

# CEMC Math Circles - Grade 11/12 March 24, 2020 - March 30, 2020 Greedy Algorithms

#### Video

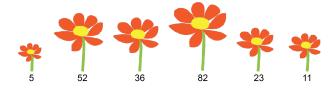
The following presentation was originally published as part of our CEMC at Home resource. Watch the video which discusses algorithmic paradigms and is based on two past problems from the Beaver Computing Challenge (BCC).

## https://youtu.be/XuR1a\_9orJQ

The two problems discussed in the presentation are included below for your reference. Links to the two apps used in the video are also provided should you wish to do some exploration on your own. On the next page, there are links to some other related problems from the BCC which serve as exercises.

## Collecting Pollen

Beever the Bee flies to a field of flowers to collect pollen. On each flight Beever visits only one flower and can collect up to 10 mg of pollen. Beever may return to the same flower more than once. The field contains 6 flowers, each containing a different amount of pollen (in mg) as shown.

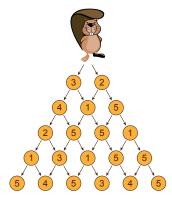


If Beever flies to the field 20 times, what is the maximum total amount of pollen Beever can collect?

App for exploration: https://www.geogebra.org/m/guzzeqn4

#### Collecting Wood

A beaver collects wood while descending from a mountaintop. Each stop contains a different amount of wood as shown.



The beaver can only follow the arrows down. What is the maximum total amount of wood the beaver can collect?

App for exploration: https://www.geogebra.org/m/nsmtks3u

## **Exercises - Related Problems**

Try each of the following past BCC problems. When coming up with solutions, ask yourself if you are using a greedy algorithm. If so, are you sure it works? If not, would a greedy algorithm work?

- 1. Nesting Dolls
- 2. Water Bottles
- 3. Coins and Monsters
- 4. Super Hero
- 5. Mountain Climber
- 6. Translation Machine