MSWLOGO Workshop for University of Pennsylvania
put together by Katherine Gibson and Alexander Roederer

Getting Started

- have the kids start the program up
- **draw the "turtle" on the board: triangle**
  - turtle's "head" is the top point of the triangle
  - turtle moves in the direction it's facing
- you can move the turtle forward 100 pixels by typing:
  FORWARD 100 and hitting **ENTER**
- the turtle can also move left or right, for example by 45:
  for left: **LEFT 45**, or for right: **RIGHT 45**
- **draw a coordinate plane on the board**
  - the kids probably know some of this (or can figure it out), so have them help you **fill in commands** (at least in chunks of 45)
- ask them what commands would draw a 100 pixel high square, and write it on the board

Drawing Shapes

- turtle walks around the outside of the shape
  - this means that though a triangle's inside angles are 60 degrees each, the turtle must turn (180-60), or 120 degrees
- have the kids help you figure out the turns to make to draw a triangle (120), pentagon (72), hexagon (60), septagon (51), octagon (45) – **360/# of sides**
  - have the kids figure out the formula needed/provide the names of each shape

Making It Easier (Looping w/ Repeats and Abbreviations)

- instead of typing the command "**FORWARD 100 RIGHT 90**" 4 times to draw a square, we can use **REPEAT**
- so instead, we type **REPEAT 4 [FORWARD 100 RIGHT 90]**
- to make our lives even easier, we can abbreviate the commands
  - so to draw a square we type **REPEAT 4 [FD 100 RT 90]**
- **write them up on the board next to the original commands**

Color

- ask if anyone knows how colors are specified on websites
- each color is specified by the combination of three colors: **red, green, and blue** or just **RGB** (order matters)
- 0 is a lack of that color of light, 255 is a full saturation
  - [0,0,0] is black (no light) and [255,255,255] is white (all light)
- use whole numbers only, between 0 and 255 (inclusive)
  - how to make red? [255, 0, 0]
  - how to make green? [0, 255, 0]
  - what does [100, 0, 100] make? purple
- color can be changed with a command like the following:

SETPENCOLOR [0 112 255]

- or, a shorter version of the command is SETPC:

SETPC [255 127 0]

- you can also color the entire screen one color:

SETSC [253 213 177]

- or set a flood color and fill the area where the turtle is currently:

SETFC [128 0 128]
FILL

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Drawing Spirographs

- ask if anyone in the class knows what a spirograph is
  - show examples on the website
- have everyone type in the following:

REPEAT 60 [REPEAT 4 [FD 90 RT 90] RT 6]

- let the kids play with colors, shapes, repeating, and spirographs for a while – this is the bulk of the workshop
  - once some of them get bored, or want more advanced techniques, move on to functions...

Functions

- functions are a way to define something for the turtle to do
- once a function has been defined, you can simply call it again and again, without having to type out the entire list of commands
- to create a function, simply type TO FUNCTION and hit enter:

TO SQUARE

- a dialog box will pop up, and you can enter as many commands as you would like; when done, click 'cancel' to finish:

REPEAT 4 [FD 100 RT 90]

- now that the function is defined, you can simply type the function name, and the turtle will perform the function's actions:

SQUARE

- you can even use functions inside functions (and on and on):

TO SPIROSQUARE
REPEAT 60 [SQUARE RT 6]

- to erase **all** your functions, use the command ERALL

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LIST OF BASIC COMMANDS

FD 100	Forward 100 pixels
RT 90	Turn right 90 degrees
LT 90	Turn left 90 degrees
BK 100	Move backwards 100 pixels
PU	Pick up the “pen”
PD	Put down the “pen”
CS	Clear the screen
HT	Hide the “turtle”
ST	Show the “turtle”

PENERASE (PE)	Set pen down and set to erase
PENNORMAL	Set pen back to normal

SETPC [r g b]	Set the pen color
SETPENSIZE [# #]	Set the pen size (numbers must match)
SETSC [r g b]	Set the screen color (wipes screen)
SETFC [r g b]	Set a flood color
FILL	Flood the area with set color

ARC	a r	Draws an arc of *a* degrees, with a radius *r* Arc starts behind turtle; turtle stays put
ARC2	a r	Draws an arc of *a* degrees, with a radius *r* Arc starts where turtle is, turtle follows arc

REPEAT # […]	Repeat the commands # times
TO …	Creates a function by the name of ... User must define function in pop-up box
ERALL	Erase all functions

[	R	G	B	]	COLOR NAME	
[	0	0	0	]	BLACK	
[	255	0	0	]	RED	
[	0	255	0	]	GREEN	
[	0	0	255	]	BLUE	
[	255	255	255	]	WHITE	
[	124	10	2	]	Barn Red	
[	237	28	36	]	Pigment Red	
[	246	75	138	]	French Rose	
[	253	213	177	]	Apricot	
[	255	127	0	]	Orange	
[	244	196	48	]	Saffron	
[	255	255	0	]	Yellow	
[	255	250	205	]	Lemon Chiffon	
[	191	255	0	]	Lime	
[	76	187	23	]	Kelly Green	
[	0	102	0	]	Pakistan Green	
[	0	0	128	]	Navy Blue	
[	0	112	255	]	Brandeis Blue	
[	135	206	235	]	Sky Blue	
[	231	254	255	]	Bubbles	
[	201	160	220	]	Wisteria	
[	199	21	133	]	Red-Violet	
[	128	0	128	]	Purple	
[	211	211	211	]	Light Gray	
[	85	85	85	]	Davy's Gray	
[	136	45	23	]	Sienna	
[	150	75	0	]	Brown	
[	193	154	107	]	Camel	