Quantitative Reasoning Lesson – Probability and Statistics Competency
What story does a graph tell you?

TMM011 Learning Outcomes

3.2 Summarize and interpret datasets with regard to shape, center, and spread. Use both graphical and numerical information. Use statistics appropriate to the shape. Students should be able to compare two or more datasets in light of this type of information.

3.5 Justify decisions based on basic statistical (probabilistic) modeling orally and/or by writing coherent statements and paragraphs.

From ***TMM011 – QUANTIATIVE REASONING (Endorsed December 21, 2015)***

Learning Goals

Students should be able to:

- Identify shape, center, and spread for graphical displays of information
- Provide an interpretation of a graph
- Meaningfully comment on others interpretations of a graph

Materials

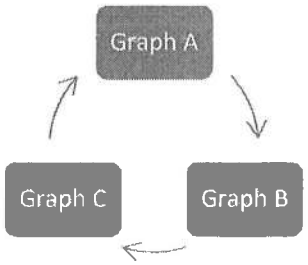
Graphs for student review suitable for posting about a room
Handouts for recording group observations/interpretations and critiques
Large sticky notes for recording interpretations/review next to the graphs
Handout for out-of-class work

Logistics

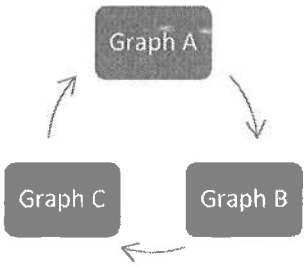
Graphs to be interpreted will be displayed around in the room in stations. The number of stations needed depends on how many students there are and how many groups will be formed. For purposes of this workshop, there will be 2 stations comprised of 3 graphs each. Students will be placed into 6 groups. Each group will have 3-5 students. Three groups will be assigned to each station and will rotate through the graphs at the station. For example, Groups 1, 2, and 3 will be assigned to a station; Groups 4, 5, and 6 will be assigned to a different station. Group 1 will start at Graph A in its station; Group 2 will start at Graph B in that same station; Group 3 will start at Graph C in that same station. Groups 4, 5, and 6 will be similarly assigned in the second station.

Each group will have 5 minutes at their starting graph to identify characteristics of the graph and to provide an interpretation of the graph. At the end of 5 minutes, the groups will rotate within their station to the next graph where they will again have 5 minutes to identify characteristics and provide an interpretation of the graph. The groups will then rotate within their station to the next graph where they will have 5 minutes to identify characteristics and provide an interpretation of the graph.

Station



Station



Once all the groups have visited all the graphs in their station, each group will be asked to record their interpretation next to one of the graphs in their station (Group 1 will record their interpretation for Graph A, Group 2 for Graph B, etc.). Groups will have approximately 5 minutes to record their observations next to the graph they are assigned. After that, each group will rotate to the next two graphs and provide a written commentary or critique of the interpretation offered for that graph. Groups will have 5 minutes per graph for their review of the interpretations.

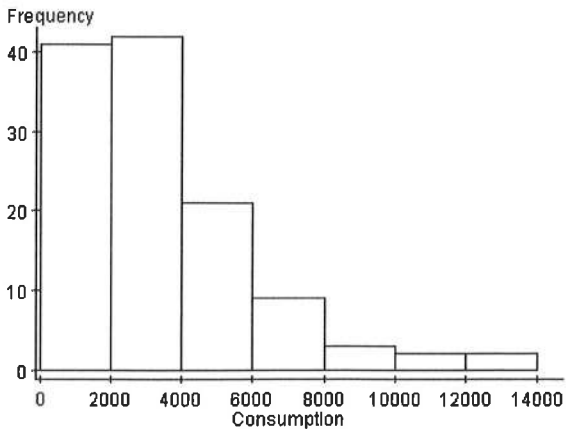
Once the groups have completed their review of the interpretations for each graph, they will rotate back to the graph for which they provided the interpretation. They will record the critiques for further reflection, discussion, and/or out-of-class work.

Sample Graphs for Interpretation

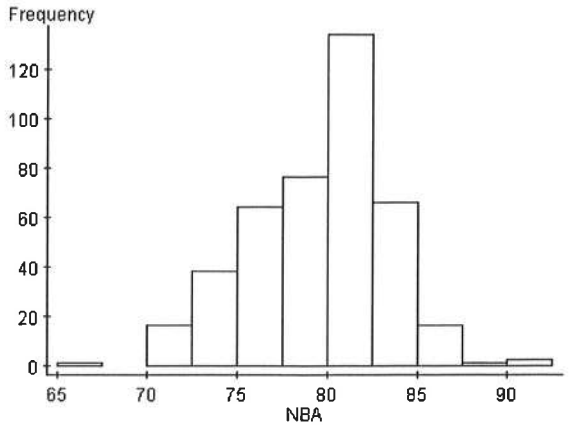
The chamber of commerce recorded the ages of shoppers in a mall on a Tuesday morning. The following stem-and-leaf plot displays the results.

0	1 1 1 2 2 3 3 4 4 4
0	5
1	
1	
2	
2	9 9
3	0 0 1 1 1 2 2 2 4
3	5 5 6 6 6 6 7 7 7
4	0 1 1 2
4	6 7 8
5	3 4
5	8 8 9
6	0 1 2 2 3 3 4
6	5 6 6 7 7

An electric company keeps track of its clients' consumption figures. The results are illustrated by this graph.

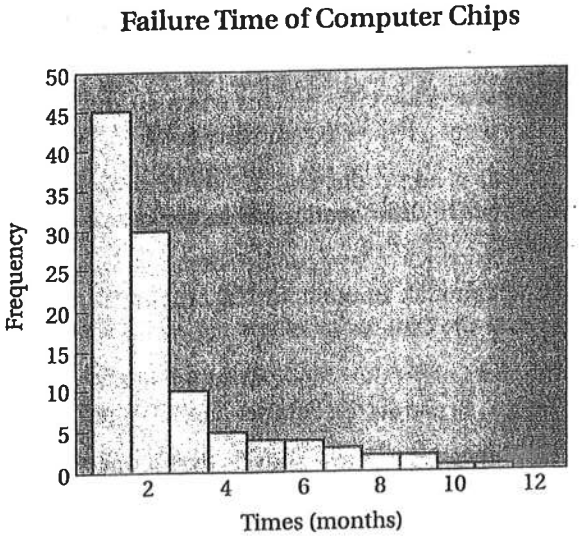


The heights of NBA players are recorded. The heights are displayed in the following graph.



The time until failure for a sample of computer chips that have failed is recorded. Those times are shown in the graph below.

Source: Hand et al., *Handbook of Small Data Sets*, 1994.



Los Alamos National Laboratory collected data about the failures in high-performance computer systems. The number of failures for particular time intervals are illustrated in the following graph.

Source: B. Schroeder and G. Gibson, "A Large-Scale Study of Failures in High-Performance Computing Systems," in *IEEE Transactions on Dependable and Secure Computing*, vol. 7, no. 4, pp. 337-350, Oct.-Dec. 2010.