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## Population Estimates: Bringing Math and Science Together

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### Driving Question:

How can we count every individual in a large population or in a population that moves around?

Word Bank	
<b>Population</b>	All the organisms that constitute a specific group or occur in a specified habitat
<b>Population density</b>	A measurement of population per unit area or volume
<b>Error</b>	Difference between a computed or measured values and a true or theoretically correct value
<b>Assumption</b>	Accepted existence of a fact or set of facts based on other facts or knowledge

### Part 1 (Engage) What is population and why is it important?

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1. What is a population? Give an example.
  
  
  
  
  
  
  
  
  
  
2. Why is knowing population size important?

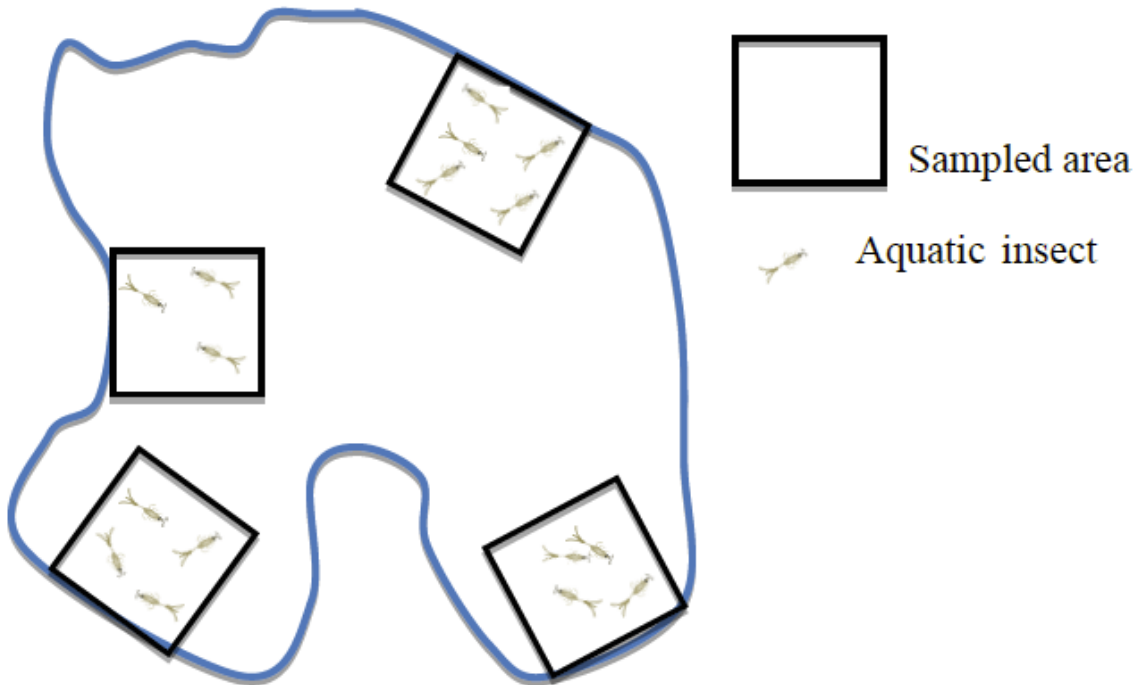


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### Part 2 (Explore) Average Population Density

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3. Come up with a population estimate of aquatic insects for the lake below based on the knowledge that only  $\frac{1}{4}$  of the lake was sampled. So each sampled area represents  $\frac{1}{16}$  of the total area.



- Write one example of a system that you think this technique would work well in.
- Write one example of a system that you think this technique would not work well in.



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### Part 3 (Explore) The Mark-Recapture Method

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Sample Time 1:

- Remove two spoonfuls of beans from the container.
- Using a permanent marker, mark each bean with a noticeable mark.
- Count and record the number of beans in each spoonful in the table below.
- Place all the beans back in the bowl.

	Spoonful 1	Spoonful 2	Total
Number of beans captured			

Sample Time 2:

- Mix the beans in the bowl so the marked beans are evenly distributed throughout the container.
- Remove two spoonfuls of beans from the bowl.
- Count and record the number of beans in each spoonful (marked and unmarked).
- Count and record the number of beans that have a mark in each spoonful.
- Return all of the beans to the bowl.

	Spoonful 1	Spoonful 2	Total
Number of beans captured (marked and unmarked)			
Number of marked beans			





**Calculate:**

$$\text{Population estimate} = \frac{\text{Total beans captured in Time 1} \times \text{Total beans captured in Time 2}}{\text{Total marked beans from Time 2}}$$

