Algorithms: Layers of Abstractions

Journal

- Students will translate sample pseudocode into a Python function.
- Students will recognize layers of abstraction for solving a Rubik's cube.
- Students will identify sequencing, selection, and iteration elements in a problem solution

- Can you solve a rubik's cube?

- How did you (or have you tried to) learn?

- Have you taught anyone else?

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Can a computer solve Rubik's Cube? Can you?

Standard Rubik's Cube

Videos:

https://www.youtube.com/watch?v=X0pFZG7j5cE (Cube Stormer 3)

https://www.youtube.com/watch?v=_d0LfkIut2M (Cube Stormer 2)

https://www.youtube.com/watch?v=vhTMm85G9GE (Human World Record)

Fast Facts:
- 43 Billion Billion combinations
- Invented in 1974
- Over 350 Million Sold

One Set of Solution Algorithms:
- www.youcandothecube.com
- http://www.youcandothecube.com/secret-unlocked/solution-stage-one.aspx

youcandothecube.com's solution algorithm

- Stage 1 – Get to know Your Rubik's Cube

Bottom Layer

- Stage 2 - Solve the white cross

- Stage 3 - Solve the white corners

Middle Layer

- Stage 4 – Solve the middle layer

Top Layer

- Stage 5 – Solve the Top Layer
    - 1st step: Make a yellow cross
    - 2nd step: Make all the corners yellow

- Stage 6 – Position the yellow pieces
    - 1st step: Position yellow corners correctly
    - 2nd step: Position yellow edges correctly

Rubik's Cube Abstraction

- Describe it.
  - Study and identify characteristics of Rubik's cubes (number of sides; possible movements; number and types of pieces -- center, edge, corner; ...)

- Predict and share
  - Predict strategies for solving the cube.

- Put in order
  - Take a set of partially solved cubes and place them in "solution order".
  - Justify your choice.

- Learn one layer.
  - Learn how to execute one full step of the solution sequence.

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Doomsday Algorithm

- https://www.youtube.com/watch?v=T_n QG-Bzxsg

- Discuss the algorithm

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How could we ~~Code It?~~

Rubiks

Doomsday

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