How to make slope art

Design:

   1. Choose one of the 5 patterns and transfer to graph paper. (thanks to www.mathcats.com for the templates)
   2. Create your design using only straight lines and from one corner to another.
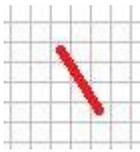
   No   Yes

   3. Get feedback from 3 people and Mr. Wagner to refine your design.

String Art:

   4. Make a copy of the design and tape it to the cork board.
   5. Hammer a nail at each of your points.
   6. Use the string to connect each of your points in the same way as your drawing.

Preparing your drawing

   7. Map out coordinates
       o Coordinates tell us where we are.
       o On a sheet of paper there are only two directions:
           ▪ Left and Right (the X direction)
           ▪ Up and Down (the Y direction)
           ▪ These are only called X and Y by tradition, you can call them anything you want.
       o The center of the graph is called the origin.
           ▪ It has an X of 0 and a Y of 0.
       o Using these pieces of information we can determine all of our points.
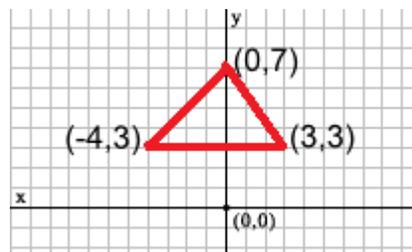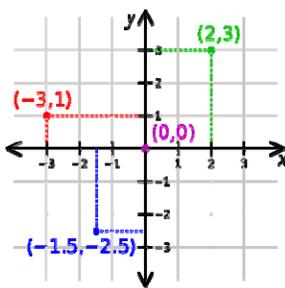
           Courtesy of Wikipedia

   8.   Calculate the slope by hand or using a python program. (see the end of the instructions)
           • Look at your line and find the coordinates for the beginning and the ending points.
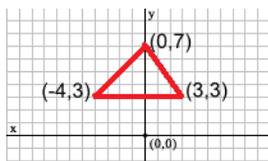
Example:

Beginning = (0,7)
End = (3,3)

- The equation for slope (m) is $m = (y_2-y_1)/(x_2-x_1)$. Choose one of your points to be point 1 and one to be point 2. It doesn't matter which one you choose.

> Point 1 = (0,7) therefore → $x_1 = 0$ $y_1 = 7$
> Point 2 = (3,3) therefore → $x_2 = 3$ $y_2 = 3$

- Calculate:

> $m = (y_2-y_1)/(x_2-x_1)$
> $m = (3-7)/(3-0) = -4/3$
> The slope is -4/3

9. Create an equation for each line utilizing the point slope. $y - y_2 = m(x-x_2)$
   - Use the slope from the previous step, and one of your points and enter it into the equation.

> $y - y_2 = m(x-x_2)$
> $y - 3 = -4/3(x-3)$

   - Simplify

> y-3 == -4/3x + 4 (Distributive Method)
> y = -4/3x+7

10. Determine the domain for each equation so the line begins and ends where it should.
    - Domain is all of the x's for the beginning and ending points.
    - In our example they are $x_1 = 0$ and $x_2 = 3$.
    - So our domain is (0,3) or all of the numbers from zero to three.

VPython

11. Open Python IDLE (Start → Programs → Python → IDLE)
12. Go to FILE and click NEW WINDOW\
13. Follow the example found on my DP on the Slope Art Project Page. (example.py)
14. Type the following to load all of the visual code into your program.

    from visual.graph import *

14. On the next line type the following to create a coordinate plane.

    graph1 = gdisplay(xmax = 20, xmin = -20, ymax = 20, ymin = 20)

15. For each of the lines in your drawing create a new variable with a different name. Make sure you choose names that are easy to not get mixed up. (example: line1, line2, etc)
16. To graph each point for your line we are going to use a "FOR" loop and a special function called "RANGE"
    o The for loop will graph each point for us automatically rather than us having to do it.
    o The range function will tell the program to graph the line from this point to this point.
17. You can download example.py from the Slope Art Project page. Open the file in IDLE. When looking at the code "#" are ignored by Python so you can say whatever you want.
18. Then hit F5 or click RUN and then RUN MODULE.
19. Good luck and be sure to ask for help if you get stuck!
20. For more information on how to customize your graph, go to http://vpython.org/webdoc/visual/graph.html