Graph Choice Chart

What question would you like to explore? Write your question as a complete sentence.

Does your question ask about the variability of a group of data points? (i.e. the range of the data, the shape of the distribution, or what the center of the data is)

- YES:
  - Examples:
    1. Do all high tides rise to the same height?
    2. How variable are wind speeds here?
    3. What is the range and distribution of incomes in the United States?
  - make a FREQUENCY PLOT

- NO:
  - Do you want to compare the variability of all data points in each group to decide if any difference between the groups is meaningful?
    - YES:
      - Examples:
        1. Which of the two car designs is most consistently the fastest?
        2. Is there a meaningful difference in the heights of fertilized and unfertilized bean plants?
      - make a BOX PLOT
    - NO:
      - Are you comparing single numbers that summarize a group? (such as mean, median, or total...)
        - YES:
          - Examples:
            1. Was the total snowfall greater this winter than last winter?
            2. Do cats and dogs have the same average body temperature?
            3. How do the median incomes for the U.S. and Sweden compare?
          - make a BAR GRAPH
        - NO:
          - Does it ask if two numeric factors are correlated?
            - YES:
              - Examples:
                1. Is the fuel efficiency of a car related to its weight?
                2. Are smoking rates correlated with median income?
                3. Given a fixed volume, how are temperature and pressure related?
              - make a SCATTER PLOT
            - NO:
              - Does it ask about how something changes through linear time?
                - YES:
                  - Examples:
                    1. Have summer lake water temperatures warmed over the last ten years?
                    2. How did my weight change over the last 3 months?
                  - make a LINE GRAPH
                - NO:
                  - Does your question ask how a total is proportioned into sub-groups? (Or what proportion a sub-group is of a total?)
                    - YES:
                      - Examples:
                        1. Which circuit accounts for the largest proportion of the electricity use by our household?
                        2. What proportion of U.S. energy comes from wind?
                        3. What proportion of U.S. residents take public transportation to work?
                      - make either PIE CHART or STACKED BAR CHART
                    - NO:
                      - For each group make a

The Maine Data Literacy Project -- Graph Choice Chart
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### Graphing tips

#### Variability questions: Frequency plot (3 kinds)

<table>
<thead>
<tr>
<th>Kind of data:</th>
<th>Dot plot</th>
<th>Box &amp; whisker plot</th>
<th>Histogram</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>One categorical group</strong> and <strong>One numeric variable</strong> (one axis)</td>
<td><img src="image1.png" alt="Atlantic Storms-2013" /></td>
<td><img src="image2.png" alt="Atlantic Storms" /></td>
<td><img src="image3.png" alt="Atlantic Storms" /></td>
</tr>
<tr>
<td>Frequency plots show how variable the group is. Describe variability by range, measure of center (mean, median, or mode), and the shape of the distribution.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Comparing groups questions: Frequency plots OR Bar graph

<table>
<thead>
<tr>
<th>Kind of data:</th>
<th>Frequency plots</th>
<th>Bar graph</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Two or more categorical groups &amp; One numeric variable</strong></td>
<td><img src="image4.png" alt="Atlantic Storms-2012" /></td>
<td><img src="image5.png" alt="Atlantic Storms" /></td>
</tr>
<tr>
<td>Frequency plots allow you to compare how variable the groups are. <strong>Bar graphs</strong> only show a single number (e.g., sum, average, percent or count) for each group.</td>
<td>(To compare two groups of values)</td>
<td>(To compare two summary values)</td>
</tr>
</tbody>
</table>

#### Correlation questions: Scatter plot OR Line graph (for time series)

<table>
<thead>
<tr>
<th>Kind of data:</th>
<th>Scatter plot</th>
<th>Line graph (for time series)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Two numeric variables</strong></td>
<td><img src="image6.png" alt="Atlantic Storms" /></td>
<td><img src="image7.png" alt="Atlantic Storms" /></td>
</tr>
<tr>
<td>Both variables must be continuously numeric. Connect dots only if one variable is linear time (i.e., days, years...) Put time on the X-axis. Show correlation with a ‘line of best fit’.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Proportion (percentage) questions: Pie chart OR Stacked bar graph

<table>
<thead>
<tr>
<th>Kind of data:</th>
<th>Pie chart</th>
<th>Stacked bar graph</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size of a subgroup as a percentage of the whole group</strong> (Total of sub-groups must = 100%)</td>
<td><img src="image8.png" alt="FARM INCOME SOURCES IN 2014" /></td>
<td><img src="image9.png" alt="Sources of Farm Income" /></td>
</tr>
<tr>
<td>In pie charts and stacked bar graphs, all sub-group percentages must total 100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Criteria for an informative graph:

- __Graph type fits the question__
- __Axes are drawn & scaled correctly__
- __Axes are labeled clearly, correctly__
- __Units are given__
- __Data are plotted accurately__
- __Legend is present, if needed__
- __Graph is overall neat & legible__
- __Title and/or caption present__
- __Trend line shown (scatter plot or line graph only)__
- __Graph helps answer the question__

(There are other kinds of questions and other kinds of graphs, and often more than one graph type is useful for a given question. Learn to graph data for these basic kinds of questions first.)