The Math of EV3Dprinter
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Circles are polygons with many points

Wikipedia: *polygons = chain of straight line segments*

Two main questions:

Q1: How to plot a straight line?
Q2: How to calculate start/end points for each line?
Q1 How to Plot a Straight Line?

**Calculating the Power**

- Distance = power * time
- or
- \( \text{time} = \frac{\text{distance}}{\text{power}} \)

- \( \text{x-dist} / \text{x-power} \)
- \( \text{y-dist} / \text{y-power} \)

- \( \text{y-power} = \frac{\text{y-dist}}{\text{x-dist}} \times \text{x-power} \)

**Options to drive the motors**

- **In sequence**
  - X first, Y next

- **Parallel – same power**
  - Y done, while X still runs.

- **Parallel – adjusted power**
  - Less power for Y. Same duration.

**For EV3**

- Distance = motor degrees
1. Calculate x-distance and y-distance
2. Identify longer distance
3. Give “base” power to longer distance motor
4. Calculate reduced power for shorter distance motor
5. Run both motors in parallel
Trigonometry is the key

Low degree = more lines

x = sin()

y = cos()

90 degree steps

45 degrees
4

30 degrees
12

10 degrees
36
1. Decide on
   - the “resolution” = degrees per step
   - the “scaling” = radius of the circle

2. In a loop use sin() and cos() to call \texttt{Go\_straight} for each step