so!

Have a good week. Sorry this lesson is longer than intended but I have been looking forward for a while to beginning our course and would love to get off to a fast start!

Steve



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



summercore

INDEX of HIGHLIGHTS can be found on the last page

The URL for SCRATCH is _____ (page 1)

HW 1.0 Send username via email to me (page 1)

Watch two starter videos (page 1) Square and Ink from Cat's Neck

*** use designated names and SHARE each assigned program ***

HW 1.1 Draw a small and large square (page 2)

Dimensions of Scratch screen are ____ by ____ (page 3)

HW 1.2 Draw a small and large pentagon (page 5)

HW 1.3 Draw a small and large triangle (page 6)

HW 1.4 Draw a decagon (page 8)

HW 1.5 Draw a polygon with 36 sides (page 8)

HW 1.6 Draw an uppercase letter that has dimensions 100 by 50 (page 8)

HW 1.65 OPTIONAL CHALLENGE Spinning Squares (page 9)

Introducing Variables and ASK/ANSWER (page 11)

Two more videos: Arrow and Variable and Change Cat to Arrow (page 12)

HW 1.7 Draw a Variable Sized triangle based on user input (page 14)

HW 1.8 Send me picture if not yet done (page 14)