Computational Thinking - Messy Problem

For how long and at what rate would it have to snow at FLCC so that, when melted, the water would fill the volume of Canandaigua Lake?

To solve this, I needed a couple pieces of hard information:

1. I need the maximum daily snowfall record of Ontario country.
2. The total surface area of FLCC's Canandaigua campus.
3. The total volume of Canandaigua Lake.

I will take the maximum daily snowfall record of Ontario country, multiply it by the total surface area of the Canandaigua FLCC campus, and then see how many days it takes to fill up the lake.

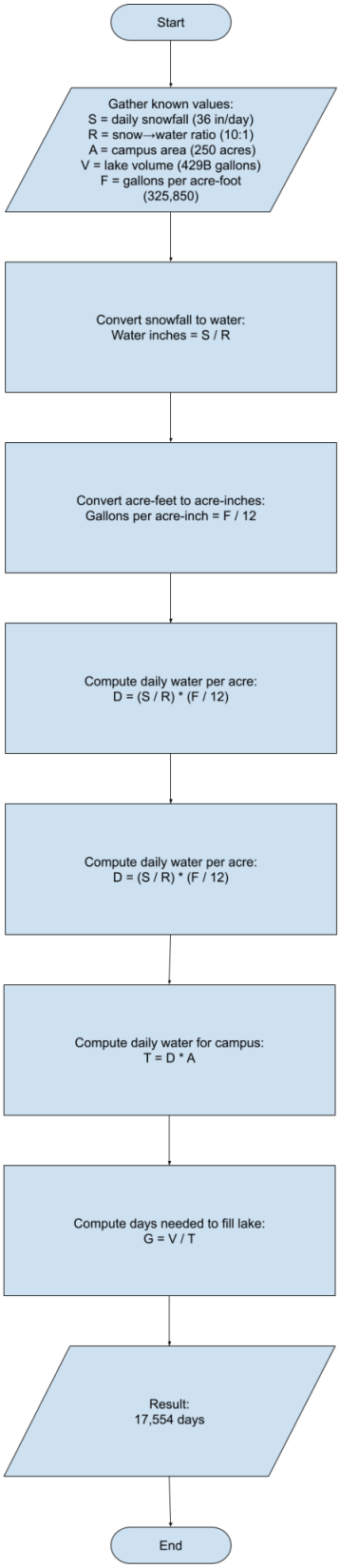
Variables

- S = Maximum daily snowfall: 36 in/day
- R = Snowfall to water conversion ratio: 10:1
- A = Campus area: 250 acres
- V = Lake volume: 429 billion gallons
- F = Gallons per acre-foot: 325,850
- D = Daily water in gallons per acre: (S / R) * (F / 12)
- T = Daily water in gallons of the campus: D * A
- G = Days needed to fill canandaigua lake: V / T

The Formula

- We need to convert snowfall to water-inches (S / R), and convert acre-feet into acre-inches (F / 12), and then multiply them to get the daily water in gallons per acre:
    - D = (S / R) * (F / 12)
    - D = (36 / 10) * (325,850 / 12)
    - D = 97,755
- We then need to multiply the daily water in gallons per acre (D), by the area of the campus (A):
    - T = D * A
    - T = 24,438,750
- Finally, to calculate the days needed to fill the lake, we need to divide the total lake volume (V), by the daily water in gallons per acre (D):
    - G = V / T
    - G = 429,000,000,000 / 24,438,750
    - G = 17,554
- It will take 17,554 days to fill Canandaigua lake at a rate of 36/in a day of snowfall in the FLCC Canandaigua campus.

Flowchart:


Start
Gather known values:
S = daily snowfall (36 in/day)
R = snow→water ratio (10:1)
A = campus area (250 acres)
V = lake volume (429B gallons)
F = gallons per acre-foot
(325,850)
Convert snowfall to water:
Water inches = S / R
Convert acre-feet to acre-inches:
Gallons per acre-inch = F / 12
Compute daily water per acre:
D = (S / R) * (F / 12)
Compute daily water per acre:
D = (S / R) * (F / 12)
Compute daily water for campus:
T = D * A
Compute days needed to fill lake:
G = V / T
Result:
17,554 days
End

Citations

Snowfall Extremes | National Centers for Environmental Information (NCEI)
FLCC Fast Facts | Finger Lakes Community College
Watershed Facts | watershed
What Are Snow Ratios?
FAQs • How many gallons of water are in an acre-foot?