

Making Mathematical Art for Your Classroom

Dan Anderson

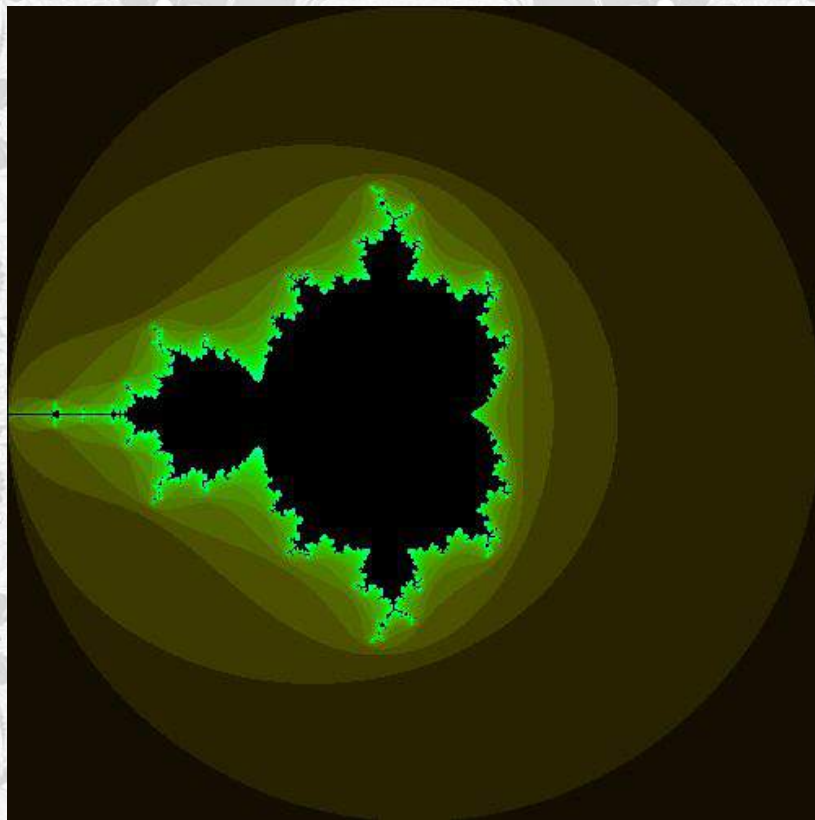
@dandersod & dandersod@gmail.com

recursiveprocess.com

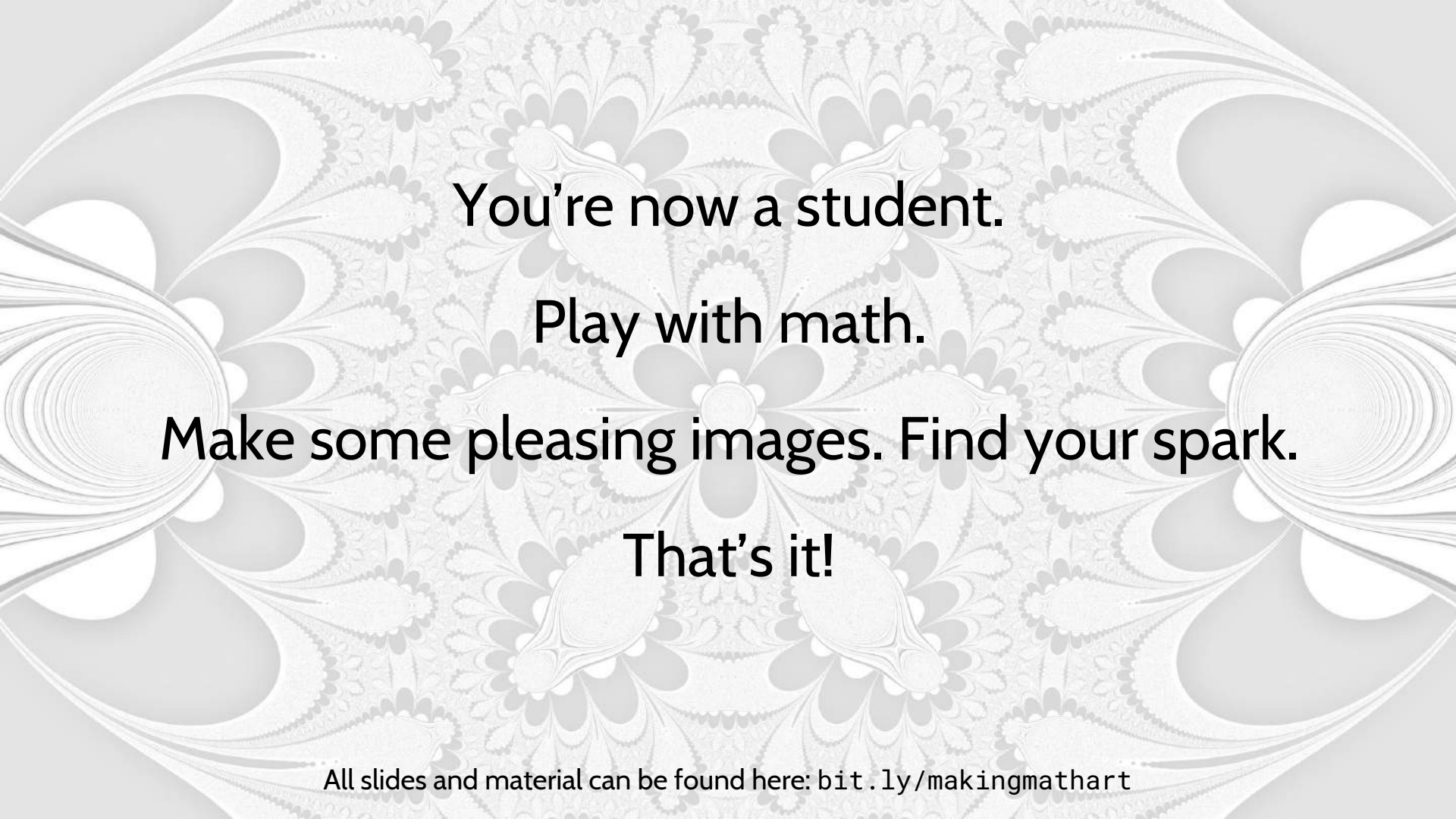
NCTM Annual 2019

All slides and material can be found here: bit.ly/makingmathart

My Spark



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You're now a student.
Play with math.
Make some pleasing images. Find your spark.
That's it!

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Tool 1: Math Art Playground in Desmos

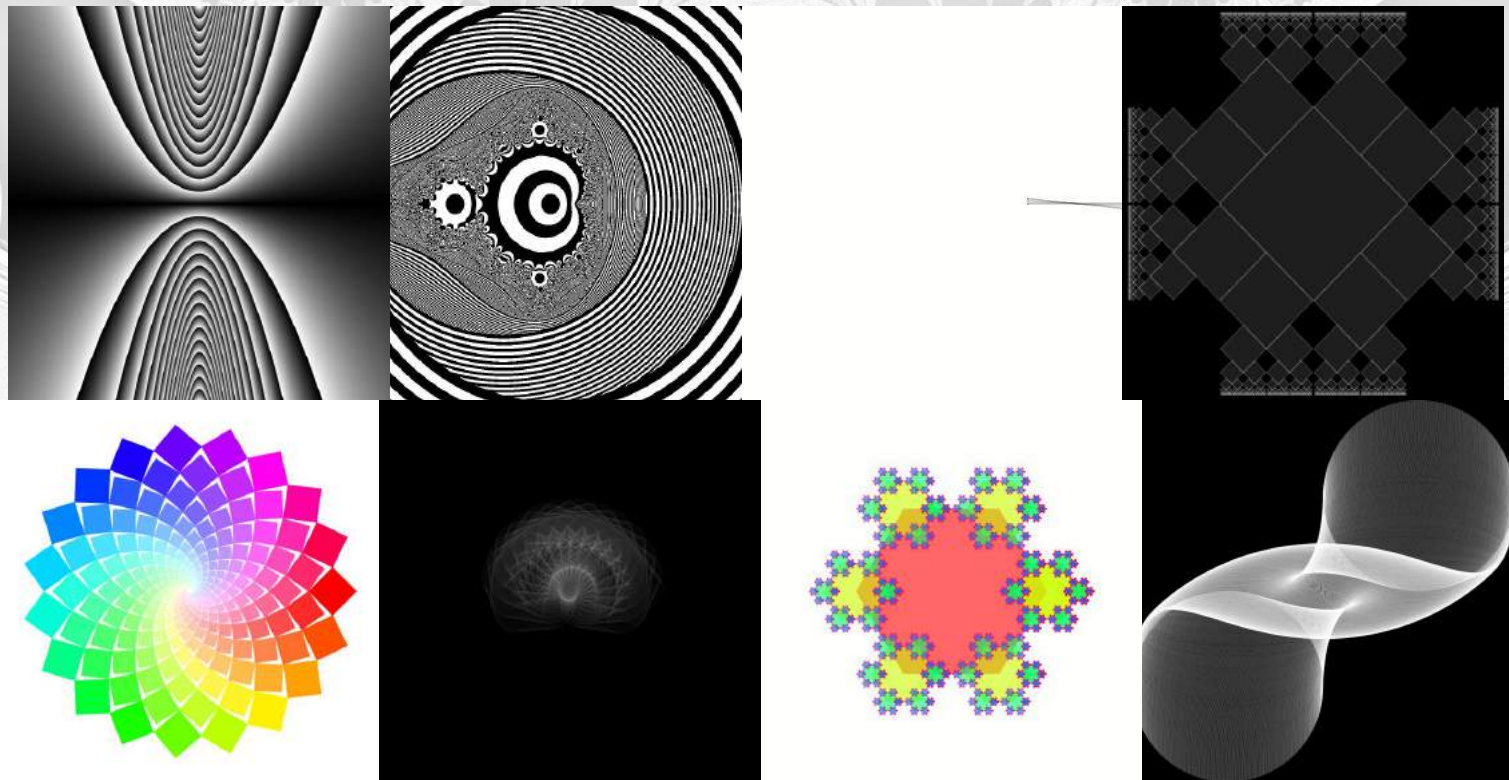
Goto: **student.desmos.com**

Join code: **B4A BER**

(if you login to desmos with a google account then you can return back to this instance whenever you'd like)

[Link to the actual Desmos Activity](#)

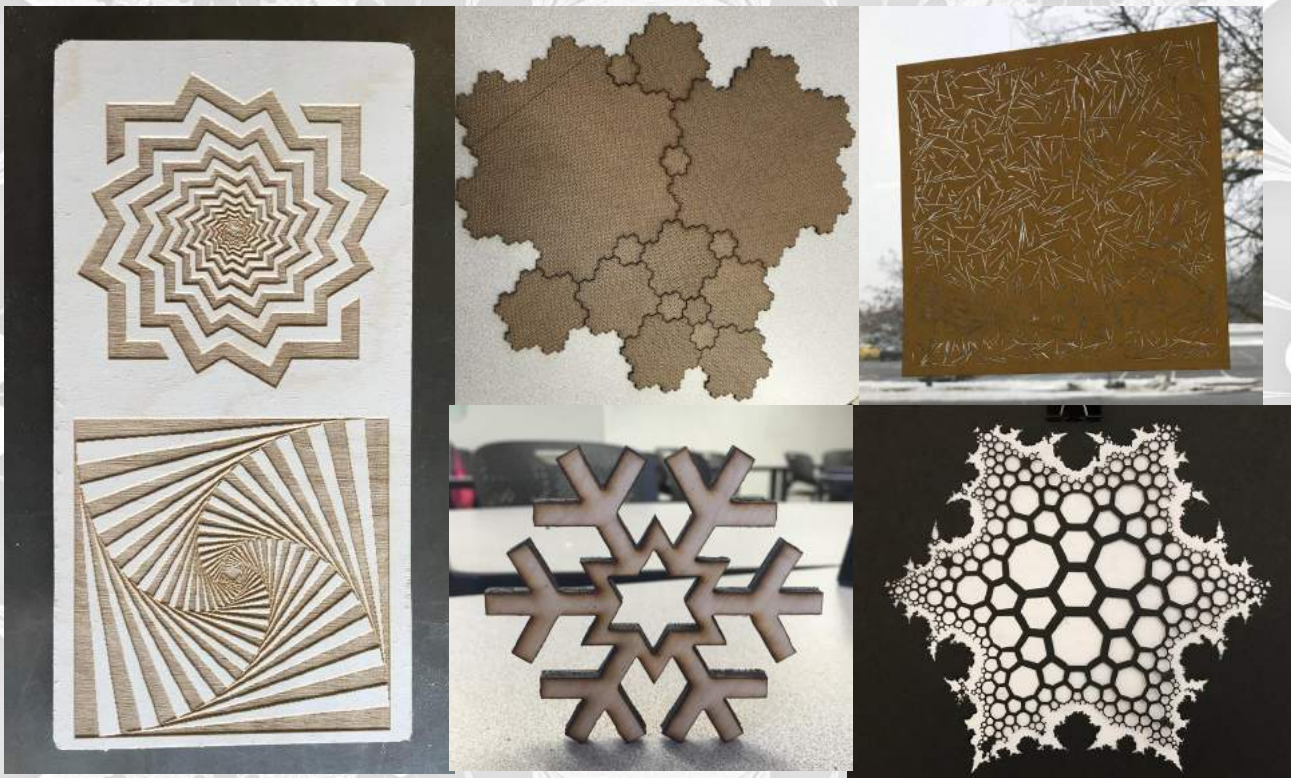
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Software Tools

- [Desmos](#) - online graphing tool (free)
- [Geogebra](#) - online graphing tool (free and allows for easy svg output)
- [Processing](#) - flexible software for learning how to code within the context of the visual arts (free and open source)
- [Inkscape](#) - software for importing and creating vector files for laser cutters / drawing robots (free and open source)
- [Fiji](#) - software for taking a series of 2D images and creating a 3D printable model (free and open source)

Hardware Tools

- [Drawing Robot](#) - Uses pens/pencils/markers to draw vector based artwork (~ \$500)
- [Craft Cutters](#) - Cuts vinyl stickers, paper, cardstock, fabric. Can draw on paper. (~ \$500)
- Laser Engraver / Cutter - Useful for engraving / cutting paper, wood, some plastics, aluminum (~ \$2000)
- 3D printer - Needs some more advanced skills to create 3D models, but can be very useful (~ \geq \$500)

Desmos to Processing

- [Function Grapher Processing Sketch](#) & [Desmos Sketch](#)
 - Vector based
- [Function Inequality Grapher Processing Sketch](#) & [Desmos Sketch](#)
 - Not vector based, but can make pixel perfect inequality graphs
- [Polar Grapher Processing Sketch](#) & [Desmos Sketch](#)
 - Vector based
- [Parametric Grapher Processing Sketch](#) & [Desmos Sketch](#)
 - Vector based
- [Implicit Inequality Processing Sketch](#) & [Desmos Sketch](#)
 - Not vector based, but can make pixel perfect implicit inequality graphs

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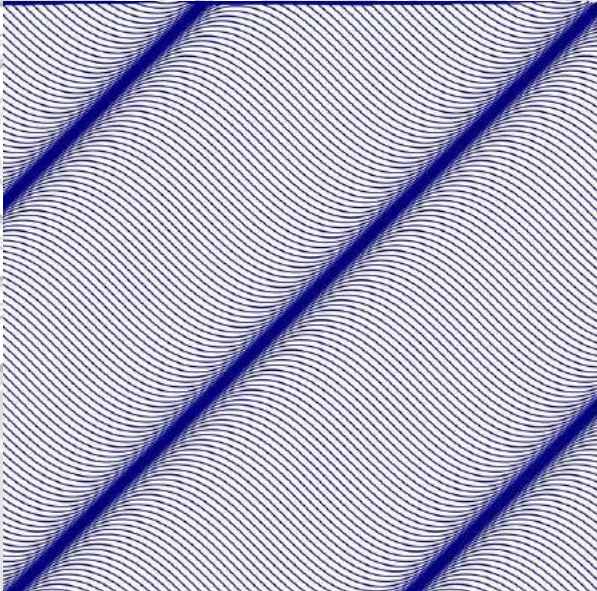
Workflows

- [Workflow: Daily Desmos -> Desmos -> Madeup -> 3D Print](#)
- [Workflow: Desmos -> Processing -> Fiji -> 3D Print](#)
- [Workflow: Desmos -> Inkscape -> Laser Cutter](#)
- [Workflow: Desmos -> Selva3d -> 3D Printer \(in 5 minutes!\)](#)

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#LearnToCodeThroughMath

- [Blog post with more info](#)
- [Twitter search](#)



The image shows a P5.js sketch editor window with the following code:

```
1 void setup() {
2   size(800, 800);
3 }
4
5 void draw() {
6   background(255);
7   stroke(0, 0, 125);
8   noFill();
9   float y, xv, yv;
10
11  for (float a = -11; a < 11; a += PI/40) {
12    beginShape();
13    for (float x = -9; x < 9; x += 18.0/300) {
14      y = sin(x-a) + a;
15      xv = map(x, -9, 9, 0, width);
16      yv = map(y, -9, 9, height, 0);
17
18      if (xv > 0 && xv < width && yv > 0 && yv < height) {
19        vertex(xv, yv);
20      }
21    }
22    endShape(OPEN);
23  }
24 }
25 }
```

Arrows indicate the mapping of mathematical expressions to code variables: $f(x) = \sin x$ maps to `y = sin(x-a) + a`; the range $a = [-8\pi, -8\pi + \frac{\pi}{40}, \dots, 8\pi]$ maps to the `for` loop for `a`; and the expression $y - a = f(x - a)$ maps to the calculation of `y`.

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