

## 12 DAYS OF CHRISMATH - DAY 12

**Level 1)** The following questions will use the Historical Christmas snowfall data from Statistics Canada. Found here: <https://www.canada.ca/en/environment-climate-change/services/weather-general-tools-resources/historical-christmas-snowfall-data.html>

- (a) How many cities are listed in the dataset?
- (b) Rank the probability of observing a ‘white Christmas’ (1955-2021) in ascending order for the following cities: Lethbridge, Calgary, Quebec, Victoria, Yellowknife.

<b>City:</b>	Lethbridge	Calgary	Quebec	Victoria	Yellowknife
<b>Rank:</b>					

Submit your answers as [a][b]. If you answered 12, and 12345 you would submit your answer as 1212345.

**Level 2)** The following questions will use the Historical Christmas snowfall data from Statistics Canada. Found here: <https://www.canada.ca/en/environment-climate-change/services/weather-general-tools-resources/historical-christmas-snowfall-data.html>

- (a) Find the average number of ‘green Christmases’ (1955-2021) for the following set of cities

{Calgary, Edmonton, Grand Prairie, Halifax, Kamloops}

Round your answer to the nearest whole number.

- (b) Lily the elf chooses 9 cities from the dataset and looks at their snow depth in early years (1960-1984). The cities he chooses are listed below:
- i. Brandon
  - ii. Barrie
  - iii. Edmonton
  - iv. Goose Bay
  - v. Kamloops
  - vi. Kelowna
  - vii. Moncton
  - viii. Windsor
  - ix. Winnipeg

He then chooses a tenth city, and the average snow depth increases to 20 cm for the 10 cities. Which province is the city he choose located? (Write your number as an answer using Table 1.)

- (c) Lolly the elf randomly selects a list of 5 cities from the dataset and looks at their recent average snow depth (1997-2021). He gives you the following information on his list of numbers:
- i. The list has the same maximum and median.
  - ii. The list has a range of 4 cm.
  - iii. The list has a mean of 16 cm.

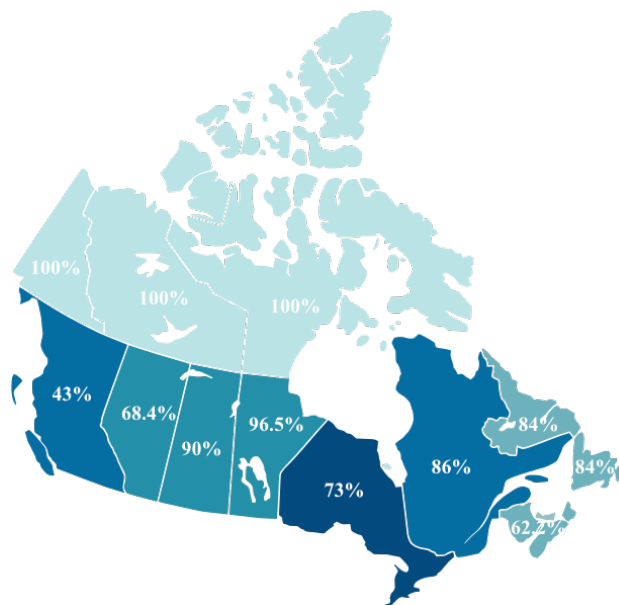
Which province is the city in his list with the minimum average snow depth located? (Write your number as an answer using Table 1.)

Province	Number
Alberta	1
British Columbia	2
Manitoba	3
New Brunswick	4
Newfoundland and Labrador	5
Nova Scotia	6
Ontario	7
Prince Edward Island	8
Quebec	9
Saskatchewan	10

Table 1: Canadian Provinces and Numbers

Submit your answers as [a][b][c],. If you answered 12, Alberta, and Ontario, you would submit your answer as 1217.

**Level 3)** The map below shows the probabilities of observing a white Christmas for each province.



The table below shows the proportions of Canadians in each province:

Province	Proportion (%)
Ontario	38
Quebec	23
British Columbia	13
Alberta	12
Manitoba	4
Saskatchewan	3
Nova Scotia	3
New Brunswick	2
Newfoundland and Labrador	1
Prince Edward Island	0.7
Northwest Territories	0.1
Yukon	0.1
Nunavut	0.1

Suppose a Canadian is selected at random from the population.

- Find the probability that they observe a white Christmas. Round your final answer to the nearest percent.
- Find the probability they are from Alberta, given that they observe a white Christmas. Round your final answer to the nearest percent.
- On Christmas day at 6 am, Larry the elf likes to slurp back a single hot drink. If it's a white Christmas he drinks hot cocoa  $\frac{4}{5}$  of the time, and he drinks a Starbucks peppermint mocha all other times. If it's not a white Christmas he drinks hot cocoa  $\frac{1}{2}$  of the time, and a Starbucks frappe-chino all other times.

Find the probability that Larry lives in Alberta, given that he drinks hot cocoa at 6 am on Christmas morning. Round your final answer to the nearest percent.

Submit your answers as [a][b][c]. If you answered 1%, 2%, and 3%, you would submit your answer as 123.