

Name : \_\_\_\_\_

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### A. RESULTS

1. What is Bear Glacier's coverage in the 1986 image? \_\_\_\_\_ grid squares (a)
2. What is Bear Glacier's coverage in the 2002 image? \_\_\_\_\_ grid squares (b)
3. What is the difference in coverage between 1986 and 2002? \_\_\_\_\_ grid squares (c)

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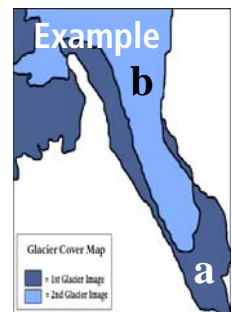
### B. CALCULATING PERCENT COVER CHANGE IN BEAR GLACIER

To calculate the percent change in glacier cover, you are looking for the change (x) that occurred in the original amount (a).

This proportion can be represented mathematically as  $\frac{x}{100}$ .

Set up the proportion for the percent of change equal to the values that represent the 1986 and 2002 glacier cover:

$$\frac{x}{100} = \frac{c}{a}$$



Plug in your values for (a) and (c) and then solve for (x).

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### C. GO THE EXTRA MILE

1. Using the scale from the original satellite images, convert your cover change value from grid squares to miles<sup>2</sup>.

Hint: look at how many grid squares equals 1 square mile and plug that into the formula below.

$$\frac{\text{(grid squares)}}{\text{(grid squares)}} \times \frac{\text{(miles}^2\text{)}}{\text{(grid squares)}} = \text{miles}^2$$

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### C. COMPARING RESULTS

1. Calculate the class average for the percent glacier cover change using miles.

*Record the class percent cover change values here.*

*Total = \_\_\_\_\_*

1. What is the class average for the percent cover change in Bear Glacier? \_\_\_\_\_
2. What was the value you calculated in section B for the percent cover change? \_\_\_\_\_
3. What is the difference between your answer and the class average? \_\_\_\_\_

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### E. EVALUATION

1. How might you improve the accuracy of your map and your calculations? For example, did you trace your cover outline carefully? How accurately did you count the grid squares?
  
2. What effects do you think your method of data collection had on your results?
  
3. If the glacial retreat captured in the satellite images of Bear Glacier is typical of most glaciers, what do you think will happen to the glaciers worldwide in the next 50 years?

## Math help for calculating the percent of cover change:

### Example Problem:

If you have 5 apples....



and you take 2 away...



then you have 3 of the 5 original apples.

**Remember...**You are looking for the amount of **CHANGE**.

$$\text{Change} = (\text{original} - \text{amount at the end}) = (5 - 3) = 2$$

The **ratio** of the **amount changed** to the **original amount** would be expressed as:

$$\frac{\text{amount of change}}{\text{original amount}} = \frac{2}{5}$$

To calculate the **percent change** in apples, you are looking for **change** (x) of the **original** amount you have, which would be (x) of 100%, or  $x / 100\%$ .

Set up the proportion to solve for x:

$$\frac{2}{5} = \frac{x}{100\%} \quad \xrightarrow{\text{solve for } x} \quad \begin{aligned} 5 * (x) &= 2 * 100\% \\ 5x &= 200\% \\ x &= 40\% \end{aligned}$$

### Calculating glacier cover:

This can also be applied to calculating the percent cover change in glacier cover using what you already know about the images:

Original amount of cover = a

Amount of cover that is left after the glacier retreats = b

Change in cover = (original cover - cover at the end) = c

Set up the proportion using the values above:

$$\frac{\text{change}}{\text{original amount}} = \frac{\text{value for } c}{\text{value for } a} = \frac{x}{100\%}$$

Now **solve for x**, which is the percent of cover change:

$$a * x = c * 100\%$$

