

Investigation 4.A: Variations Great and Small

Question: Are there measurable differences in size among individuals of the same species?

Hypothesis

Make and record a hypothesis about how a particular characteristic might be distributed throughout a population. (For example, would it be evenly distributed?)

Materials

- ruler
- electronic balance
- bean seeds or peas
- graph paper

Experimental Plan

1. With your group, design an investigation to determine the variation in the mass of plant seeds and a second investigation to determine the variation in the length of the human thumb or the width of the human hand.
2. State and record a hypothesis for each investigation.
3. As a group, decide how you will make the appropriate measurements and how many samples you will need. Also decide whether to pool your data with other groups. (Keep in mind that the larger the sample size, the more reliable the results are.)
4. Design a table similar to the one shown in the sample to record data for each investigation.
5. Identify the variables that you will control to ensure that your data are reliable.
6. Show your experimental plan to your teacher before beginning your investigation.

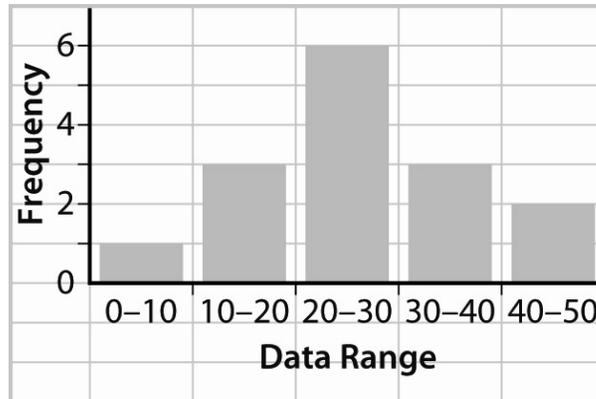
Data and Observations

1. Conduct your investigations, and record your results.
2. Group the data into meaningful categories.
3. Pool data from other groups if required to produce meaningful results.
4. A frequency histogram is a representation of a frequency distribution by means of rectangles whose widths represent class intervals and whose areas are proportional to the corresponding frequencies. Use a computer and spreadsheet software to construct a frequency histogram of data collected.

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Sample Data Table and Histogram

Data range (mm)	Frequency
0–10	1
10–20	3
20–30	6
30–40	3
40–50	2



Analysis

1. Identify the range of the data that you collected for each investigation.

Conclusions

2. What can you conclude about the variations within a population? Is there a “typical” length or mass? Or is the frequency the same for each data range?
3. Would you get a greater or smaller variation in the range of data if all of the individuals sampled came from the same parents—for example, if all of the seeds you measured originated from the same plant?

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HANDOUT		

4. What advantage would size (either large size or small size) have to the population studied? (For example, what advantage would large size have to a seed?)