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5001/5003 Intensive Foundations
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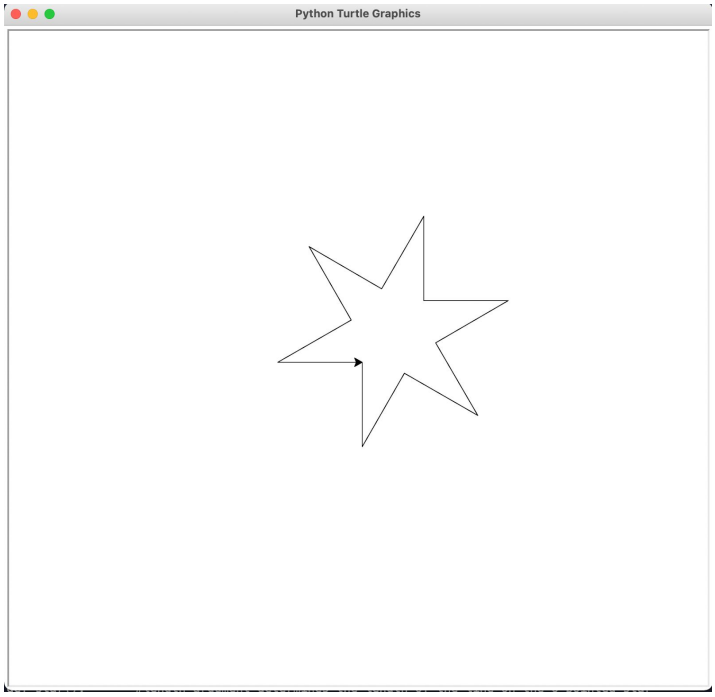
Report 01
Make a Scene Project

The make a scene project's purpose is to practice and realize the breakdown of simple problems and creating algorithms to best fit drawing shapes in turtle. In turtle, we can create simple shapes by providing turtle commands and parameters to determine the size and shape. Creating simple shapes allows us to use them as a foundation for creating a more complex shape and reduces the amount of code we need to re-write. The concepts provided in the project help reinforce breaking down problems to a simple solution and building complexity from the simple solution.

1) **What is a variable?**
    a) A variable is a way we can store a value for use in a program or function.
2) **What is a function and how are they useful?**
    a) A function is a binding that has defined instructions and when run/called those set of instructions will run
    b) Functions are useful as they allow a programmer to define a certain set of instructions to a name and call those set of instructions when they need to run it in their program. Without functions there would be a lot of repeated lines of code.
3) **What is a parameter and how do they affect the generality of a function?**
    a) A parameter is a value or variable we can provide to a function to allow it to be dynamic. When the function is called we can provide arguments which will provide values to the parameter of the function. This allows the function to be more dynamic instead of being a function that is completely static. A great example of using a parameter is giving a function that draws a square and a parameter that allows the size of it to change. Without a parameter the square will always be set to one size which is defined in the function.
4) **How can you use functions to create complexity with less code?**
    a) Functions can create complexity by taking variables and sometimes other functions that are already defined and be re-defined in a new function. By using this method less code will need to be written and prevent redundant lines of code as well.
5) **Who is Sol LeWitt? Do you think you could emulate his drawing style with code?**
    a) Sol LeWitt was an american artist who created sculptures and wall art. His work was associated with conceptual and minimalism art. The majority of his art features geometry and exploring permutations of shapes.
    b) With code, we can most definitely express his artwork. This could be done by defining simple shapes that we need to imitate his art style. From there,

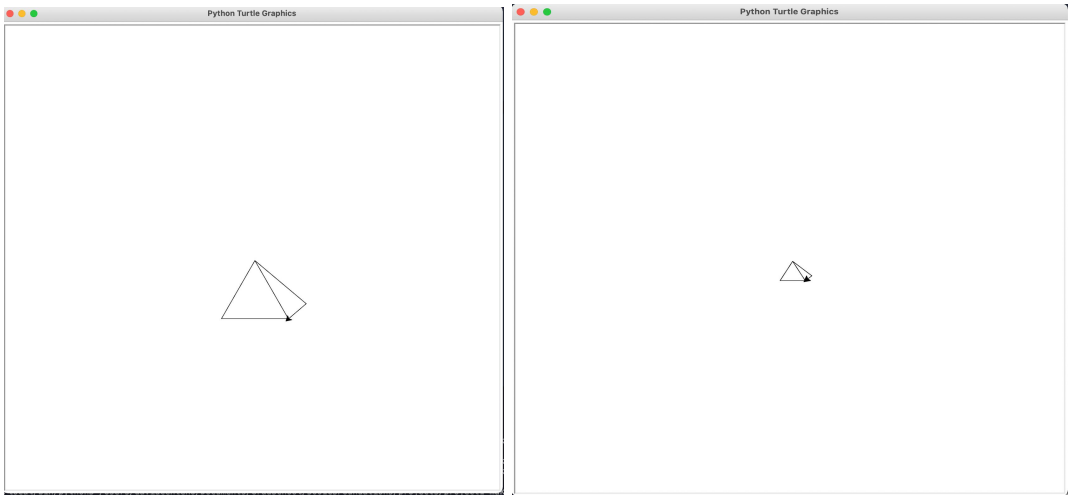
we can use a function that would have an algorithm that would call the shape and further instructions of what to draw.We can then ask the function to repeat a certain number of times to create Sol's pattern of shapes.

Image #1



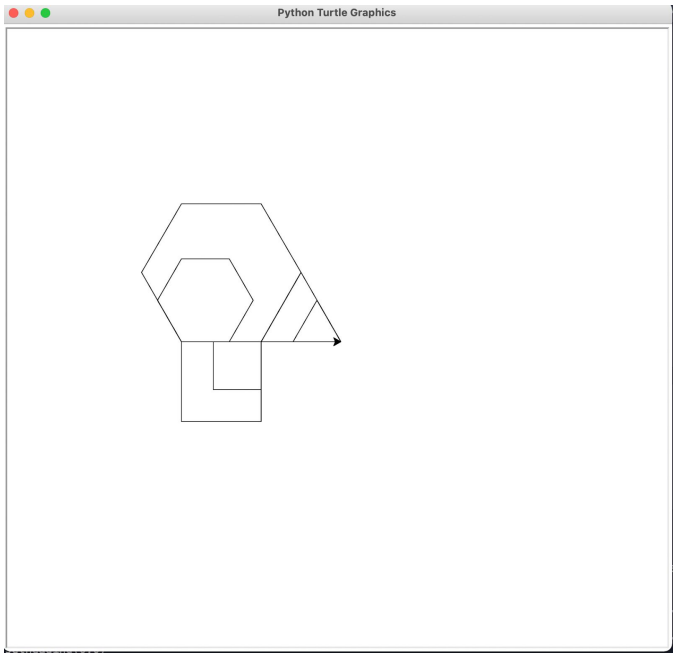
When I first tried creating a star I thought my end result was going to be a five point star. The further I repeated my code I saw that this was turning into a 6 point star. Creating this shape gave me an appreciation of using parameters and using a for loop.

Image #2 & #3



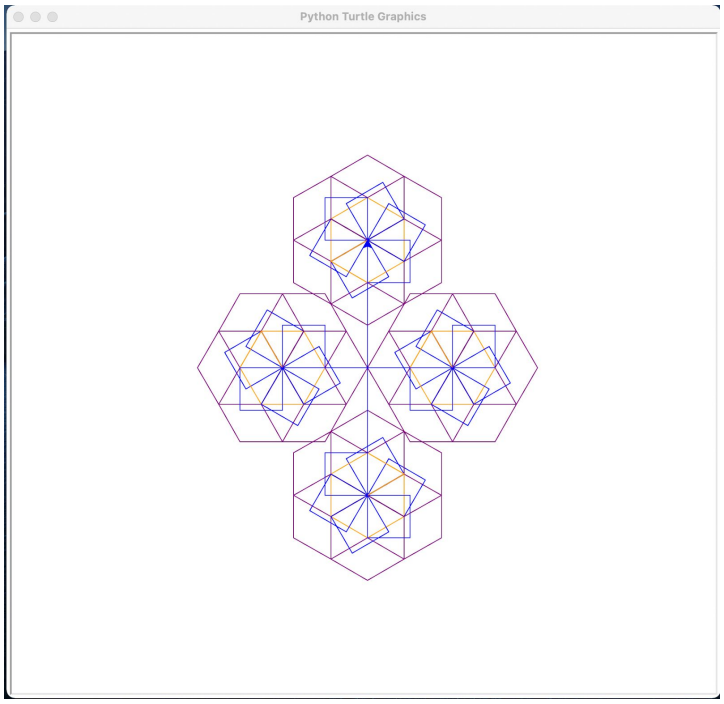
Programming this second image definitely reinforced the importance of setting a variable and using it to scale an object. I'm thinking another way that this could be done is by using a parameter as well.

Image #4



Programming to get the result of image #4 definitely set the importance of using parameters for me. Once the code was set in place it was much easier to change the size of the shapes. Due to the growing complexity of this, I definitely paid more attention to how I left comments in my code.

Image #5



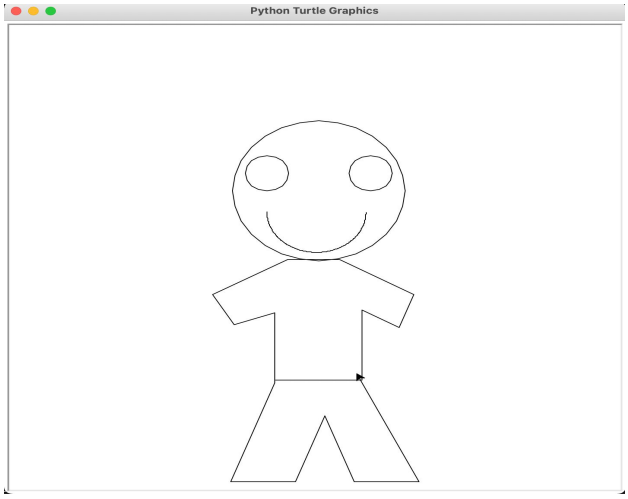
Creating a scene with the shapes I never realized how much fun you can have with shifting a hexagon around. I stumbled on this by accident as I had a square and triangle off set my repeat of shapes. After I saw the shape created, I saw what I wanted to draw with this. The repetition of code led me to research how to use a for loop to reduce the amount of repetition in my code. This was one of the extensions I chose for the project as I could see how this is useful for making more complex scenes and shapes.

Extensions:

For loop: The making of the complex shape as well as the scene showed me how much I needed to repeat lines of code. I saw how messy this could get so I sought after using a for loop. Incorporating the for loop has saved me over thirty plus lines of code I believe. Below is an example of a for loop I used in my code.

```
def cShape(length): #Complex shape using the below three shapes
    square(length)
    triangle(length)
    for i in range (6):
        hexagon(length)
        triangle(length)
        square(length)
```

Person Shape:



As an extension I wanted to make use of the circle function in turtle and try and create something with it. I first made the shirt and pants. I found it rather difficult trying to keep both sides the same size/lengths. I'm sure if I applied more thought and mathematics to this I would have found the solution. Using the circle ( ) function was easy enough to use. I then figured out how to use the setPosition ( ) and setHeading( ) or seth( ) function to place the turtle and reset the position and angle. My last challenge was how to draw a half circle. I tried a few things but could not figure out quite how to do this. I resorted to looking at stackoverflow for assistance. I did find a solution and adjusted for this drawing. Knowing this was borrowing from another person's solution I wanted to make sure I understood how this works. The function works by using a for loop which I've used before but then having the loop run 180 times (half of a circle) and to move

1px forward and adjust by 1 degree over each iteration. This now makes sense to me on how I can create a semi-circle.

Reflection:

Working on this project definitely reinforced the idea of breaking down problems to as simple as possible and building in complexity from there. It has also provided me to see what other problems I may encounter in my code and how to identify and solve them. An example of this was the repetition of code I was using.

Acknowledgements:

Turtle documentation: https://docs.python.org/3/library/turtle.html

For loops solution: https://www.w3schools.com/python/python_for_loops.asp

Semi-Circle Solution in Person Function:

https://stackoverflow.com/questions/29441237/how-to-draw-a-semicircle-in-python-turtle-only

Sol Lewitt information: https://www.theartstory.org/artist/lewitt-sol/ , https://www.thoughtco.com/sol-lewitt-biography-4582474,